

Post Graduate Diploma in Advanced Manufacturing Technology (PGDAMT)

SEMESTER I

Sl. No.	Course Code	Course Title	Hours/Week			Credit Points
			Lecture	Tutorial	Practical	
1	ENG-CMERI-2-2120	Theory of Manufacturing Processes & Systems	2	0	2	3
2	ENG-CMERI-1-2121	Near-net-shape Manufacturing	1	0	4	3
3	ENG-CMERI-1-2122	Precision Measurement & Quality Assurance	1	0	4	3
4	ENG-CMERI-1-2123	CAD/CAM	1	0	4	3
5	ENG-CMERI-2-2108	Computer Programming & Numerical Methods	2	0	2	3
6	ENG-CMERI-1-2149	Seminar	0	1	0	1
Semester Credit Points						16

SEMESTER II

Sl. No.	Course Code	Course Title	Hours/Week			Credit Points
			Lecture	Tutorial	Practical	
1	ENG-CMERI-1-2125	Prototype Assembly & Maintenance	0	2	12	8
2	ENG-CMERI-1-2150	Project Work and Viva-voce	0	2	16	10
Semester Credit Points						18
Total Credit Points						34

COURSE DETAILS

ENG-CMERI-1-2120	THEORY OF MANUFACTURING PROCESSES AND SYSTEMS	L-T-P-C : 2-0-2-3
<p>Introduction: Overview of Machining Technology, Theory of Chip Formation in Metal Machining, cutting tools and materials.</p> <p>Conventional Manufacturing Processes: Different types of material removal processes, Joining & Forming processes, Machine tools & their structure.</p> <p>Non-Conventional Manufacturing: Electrical Discharge Machining, Electro Chemical Machining, Laser Assisted Machining, Forming and joining.</p> <p>Finishing and Polishing Processes.</p> <p>Production Planning and Control: Process planning & Scheduling, Inventory Control, Material and Capacity Requirements Planning, Just-In-Time and Lean Production.</p> <p>Introduction to Micro Machining.</p> <p>Experimentation and hands-on for understanding the machines and manufacturing processes, extensive practical study will be carried out.</p>		
ENG-CMERI-1-2121	NEAR NET SHAPED MANUFACTURING PROCESSES	L-T-P-C : 1-0-4-3
<p>Metal Casting: Casting processes, Methoding, Casting defect and salvaging and Solidification of Metal and composite.</p> <p>Metal powder processes: Fundamentals of Powder Metallurgy, Metal Injection molding, Powder forging and Sintering.</p> <p>Heat treatment: Austempering, Solutionising and ageing, material testing.</p> <p>Extensive experiments with related processes covered in theoretical classes for better understanding through practical training.</p>		
ENG-CMERI-1-2122	PRECISION MEASUREMENT AND QUALITY ASSURANCE	L-T-P-C : 1-0-4-3
<p>Basics of measurement & Important terms: standards, scales, error, precision, accuracy, inspection and calibration, measuring instruments and their uses, effects of environment in measurement.</p> <p>Coordinate measuring machine (CMM): Its major types and elements, coordinate systems, process, probes and softwares, prismatic component inspection and reverse engineering, causes of parametric errors of CMM and its evaluation.</p> <p>Laser interferometry: Principle in measurement, elements of laser interferometer, measurement of position, straightness, squareness, flatness and angular, performance evaluation CNC machine by laser measurement system and auto error compensation.</p> <p>Surface texture: Surface texture measurement and its importance, instruments used for surface texture measurement, filtering, surface texture parameters, surface data analysis.</p> <p>Machine vision: Machine vision system, principle of working, fields of machine vision system, gray scale image processing techniques, binary imaging, mathematical morphology for shape analysis, photogrammetry.</p>		

Quality Assurance: Measurement system analysis, quality assurance through gage R & R study, process capability indices, one sided and two sided specifications, statistical control of processes, control charts - X bar, s and p, uncertainty of measurement.

Hands-on on study and use of standards and instruments. Extensive practical training with related measurement techniques covered in theoretical classes for better understanding.

ENG-CMERI-1-2123

**COMPUTER AIDED DESIGN AND MANUFACTURING
(CAD/CAM)**

L-T-P-C : 1-0-4-3

Introduction to CAD/CAM: Definition, Historical development of CAD/CAM, Evolution of CAD, Exposure to different CAD platforms, Exposure to different formats of data exchange in CAD, Integration of CAD with manufacturing, Advantages of CAD/CAM.

Concept of machine centers: Principles of Numerical Control, Types and classification of CNC Machine Tools, Features of CNC Systems, Direct numerical control (DNC), Elements of CNC viz. ball screws, rolling guide ways, structure, machining centers and interpolators, drives and controls, standard controllers, control resolution, spatial resolution, accuracy, repeatability, compliance.

CNC programming: Machine coordinate systems, Planning for NC operations, Work holding for CNC operations, APT, Manual ISO Part Programming, Subroutines, Compensation and Offsets, Canned Cycle, Part modeling in CAD/CAM software, Pre-processing of a part model for CNC machining, Tool path generation and simulation for CNC machining.

Economics and Maintenance: Factors influencing selection of CNC Machines, Cost of operation & commissioning of CNC Machines, Maintenance features and Preventive Maintenance of CNC Machines.

Flexible Manufacturing Systems : Concept of Manufacturing Cell, Single Machine Cell, Flexible Manufacturing Cell, Pallet Changers, Automatic Tool Changers, Part Buffers, Flexible Manufacturing Systems (FMS), Typical FMS layouts, Advantages and disadvantages of FMS, Concept of Additive Manufacturing and Rapid Prototyping.

Hands-on on study and extensive practical training on 3D modelling, selection of machining strategies, tool path generation, machining simulation, data transfer techniques including automatic tool changing operations in vertical machining center and CNC lathe covered in theoretical classes for better understanding

ENG-CMERI-2-2108

Computer Programming & Numerical Methods

L-T-P-C : 2-0-2-3

Computer Programming: Introduction of C, Operators, Conditional statements and loops, Arrays, Functions, Structures and Unions, Pointers, Files handling.

C++ Overview, Classes in C++, Overloading, Inheritance, Overview of visual C++

MatLab - Basic, Matrix operations and functions in MATLAB, MATLAB scripts and functions (m-files) Simple sequential algorithms. Reading and writing data.

Numerical Methods :Introduction, finite floating point arithmetic, catastrophic cancellation, chopping and rounding errors; Solution of nonlinear equations; bisection, Newton's & Muller's method, fixed point iteration;

Numerical optimization, Golden section search, Newton's method optimization; linear algebraic

equations; forward Gaussian elimination, pivoting, scaling, back substitution, LU-decomposition, norms and errors, condition numbers, iterations, Newton's method for systems, computer implementation; Interpolation- Lagrange, Newton & inverse ;

Numerical Integration; finite differences, Newton cotes, trapezoidal, Simpson's rule, extrapolation, Gaussian quadrature; Numerical solution of ODE; Euler's method, Runge-Kutta method, multi-step methods, predictor-corrector methods, rates of convergence, global errors, algebraic and shooting methods, boundary value problems, computer implementation.

ENG-CMERI-1-2125

PROTOTYPE ASSEMBLY & MAINTENANCE

L-T-P-C : 0-2-12-8

Practical training on limits-fits and tolerances for better understanding on assembly requirements of two mating parts including hands on study on measurements and error budgeting of assembled machines/systems.

Hand on study on manufacturing of critical miniature components having micro-nano scale geometries. Assembly, Inspection Testing & performance evaluation of micro machines including system engineering.

Practical training on product –process design starting from CAD data preparation, slicing, tool path generation & layered deposition of metals to build components by bottom-up approach manufacturing.

Workshop practices including CAD design, process planning, scheduling, manufacturing & inspection of live components.

Practical training on 3D modeling, selection of machining strategy, tool path generation, data transfer and operation of CNC machine for manufacturing of critical components.

Casting simulation, training on sand mould preparation, metal casting and finishing of live components.

Hands on study on range of heat treatment processes including solutionizing and austempering of cast components.

Hands on study and extensive practical training powder metallurgy and powder injection moulding for manufacturing of small and complex components and assembly plastic parts.