

COURSE PROSPECTUS

Name of the Group: CAD/CAM

Name of the Course: P.G. Diploma Course on Digital manufacturing

Course Code: CAD 700

Starting Date: 27th Mar 2023

Duration: 24 Weeks – 720 Hours (@6 hours/day)

Course Coordinator: Mr. E. Leelakrishnan, Senior Consultant, Mob: 9176030058

No. of Seats: 12

Preamble: In the era of Industry 4.0, technologies keep on be upgrading and capacity building of the required manpower is of high demand. Industry 4.0 has various sectors involved with it; one such sector is Digital Manufacturing. This Digital Manufacturing sector is a combination of various domains like CNC, Additive Manufacturing, IIoT, Industrial Automation, Industrial Robotics, etc. This PG Diploma Course will provide the hands-on training for the individual in working with the Digital Manufacturing Sector.

Objective of the Course: This course aims to mobilize engineering graduates to understand and implement digital technologies in modern industries. The course provides the opportunity to assimilate the existing digitized manufacturing technologies and dispense the latest and future technologies the industry is adapting. The course is structured to make the trainees competent enough to adapt to the ongoing changes in the field of digitization of the manufacturing industry by providing comprehensive training and knowledge in Digital Manufacturing technologies

Outcome of the Course: By the end of this course, the trainees will be able to

- Program manually and automatically generate programs for any complex part machining
- Implement CNC technologies for applications other than machining
- Conceptualize, design and create any product using additive manufacturing
- Comprehensively design for additive manufacturing
- Operate and use different 3-D printing technologies as per-requisites
- Automate an industrial set-up according to the requirements using PLC controls
- Program and actuate robots for factory applications
- Implement 'industrial internet of things' for specific small-scale industrial applications.

Expected Job Roles:

- Engineer/ Lead Engineer/ Senior Engineer/ Project Engineer (3DPAM)
- Supervisor (CNC)
- IIOT Developer
- DfAM Engineer
- Robotics Engineer
- Industry 4.0 Lead Engineer
- Automation Engineer

Course Structure:

Sl. No	Module Title	Duration (Hours)			Credit	
		Theory	Lab	Total	Theory	Lab
1	Introduction to CNC technology	60	0	60	2.50	0
2	Application of CNC technology	30	30	60	1.25	0.63
3	Introduction to additive manufacturing	15	45	60	0.63	0.94
4	Additive Manufacturing Technologies	45	0	45	1.88	0
5	Design For additive manufacturing	15	45	60	0.63	0.94
6	Industrial Automation	30	30	60	1.25	0.63
7	Industrial Robotics	45	45	90	1.88	0.94
8	Industrial Internet of Things (IIoT)	45	45	90	1.88	0.94
9	Domain Specific Project work	10	50	60	0.42	1.04
10	Integrated Project	11	94	105	0.46	1.96
11	Interpersonal skills	30	0	30	1.25	0
	Total Duration/Credits	336	384	720	22	

Other Contents

I. Course Fees:

General Candidates: Course fee is Rs. 50,000/- + all taxes as applicable

SC/ST Candidates : Limited seats are reserved for SC/ST candidates as per Govt. of India norms on merit basis, and tuition fee is waived for these candidates.

However they are required to remit an amount of **Rs. 5,000/- as Advance caution/security deposit**. This amount will be considered as caution/security deposit and will be refunded after successful completion of the course. If the student fails to complete the course successfully, this amount along with any other caution/security deposits by the student will be forfeited.

Module wise Course Fee

Modular admission is also possible

CAD 700 : P.G. Diploma Course on Digital manufacturing						
Module & Course Code		Module name	Duration (Weeks)	Fees (for General candidates)	Payable by SC/ST candidates admitted under reservation quota	Prerequisite
Module I	CNC 001	Introduction to CNC technology	2 Weeks – 60 Hours (@6 hours/day)	4,167 Excluding GST	Rs.417/- (refundable after successful completion of course)	Nil
Module II	CNC 007	Application of CNC technology	2 Weeks – 60 Hours (@6 hours/day)	4,167 Excluding GST	Rs.417/- (refundable after successful completion of course)	Nil
Module III	AM 001	Introduction to additive manufacturing	2 Weeks–60 Hours (@6 hours/day)	4,167 Excluding GST	Rs.417/- (refundable after successful completion of course)	Nil
Module IV	AM 002	Additive Manufacturing Technologies	1.5 Weeks–45Hours (@6 hours/day)	3,125 Excluding GST	Rs.313/- (refundable after successful completion of course)	AM001
Module V	AM 006	Design For additive manufacturing	2 Weeks–60 Hours (@6 hours/day)	4,167 Excluding GST	Rs.417/- (refundable after successful completion of course)	AM001, AM002
Module VI	DM 001	Industrial Automation	2 Weeks – 60 Hours (@6 hours/day)	4,167 Excluding GST	Rs.417/- (refundable after successful completion of course)	Nil
Module VII	DM 002	Industrial Robotics	3 Weeks – 90 Hours (@6 hours/day)	6,250 Excluding GST	Rs.625/- (refundable after successful completion of course)	Nil
Module VIII	DM 003	Industrial Internet of Things (IIoT)	3 Weeks–90 Hours (@6 hours/day)	6,250 Excluding GST	Rs.625/- (refundable after successful completion of course)	Nil

					successful completion of course)	
Module IX	PW 001	Domain Specific Project work	2 Weeks–60 Hours (@6 hours/day)	4,167 Excluding GST	Rs.417/- (refundable after successful completion of course)	(CNC001+CNC007)/AM003/ DM001/ DM002/DM003
Module X	PW 002	Integrated Project	3.5 Weeks–105 Hours (@6 hours/day)	7,292 Excluding GST	Rs.730/- (refundable after successful completion of course)	CNC001+CNC007+AM003+ DM001+ DM002 + DM003
Module XI	IS 001	Interpersonal skills	1 Weeks–30 Hours (@6 hours/day)	2,083 Excluding GST	Rs.208/- (refundable after successful completion of course)	Nil

II. Registration Fee: An amount of Rs.1000/- (including all taxes as applicable)(nonrefundable) should be paid at the time of registering for the course.

This fee shall be considered as part of course fee, if the student joins the course. If a student register and pay for more than one course and join for any one course, all such amount will be adjusted against the course fee payable.

If the student does not join for the registered course / any of the registered courses, fee paid shall be forfeited.

For SC/ST candidates admitted under reservation quota, the registration fee is Rs.500/- and will be considered as part of caution/security deposit and will be refunded after successful completion of the course. If the candidate does not join or fails to complete the course the amount will be forfeited

For all other candidates the registration fee shall be Rs. 1000/-

However above the registration fee shall be refunded on few special cases as given below

- Course postponed and new date is not convenient for the student
- Course cancelled in advance, well before the admission date

III. Course Fee Installment Structure:

(applicable only to PG/Advanced Diploma courses. For all other courses may be indicated as “Not applicable for this course”)

Students can pay the full fees of Rs. 59,000/- (Rs. 50,000/- + all taxes as applicable) in advance or as installments as given below

Fees	*Amount for Other Candidates	Amount for SC/ST Candidates admitted under reservation (considered as caution/security deposit)	Due Date (on or before)
Registration Fee	Rs.1000/-	Rs.500/-	During Registration
1 st Installment	Rs. 34,400/-	Rs.5,000/-	27/03/2023
2 nd Installment	Rs. 23,600/-	NIL	17/05/2023
Total Fee	Rs. 59,000/-	Rs. 5,000/- (refundable after successful completion of course)	NIL

*Above fees is inclusive CGST 9% and SGST 9%, and revision, if any by Government shall be applicable at the time of payment.

Fine will be applicable for late fee payment.

IV. Eligibility : B.E/ B.Tech in Mechanical Engineering/ Equivalent (*Final year students also may apply)

* *Certificate will be issued only after successful completion of the mentioned Eligibility Criteria.*

V. Number of Seats :12

VI. Selection of candidates :The candidates passed in the qualifying examination will be based on their marks obtained, subject to eligibility and availability of seats

VII. Test/Interview (*if applicable*) :Not Applicable

VIII. Counseling/Admission :Starting date of the course

IX. Important Dates (if applicable) :

Starting date:	27.03.23
Last date to submit application form:	24.03.23
Selection intimation in website:	25.03.23
Counseling/Admission	27.03.23
Commencement of class work:	27.03.23
Payment of Fee	27.03.23

X. Course Timings :10:00 Hrs to 17:00 Hrs (13:00 Hrs to 14:00 Hrs Lunch break)(Excl Saturdays, Sundays and National Holidays)

XI. Placement :Support shall be provided

XII. Lab Facilities:

Hardware/Tools: CNC Lathe, CNC Milling Centre, Ultimaker 3-D Printer, Formlabs SLA Printer and Accessory units, PCs, Classroom Facilities, Basic Workshop facilities, Mistubishi Movemaster EX, NI, AB, Siemens, ABB, (PLCS), Field Instruments

Software: CREO Parametric, ANSYS, Skylab/MATLAB, 3-D Experience, CURA, Preform, EIGER, Free CAD, Octaprint, Kep Server, Robo DK, NI, AB, Siemens, ABB (PLC software), SCADA/HMI

XIII. Course Contents :

Course Brief – CAD700PG Diploma Course on Digital Manufacturing

Industry 4.0 is changing how the products are designed, produced, and disposed of, infusing new manufacturing technologies. It is estimated that Industry 4.0 will make production systems faster by up to 30% and increase efficiency by 25%, elevating mass customization to new levels. In a career in any manufacturing field, to keep up with an evolving landscape, a student needs to be well acquainted with the fundamentals of Industry 4.0 and how digital advances are influencing the capabilities of factories. To lead this transformation, engineers will need to build skills in Digital Manufacturing such as 3D printing or Additive Manufacturing, CNC technologies, Industrial automation and robotics, industrial IoT, and more.

Having prime importance in the growth of the mass-production sector, Digital Manufacturing gives the ability to manage production requirements based on changing market demands quickly. It also reflects the maturity of the organization and its global competitiveness. The expected outcomes are reduced cost of production, flexibility, and reduced time to market. This course focuses primarily on manufacturing technologies with a high-value area of employment but also because it makes it easy to share tangible outcomes from successful digital technology implementations.

The course introduces Additive manufacturing and CNC technology, which is proven to be very effective and widely adapted manufacturing technologies and explores the digital platforms to a great extent. Industrial automation and robotics will provide the basics of digital control and how the integrated systems interact to perform the tasks effectively. The final part of the course will be based on the Industrial Internet of things which is of great importance in the upcoming manufacturing industry. Learners have the opportunity to create a roadmap for achieving their personal goals related to digital manufacturing as a profession through the course project.

DIGITAL MANUFACTURING

The contents of the modules are listed below.

Introduction to CNC Technology – 60 Hrs

Manufacturing and Machining, Basics of Machining, Evolution of machine tools, NC machines, CNC machines, Automation and DNC system. Introduction to machine tools: Basic Machining Operations, Operations performed in Lathe, Milling machines etc., Number of axis and control, Types of machine tools, Types of control systems. Health and Safety: Introduction to safety equipment and their uses, Occupational Safety, Environment guidelines, legislations & regulations, Disposal procedure of waste materials, Warning, caution & personal safety while using Machine tools.

Application of CNC Technology – 60 Hrs

CNC machines for Welding, forming, plastic manufacturing, 3-D Printing etc. Program generation for EDMs and CMMs. Die and Mold manufacturing, Aerospace, automobile, biomedical, packing and other applications of CNC technology. Specific application case studies. Recent Developments and Future of the technology. Career in CNC technology, Personality traits, Entrepreneurship and opportunities.

Introduction to Additive Manufacturing – 60 Hrs

Introduction to the Basic Principles of Additive Manufacturing, AM evolution, Distinction between AM & CNC machining, Advantages of AM, AM around the world.

AM Process Chain: Conceptualization and CAD, Conversion to STL, Slicing, Transfer to AM Machine, Machine Setup, Build, Removal and Cleanup, Post Processing, Application. CAD Modeling: Sketching, Part Design, Assembly Design, Drafting

Additive Manufacturing Technologies – 45 Hrs

ASTM Classification: Material Extrusion, VAT Photopolymerization, Sheet Lamination, Binder Jetting, Material Jetting, Powder Bed Fusion, Direct Energy Deposition. Construction, Working, Materials Used, Process Chain, Slicing, Accuracy, Speed, Applications, Limitations

Design for Additive Manufacturing – 60 Hrs

Introduction: Motivation, Design for Manufacturing and Assembly, AM Unique Capabilities, Core DFAM Concepts and Objectives, Exploring Design Freedom, Topology Optimization, Optimal Light Weight Structures.

General DFAM Methods: Part Orientation, Removal of Support, Hollowing out Parts, Inclusion of Undercuts and other Manufacturing constraining Features, Interlocking Features, Reduction of Part count in an Assembly, Identification Markings/ Numbers.

Guidelines for Process Selection: Introduction, Selection method for a part, Challenges of Selection, Preliminary Selection, Production Planning and Control.

Industrial Automation – 60 Hrs

Automation Principles & Strategies, Concept of automation; Basic elements and types of automation; flexibility, degree, levels and assessment of automation; Components of Automation: Sensors, Actuators, ADC, DAC and Input/output devices. Industrial Control: Industrial control systems; Mechanical, Hydraulic, Pneumatic, Electrical, Electronic and hybrid systems; Concepts, features and parameters governing the selection of various components of Industrial control systems. PLC: Discrete Control using PLC & PLC network, Micro PLC, Programming a PLC, Logic Functions, input & output Modules, PLC Processors, PLC Instructors, Documenting a PLC System, Timer & counter Instructions, data Handling instructions, Sequencing Instructions, Mask Data representation.

Industrial Robotics – 90 Hrs

Robot Geometry: Degree of Freedoms, Articulating Configuration, Robot Drives, Motion control, Robot tooling, Programming, Sensing Capability, Performance specification, Robot Operating System, Robot Implementation, Industrial Application.

Industrial Internet of Things (IIOT) – 90 Hrs

Introduction, communication Protocols, IIoT architecture, Case studies, Platforms, IIoT for additive manufacturing, Implementing IIoT solutions using Cloud, Introduction to Industry 4.0

Interpersonal Skills and Entrepreneurship – 30 Hrs

Effective Communication, Development competency, Proficiency in English, Self & time management, Motivation techniques, interpersonal Skill development, Computer literacy, Life skills, Entrepreneurship, Occupational safety, Health and Environment-Education.

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