ACADEMIC YEAR (2021-2022)						
	J.K.K.MUNIRAJAH COLLEGE OF TECHNOLOGY T.N.Palayam(po),Gobi(tk)-638506, Erode(dt).					Metric No 1.3.2
S.No	Name of the course	Course code	programme offering	project work	internship	Number of students
(2021-2022) Regulation-2017						
1	Advanced in Manufacturing Technology	MF5101	MANUFACTURING ENGINEERING	✓	✓	1
2	Computer Integrated Manufacturing Systems	MF5102	MANUFACTURING ENGINEERING	✓		1
3	Advances in Metrology and Inspection	CM5251	MANUFACTURING ENGINEERING	✓	✓	1
4	Materials Testing and Characterization Techniques	MF5016	MANUFACTURING ENGINEERING	✓	✓	4
5	Project Work Phase I	MF5311	MANUFACTURING ENGINEERING	✓		2
6	Project Work Phase II	MF5411	MANUFACTURING ENGINEERING	✓		2

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MANUFACTURING ENGINEERING

2021-2022

S.NO	REG.NO	STUDENT NAME	PROJECT	INTERNSHIP
1	731220410001	MANOJ U	✓	

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PROJECT

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MANUFACTURING ENGINEERING

2021-2022

S.No	Name of the Course that include experiential learning through Project Work/Internship/Field Visit
1	Advanced in Manufacturing Technology
2	Computer Integrated Manufacturing Systems
3	Advances in Metrology and Inspection
4	Materials Testing and Characterization Techniques
5	Project work phase-I
6	Project work phase-II

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MF5101 **ADVANCES IN MANUFACTURING TECHNOLOGY** L T P C
3 0 0 3

OBJECTIVE:

- The students are expected to understand special machining processes, unconventional machining processes, micro machining process, nano fabrication processes and rapid prototyping.

UNIT I UNCONVENTIONAL MACHINING 10

Introduction-Bulk processes - surface processes- Plasma Arc Machining- Laser Beam Machining-Electron Beam Machining-Electrical Discharge Machining – Electro chemical Machining-Ultrasonic Machining- Water Jet Machining-Electro Gel Machining-Anisotropic machining-Isotropic machining-Elastic Emission machining – Ion Beam Machining.

UNIT II PRECISION MACHINING: 10

Ultra Precision turning and grinding: Chemical Mechanical Polishing (CMP) - ELID process – Partial ductile mode grinding-Ultra precision grinding- Binderless wheel – Free form optics. aspherical surface generation Grinding wheel- Design and selection of grinding wheel-High-speed grinding-High-speed milling- Diamond turning.

UNIT III ADVANCES IN METAL FORMING 7

Orbital forging, Isothermal forging, Warm forging, Overview of Powder Metal techniques –Hot and Cold isostatic pressing - high speed extrusion, rubber pad forming, Hydroforming, Superplastic forming, Peen forming-micro blanking –Powder rolling – Tooling and process parameters.

UNIT IV MICRO MACHINING AND NANO FABRICATION 10

Theory of micromachining-Chip formation-size effect in micromachining-microturning, micromilling, microdrilling- Micromachining tool design-Micro EDM-Microwire EDM-Nano fabrication:LIGA, Ion beam etching, Molecular manufacturing techniques –Atomic machining- Nano machining techniques – Top/Bottom up Nano fabrication techniques - Sub micron lithographic technique, conventional film growth technique, Chemical etching, Quantum dot fabrication techniques – MOCVD – Epitaxy techniques.

UNIT V RAPID PROTOTYPING AND SURFACE MODIFICATION TECHNIQUES 8

Introduction – Classification – Principle advantages limitations and applications- Stereo lithography – Selective laser sintering –FDM, SGC, LOM, 3D Printing-Surface modification Techniques: Sputtering-CVD-PVD-Diamond like carbon coating-Plasma Spraying Technique.-Diffusion coatings-Pulsed layer deposition.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of this course the students are expected

1. to produce useful research output in machining of various materials
2. use this knowledge to develop hybrid machining techniques
3. Application of this knowledge to manage shop floor problems

MF5102 **COMPUTER INTEGRATED MANUFACTURING SYSTEMS** L T P C
3 0 0 3

OBJECTIVES:

This course will enable the Student

- To gain knowledge about the basic fundamental of CAD.
- To gain knowledge on how computers are integrated at various levels of planning and manufacturing understand computer aided planning and control and computer monitoring.

UNIT I COMPUTER AIDED DESIGN 9

Concept of CAD as drafting and designing facility, desirable features of CAD package, drawing features in CAD – Scaling, rotation, translation, editing, dimensioning, labeling, Zoom, pan, redraw and regenerate, typical CAD command structure, wire frame modeling, surface modeling and solid modeling (concepts only) in relation to popular CAD packages.

UNIT II COMPONENTS OF CIM 9

CIM as a concept and a technology, CASA/Sme model of CIM, CIM II, benefits of CIM, communication matrix in CIM, fundamentals of computer communication in CIM – CIM data transmission methods – seriel, parallel, asynchronous, synchronous, modulation, demodulation, simplex and duplex. Types of communication in CIM – point to point (PTP), star and multiplexing. Computer networking in CIM – the seven layer OSI model, LAN model, MAP model, network topologies – star, ring and bus, advantages of networks in CIM

UNIT III GROUP TECHNOLOGY AND COMPUTER AIDED PROCESS PLANNING 9

History Of Group Technology – role of G.T in CAD/CAM Integration – part families- classification and coding – DCLASS and MCLASS and OPTIZ coding systems – facility design using G.T – benefits of G.T – cellular manufacturing. Process planning - role of process planning in CAD/CAM

UNIT IV SHOP FLOOR CONTROL AND INTRODUCTION TO FMS 9

Shop floor control – phases – factory data collection system – automatic identification methods – Bar code technology – automated data collection system.

FMS – components of FMS – types – FMS workstation – material handling and storage system – FMS layout- computer control systems – applications and benefits.

UNIT V COMPUTER AIDED PLANNING AND CONTROL AND COMPUTER MONITORING 9

Production planning and control – cost planning and control – inventory management – material requirements planning (MRP) – shop floor control. Lean and Agile Manufacturing. Types of production monitoring systems – structure model of manufacturing – process control and strategies – direct digital control.

OUTCOMES:

At the end of this course the students are expected

1. to produce useful research output in computer integrated manufacturing
2. use this knowledge to develop computer techniques
3. Application of this knowledge to functionalise computer aided planning.

TOTAL: 45 PERIODS

REFERENCES:

1. Chris McMahon and Jimmie Browne, "CAD CAM Principles, Practice and Manufacturing Management", Pearson Education second edition, 2005.Ranky, Paul G., "Computer Integrated Manufacturing", Prentice hall of India Pvt. Ltd.,2005.
2. James A. Regh and Henry W. Kreabber, "Computer Integrated Manufacturing", Pearson Education second edition, 2005.
3. Mikell. P. Groover "Automation, Production Systems and Computer Integrated Manufacturing", Pearson Education 2001.

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CM5251 **ADVANCES IN METROLOGY AND INSPECTION** **L T P C**
3 0 0 3

OBJECTIVES:

- To teach the students basic concepts in various methods of engineering measurement techniques and applications, understand the importance of measurement and inspection in manufacturing industries.
- To make the students capable of learning to operate and use advanced metrological devices with ease in industrial environments.

UNIT I CONCEPTS OF METROLOGY: **8**

Terminologies – Standards of measurement – Errors in measurement – Interchangeability and Selective assembly – Accuracy and Precision – Calibration of instruments – Basics of Dimensional metrology and Form metrology

UNIT II MEASUREMENT OF SURFACE ROUGHNESS: **9**

Definitions – Types of Surface Texture: Surface Roughness Measurement Methods- Comparison, Contact and Non Contact type roughness measuring devices, 3D Surface Roughness Measurement, Nano Level Surface Roughness Measurement – Instruments.

UNIT III INTERFEROMETRY: **8**

Introduction, Principles of light interference – Interferometers – Measurement and Calibration – Laser Interferometry.

UNIT IV MEASURING MACHINES AND LASER METROLOGY: **10**

Tool Makers Microscope – Microhite – Coordinate Measuring Machines – Applications – Laser Micrometer, Laser Scanning gauge, Computer Aided Inspection techniques - In-process inspection, Machine Vision system-Applications.

UNIT V IMAGE PROCESSING FOR METROLOGY: **10**

Overview, Computer imaging systems, Image Analysis, Preprocessing, Human vision system, Image model, Image enhancement, gray scale models, histogram models, Image Transforms - Examples.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of this course the students are expected to

1. Understand the advanced measurement principles with ease.
2. Operate sophisticated measurement and inspection facilities.
3. Design and develop new measuring methods.

REFERENCES

1. "ASTE Handbook of Industries Metrology", Prentice Hall of India Ltd., 1992.
2. Bewoor, A.K. and Kulkarni,V.A.,"Metrology and Measurement", Tata Mc Graw-Hill, 2009.
3. Galyer, F.W. and Shotbolt, C.R., "Metrology for engineers", ELBS, 1990.
4. Gupta, I.C., "A Text Book of engineering metrology", Dhanpat Rai and Sons, 1996.
5. Jain ,R.K.,"Engineering Metrology", Khqanna Publishers, 2008.
6. Rajput,R.K., "Engineering Metrology and Instrumentations", Kataria & Sons Publishers, 2001.

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MF5016 MATERIALS TESTING AND CHARACTERIZATION TECHNIQUES L T P C
3 0 0 3

OBJECTIVE:
This course aims to impart knowledge on various techniques of material characterization.

UNIT I MICRO AND CRYSTAL STRUCTURE ANALYSIS 10
Principles of Optical Microscopy – Specimen Preparation Techniques – Polishing and Etching – Polarization Techniques – Quantitative Metallography – Estimation of grain size – ASTM grain size numbers – Microstructure of Engineering Materials - Elements of Crystallography – X- ray Diffraction – Bragg's law – Techniques of X-ray Crystallography – Debye – Scherer camera – Geiger Diffractometer – analysis of Diffraction patterns – Inter planer spacing – Identification of Crystal Structure, Elements of Electron Diffraction.

UNIT II ELECTRON MICROSCOPY 9
Interaction of Electron Beam with Materials – Transmission Electron Microscopy – Specimen Preparation – Imaging Techniques – BF & DF – SAD – Electron Probe Microanalysis – Scanning Electron Microscopy – Construction & working of SEM – various Imaging Techniques – Applications- Atomic Force Microscopy- Construction & working of AFM - Applications .

UNIT III CHEMICAL AND THERMAL ANALYSIS 9
Basic Principles, Practice and Applications of X-Ray Spectrometry, Wave Dispersive X-Ray Spectrometry, Auger Spectroscopy, Secondary Ion Mass Spectroscopy, Fourier Transform Infra Red Spectroscopy (FTIR)- Proton Induced X-Ray Emission Spectroscopy, Differential Thermal Analysis, Differential Scanning Calorimetry (DSC) And Thermo Gravitymetric Analysis (TGA)

UNIT IV MECHANICAL TESTING – STATIC TESTS 8
Hardness – Brinell, Vickers, Rockwell and Micro Hardness Test – Tensile Test – Stress – Strain plot – Proof Stress – Torsion Test - Ductility Measurement – Impact Test – Charpy & Izod – DWTT - Fracture Toughness Test, Codes and standards for testing metallic and composite materials.

UNIT V MECHANICAL TESTING – DYNAMIC TESTS 9
Fatigue – Low & High Cycle Fatigues – Rotating Beam & Plate Bending HCF tests – S-N curve – LCF tests – Crack Growth studies – Creep Tests – LM parameters – AE Tests-modal analysis - Applications of Dynamic Tests.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of this course the students are expected to be knowledgeable in microstructure evaluation, crystal structure analysis, electron microscopy, Chemical Thermal Analysis, static and dynamic mechanical testing methods.

REFERENCES:

1. ASM Hand book-Materials characterization, Vol – 10, 2004.
2. Culity B.D., Stock S.R& Stock S., Elements of X ray Diffraction, (3rd Edition). Prentice Hall, 2001.
3. Davis J. R., Tensile Testing, 2nd Edition, ASM International, 2004.
4. Davis, H.E., Hauck G. & Troxell G.E., The Testing of engineering Materials, (4th Edition), McGraw Hill, College Divn., 1982.

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THERMAL BEHAVIOUR OF NATURAL FIBER REINFORCED HYBRID COMPOSITE MATERIAL

PHASE II REPORT

Submitted by

MANOJ U

in partial fulfillment for the award of the degree of

MASTER OF ENGINEERING IN

MANUFACTURING ENGINEERING

J.K.K MUNIRAJAH COLLEGE OF TECHNOLOGY

T.N. PALAYAM, GOBI-638 506.

DEPARTMENT OF MANUFACTURING ENGINEERING

ANNA UNIVERSITY, CHENNAI

MAY 2022

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ANNA UNIVERSITY, CHENNAI

BONAFIDE CERTIFICATE

Certified that this Report titled **"THERMAL BEHAVIOUR OF NATURAL FIBER REINFORCED HYBRID COMPOSITE MATERIAL"** is the bonafide work of **MANOJ U** who carried out the work under my supervision. Certified further that to the best of my knowledge and the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

SIGNATURE

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Submitted for the Viva-Voce examination held on 18.05.22

Internal Examiner

External Examiner

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I also thank all the teaching and non-teaching staffs of the Department of Manufacturing Engineering and all my friends for their help and support to complete this project successfully.

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ABSTRACT

This project mainly deals with the analysis of moisture absorption effect and the thermal properties of palmyra fiber reinforced epoxy composites. The hybrid composites were prepared using palmyra fiber and glass fibers with epoxy resin and three different compositions by using hand layup technique. Specimens were cut from the fabricated laminate according to the ASTM (American society for Testing & Materials) standards for different experiments. The thermal property of palmyra fiber composite material can be obtained by means of Dynamic Mechanical Analysis (DMA), Differential scanning calorimetric Analysis (DSCA), Thermal Conductivity test (Physical and Software through Ansys).The thermal degradation properties of the specimen is examined using Thermo gravimetric analysis. Water absorption studies of Palmyra fiber composites shows that the untreated fiber absorbs more water than treated fiber.

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CHAPTER 6

CONCLUSION

Treated and untreated Palmyra fiber sample were submerged in distilled water at different time period 0,2,4,6,8,10,and 12 hours. The Samples were taken out periodically and weighted immediately, after wiping out the water on the fiber, using a precise four-digit balance to find out the content of water absorbed. All the samples weight is measured, previously to be immersed in water. The percentage of water absorption at any time y, Mt, was calculated by the equation.

Untreated fiber absorbed more water than treated fiber. From the water absorption study the alkaline treatment reduce the moisture absorption property on the fiber.

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