GOVERNMENT OF TAMILNADU
DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI
STATE PROJECT COORDINATION UNIT
(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**CNC MILLING**
Course Code	ME/2020/008
Course Duration	60 Hours
Minimum Eligibility Criteria	ITI/10th/+2/Diploma/Graduates
Pre-requisites (if any)	Basic knowledge in CNC
Course Objectives	Training module has been designed to provide the participants to • Understand the concept and requirement of Design and Manufacturing. • Understand the working principle of CNC Milling • Learn the programming methods for CNC Milling
Course Outcomes	At the end of training, the participants will be able to • Operate all CNC Machine tools and equipment's efficiently • Identify all the components of CNC Machine tool • Prepare CNC programs for CNC Vertical Machining Centre • Make use of special programming features and execute on CNC Vertical Machining Centre
Expected Job Roles	CNC Programmer, Operator and Service Technician

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
ME/2020/008	**CNC MILLING**	Theory	30	10	20	3 Hours
		Practical	30	40	80	
		Total	60	50	100	

ME/2020/008- CNC MILLING

DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	**Introduction to Computer Numerical Control (CNC):**	**02 Hours**	
1.1	General Safety & Maintenance – Typical applications of CNC – Advantages and limitations of CNC – Classification of CNC machinetools.	02	
II	**Components of CNC machine tool:**	**03 Hours**	
2.1	Drive systems-Machine spindle-Spindle drives-Slide drives, Slide moving elements, Feedback system-Incremental encoders-Absolute encoders, Tool change –Automatic Tool Changing System (ATC).	03	
III	**Programming fundamentals:**	**05 Hours**	
3.1	Procedure for manual NC Programming-Structure of a program-Programming methods-Data input.	02	
3.2	Axes Designation for Various CNC machine tools-Zero and Reference points on CNC Machine tools.	03	
IV	**Part Programming for CNC Vertical Machining Centre:**	**20 Hours**	
4.1	Co-ordinate system – absolute and incremental co-ordinate system, G codes and M codes for CNC VMC, Part Programming practice – linear Interpolation	06	
4.2	Part Programming practice circular interpolations, Program using subroutines, Program for cutter radius compensation	04	
4.3	**Practical:** Program proving through FANUC simulation software and to provide training for CNC Milling in Tool Offset and Part programming for typical components.		10
V	**Training in CNC Milling:**	**30 Hours**	
5.1	Tool and Work holding devices, Tool selection – Process planning – cutting tool specification and tool selection, Tool offset setting, Work piece datum setting and Cutting parameters calculation.	10	
5.2	**Practical:** Tool offset setting- Work piece datum setting-CNC Machine Control Unit-The console and Console key pad-Operators panel and Machining Practice (simple exercises).		20
	Total Theory and Practical hours	**30**	**30**
	Total hours	**60**	

HARDWARE REQUIREMENT

S. NO.	LIST OF TOOLS /EQUIPMENTS
1.	• CNC Vertical Machining Centre • Tool Holders (CNC Vertical Machining Centre) • Various types of tools (CNC Vertical Machining Centre) • CAM Software (CNC Vertical Machining Centre Simulation)

SOFTWARE REQUIREMENT

S. NO.	LIST OF SOFTWARE
1.	• CAM Software (CNC Vertical Machining Centre Simulation)

REFERENCE BOOKS

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	CAD/CAM/CIM	R.Radhakrishnan S.Subramanian	New Age International Pvt. Ltd., New Delhi, 3rd Edition 2008
2.	Automation, Production Systems, and Computer-Integrated Manufacturing	Mikell P. Groover	McGraw Hill book company,USA, 1983
3.	CAD/CAM	Mikell P.Groover, Emory Zimmers Jr	Pearson Education, New Delhi. 2002
4.	Computer control of manufacturing systems	Yoram Koren	McGraw Hill book company, USA
5	Computer Aided Design and Manufacturing	Dr.Sadhu Singh	Khanna publishers, Delhi – 110 002.
6	Computer Aided Design and Manufacturing	Anup Goel A.Jacob Moses Renjin J. Bright Ruchi Agarwal	Technical Publications, Maharashtra – 411 030.
7	Computer Aided Design and Manufacturing	Dr.G.K.Vijayaraghavan Dr.V.Jayakumar Dr.S.Sundaravalli	Suchithra Publications, Chennai – 600 050.

ASSESSMENT AND CERTIFICATION

S. No.	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training , Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max.Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Aim and Procedure	20
	b)Demonstration / Execution	25
	c) Result & Viva Voce	15
	d)Record	20
	Total Marks	**100**

THEORY MODEL QUESTION PAPER

ME/2020/008 - CNC MILLING

(Maximum Marks: 20)

(N.B: Answer any **Twenty** questions) **20x1= 20 Marks**

1. Write any two types of safety.
2. Name any two safety devices.
3. Draw third angle projection symbol.
4. Write down the least count of Vernier height gauge.
5. Write any two parts of Milling Machine.
6. List out types of Milling Machine.
7. Write any two tools used in Milling Machine.
8. Write any two Operations in Milling Machine.
9. What is the use of arbor in Milling Machine?
10. Name of the materials used to manufacture column of Milling Machine.
11. What is CNC Machine?
12. Write two co-ordinate systems.
13. Write any two parts of CNC Vertical Machining Centre.
14. What is meant by ATC?
15. Write any two operations performed in Vertical Machining Centre.
16. Write any two advantages of CNC Vertical Machining Centre.
17. What is the use of End mill cutter?
18. Name the Code used to linear interpolation.
19. Name the Code used to change the tool.
20. What is meant by canned cycle?
21. What is G Code used for reaming cycle?
22. Write down the syntax format for G84.
23. What is meant by of BT40 / ER32?
24. What is meant by cutter radius compensation?
25. What is meant by Reading Skill?