



**CERTIFICATE COURSE IN  
MACHINING  
(CCM)**



**curriculum**

**Ministry of Micro, Small and Medium  
Enterprises, New Delhi  
(MSME-Technology Centre)**

### COURSE/MODULE TEMPLATE

**COURSE NAME: CERTIFICATE COURSE IN MACHINING**

**COURSE CODE: MSME/CCM/00**

**COURSE OUTCOMES: After completion of course Student should be able to:**

1. Customize object drawing on CAD using Toolbars viz. Draw, Modify, and Dimensioning. Format Layer and Style.
2. Create objects using 3D Modeling and Print Preview and Plotting in CAD.
3. Operate different conventional machine with different operation like milling, turning & grinding etc.
4. Calculate different cutting parameters, perform different cutting operation & cutting time calculation in Production system.
5. Operate different measuring instrument and calculate the measuring value.
6. Study the Drawing with all values like GD & T symbol and roughness value.
7. Implement Quality management System & 5S.

**THEORY HOURS: 300**

**PRACTICAL HOURS: 480**

**THEORY MARKS: 600**

**PRACTICAL MARKS: 300**

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	TH hours	Marks
UNIT-I	Production Technology	Manufacture components using various machine tools like Lathe, Milling, and Grinding.	Workshop safety rules Use of personal protective equipment (PPE). Cutting tool materials. Parts of lathe machine and their function. Lathe and Lathe operations Milling and Milling Operations Grinding and Grinding operations. De-burring process Cutting Tools Coolants and Lubricants Accessories and Attachments	160	100
UNIT-II	Engineering Drawing	Identify types of line, line group, arrow head, type of paper size, title block, out boundary. Demonstrate scale, dimension, dimensioning rules & its use. Demonstrate angle of projection method, orthographic views, Sectioning, its type and application. Use limits, fits and tolerances on the drawing.	Practice of drawing by conventional method with the help of drawing tools like, drawing board, mini drafter, pencil etc. Use scale and put dimension with the help of drawing tools on different mechanical objects. Do practice with the help of drawing tools of different parts. Do practice by providing different surface roughness symbols on the drawing as per requirement. Do conventional practice by showing tolerance of different fittings in an assembly drawing. Do practice by studying the individual parts of an assembly drawing.	30	100
UNIT-III	Engineering	Explain standardization of	Explain standardization of	30	100

	Metrology	<p>measuring instrument (linear, angular, precision &amp; non precision).          Explain Gauges (standard gauge: feeler gauge, radius gauge, screw pitch gauge).          Explain Telescopic gauge, slip gauge, standard wire gauge.          Demonstrate Limit gauge: plug gauge, thread plug gauge, snap gauge.          Demonstrate Ring gauge, thread ring gauge.</p>	<p>measuring instrument (linear, angular, precision &amp; non precision).          Explain Gauges (standard gauge: feeler gauge, radius gauge, screw pitch gauge).          Explain Telescopic gauge, slip gauge, standard wire gauge.          Demonstrate Limit gauge: plug gauge, thread plug gauge, snap gauge.          Demonstrate Ring gauge, thread ring gauge.          Demonstrate Comparators as well as hand on practice on CMM, Height master, profile projector.</p>		
UNIT-IV	MS office	<p>Explain MS office, by using MS office prepare word document, spread sheet, presentations etc.</p>	<p>Microsoft office word, identify the items on the word program screen, work with graphics by adding clip art/ images from files, format pages, insert header/footer/ page numbers, preview the document and print it, Microsoft office excel, , identify the items on the word program, convert excel to PDF, enter the data, insert and delete rows/ columns, create tables&amp; charts, import, filter and sort the data, Use pivot tables. Microsoft office power point, add slide transition, add animation to slide content, view a presentation using slide show, print a presentation.</p>	15	100
UNIT-V	Auto-CAD	<p>Prepare production drawing using AutoCAD.</p>	<p>Co-ordinate system, used in AutoCAD.          interface of AutoCAD, mouse function, functional keys, shortcut keys, paper size Window limits, line, construction line, ray, trim, extend, erase. Circle, rectangle, copy, move, and offset, rotate.          Array, mirror, scale, stretch, polyline, polygon, and arc. Spline, ellipse, revision cloud, and region, explode, join, break, and break at a point.          point, point style, divide, measure, fillet, chamfer, blend curve          Hatch, gradient, details of sectional view.          Text, Mtext, text style, arc aligned text, mirror text          Block, Wblock, insert block, edit block          Identify dimension toolbar,</p>	35	100

			Dimension style & GD&T symbols Plotting and printing drawing.		
UNIT-VI	Soft Skill	Demonstrate Communication Skills, use language as a tool of communication Demonstrate and improve the participant's English language skills. Demonstrate Personality Development Demonstrate Full Dress Rehearsal	Enhance the Basics of Communication, Soft Skills, and non-verbal communication – body language. Read The Sounds of English – Vowels & Consonant. Word Accent – Accent, Tone, Pitch Give seminar where presentation skills, Newspaper reading, Body Language – positive gestures, handshakes, eye contact, smiles, styles of walking, hand movements, etc. can be observed through supervision. Counsel role plays and situation handling, personal and career development (career counseling) Write an effective cover letter, resume/curriculum vitae,) Participate in Group Discussion, attend personal Interview, and face corporate Interface. Conduct mock drill for the above.	30	100
<b>Total</b>				300	600

## COURSE WISE DETAILS CONTENTS

**Program Name** : CERTIFICATE COURSE IN MACHINING

**Course Title** : Production Technology  
:Engineering Drawing  
:Engineering Metrology  
:Fundamental of Computer  
:Auto CAD  
:Soft Skill

**Course Code** : MSME/CCM/00

### **Rationale:**

Indian manufacturing industry sector which comprises majority of Small & Medium scale enterprises requires highly skilled in “Machining” who can be engaged in production of precision tools & components with minimum wastages of time, money and material. The aim of the training is to develop highly skilled Tool Makers to contribute in the overall development of the Indian industry through use of modern technology such as, Computer Aided Manufacturing (CAM)/ Computer Aided Designing (CAD)/ Computer Aided Engineering (CAE).

### **Outcomes:**

1. Customize object drawing on CAD using Toolbars viz. Draw, Modify, and Dimensioning. Format Layer and Style.
2. Create objects using 3D Modeling and Print Preview and Plotting in CAD.
3. Operate different conventional machine with different operation like milling, turning & grinding etc.
4. Calculate different cutting parameters, perform different cutting operation & cutting time calculation in Production system.
5. Operate different measuring instrument and calculate the measuring value.
6. Study the Drawing with all values like GD & T symbol and roughness value.
7. Implement Quality management System & 5S.

**Theory:**

Topic and Contents	Hours	Marks
<p><b>Topic 1: Production Technology</b></p> <p><b>MAJOR CHAPTERS</b></p> <ul style="list-style-type: none"> <li>➤ Importance of safety &amp; general precaution observed in the industry/shop floor (10 Marks)</li> <li>➤ Files (20 Marks)</li> <li>➤ lathe Machine (20 Marks)</li> <li>➤ Milling Machine (20 Marks)</li> <li>➤ Grinding Machine (20 Marks)</li> <li>➤ Drilling Machine (10 Marks)</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 1.1 Importance of safety &amp; general precaution observed in the industry/shop floor: (10 Marks) <ul style="list-style-type: none"> <li>• Introduction to first aid ,</li> <li>• operation of electrical mains ,</li> <li>• Introduction of PPE.</li> <li>• Introduction of 5S ,concept &amp;application</li> <li>• Responses to emergencies e.g. power failure, fire etc.</li> </ul> </li> <li>➤ 1.2 Use of Files: (20 Marks) <ul style="list-style-type: none"> <li>• Introduction to files,</li> <li>• Classification and specification file, (Length, cut, grade, shape) Types of filing (Straight filing, Cross filing, Draw filing).</li> <li>• Advantages and disadvantages of filing.</li> <li>• Marking procedure,</li> <li>• Instruments used for marking,</li> <li>• Safety of keeping marking tools.</li> </ul> </li> <li>➤ 1.3 lathe Machine: (20 Marks) <ul style="list-style-type: none"> <li>• Introduction to the Lathe,</li> <li>• Classification and specification ,</li> <li>• work holding and tool holding devices,</li> <li>• accessories and attachment used in lathe,</li> <li>• Tools used in lathe,</li> <li>• Grinding of Single point cutting tool.</li> <li>• Different turning operation performed on lathe like facing, turning, chamfering, center drilling, in between center turning.</li> <li>• Forming operation like Radius Forming, Grooving, Knurling, Die Passing, Thread Cutting, Drilling and Boring.</li> </ul> </li> <li>➤ 1.4 Milling Machine (20 Marks) <ul style="list-style-type: none"> <li>• Introduction to Milling machine,</li> <li>• Classification and Specifications,</li> </ul> </li> </ul>	160	100

<ul style="list-style-type: none"> <li>• Different operations performed,</li> <li>• Work holding and tool holding devices (v-blocks, vices, fixtures, stub arbors, collet adaptors) used on it.</li> <li>• Classification of milling i.e. Face milling, Peripheral milling (up&amp; down milling) profile milling.</li> <li>• Explain about milling machine operations,</li> <li>• Its attachments.</li> <li>• Calculation of RPM &amp; feed.</li> <li>• Different milling operation like Slot Milling, Special Milling.</li> </ul> <p>➤ 1.5 Grinding Machine: (20 Marks)</p> <ul style="list-style-type: none"> <li>• Introduction to grinding machine,</li> <li>• Classification and specification of the machine,</li> <li>• types of grinding (surface grinding, reference grinding, slot grinding), work holding devices,</li> <li>• advantages and disadvantages of grinding,</li> <li>• Safety precaution to be taken during grinding.</li> <li>• Angular grinding by using Sine vice.</li> </ul> <p>➤ 1.6 Drilling Machine: (10 Marks)</p> <ul style="list-style-type: none"> <li>• Introduction to Drilling process,</li> <li>• tools used in drilling,</li> <li>• checking the tool by using point angle gauge,</li> <li>• Assembly of all the parts,</li> <li>• Finding the problems and remedies of that.</li> </ul>		
<p><b>Topic 2: Engineering Drawing</b></p> <p><b>MAJOR CHAPTERS:</b></p> <ul style="list-style-type: none"> <li>➤ Drawing equipment's and its application (25 Marks)</li> <li>➤ Orthographic Projection (25 Marks)</li> <li>➤ Isometric projection (25 Marks)</li> <li>➤ Sectioning (25 Marks)</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 2.1 Drawing equipment and its application (25 Marks) <ul style="list-style-type: none"> <li>• What is drawing?</li> <li>• Concept and Introduction of Engineering drawing.</li> <li>• Setting of paper size, drawing of title block with border line.</li> <li>• Drawing of Types of line, their properties, and arrow head.</li> <li>• Types of scale, dimensioning rules &amp; their uses.</li> </ul> </li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 2.2 Orthographic Projection (25 Marks) <ul style="list-style-type: none"> <li>• Concept of projection,</li> <li>• Types of projection and applying symbol of projection.</li> </ul> </li> </ul> <p><b>Contents:</b></p>	30	100

<ul style="list-style-type: none"> <li>➤ 2.3 Isometric projection (25 Marks) <ul style="list-style-type: none"> <li>• Isometric scale</li> <li>• Isometric view</li> </ul> </li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 2.4 Sectioning (25 Marks) <ul style="list-style-type: none"> <li>• Types</li> <li>• Application</li> <li>• View positioning</li> </ul> </li> </ul>		
<p><b>Topic 3: Engineering Metrology</b></p> <p><b>MAJOR CHAPTERS:</b></p> <ul style="list-style-type: none"> <li>➤ Linear measuring instruments. (30 Marks)</li> <li>➤ Angular measuring instruments. (30 Marks)</li> <li>➤ Gauges and comparators. (40 Marks)</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 3.1 linear measuring instruments. (30 Marks) <ul style="list-style-type: none"> <li>• Standardization of linear measuring instrument.</li> <li>• Vernier Caliper</li> <li>• micrometer</li> <li>• Height Gauge</li> </ul> </li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 3.2 angular measuring instruments. (30 Marks) <ul style="list-style-type: none"> <li>• Standardization of angular measuring instrument.</li> <li>• Angle protractor</li> <li>• Vernier/universal angle protractor</li> <li>• sine bar</li> </ul> </li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 3.3 gauges and comparator (40 Marks) <ul style="list-style-type: none"> <li>• Standardization of Gauges (standard gauge: feeler gauge, radius gauge, screw pitch gauge).</li> <li>• Limit, fit and tolerance.</li> <li>• Limit gauge: plug gauge, thread plug gauge, snap gauge.</li> <li>• Ring gauge, thread ring gauge.</li> <li>• Comparators as well as hand on practice on different measuring instruments.</li> </ul> </li> </ul>	30	100



<p><b>Topic 4: Introduction to MS Office</b></p> <p><b>MAJOR CHAPTERS :</b></p> <ul style="list-style-type: none"> <li>➤ Ms office word (40 marks)</li> <li>➤ Ms office excel (30 marks)</li> <li>➤ Ms office power point (30 marks)</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 4.1 Ms office word (40 marks) <ul style="list-style-type: none"> <li>• WHAT is Microsoft word</li> <li>• Identify the items on the word program screen, know how to use tool bars, customize tool bars, work with files,</li> <li>• Work on multiple documents, work with text, select/ delete/ format text, format paragraphs, work with lists, insert rows/columns in a table,</li> <li>• Work with graphics by adding clipart/ images from files, use spelling and grammar check, insert header/ footer/ page numbers, preview the document and print it&amp; use speech tools.</li> </ul> </li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>➤ 4.2 Ms office excel (30 marks) <ul style="list-style-type: none"> <li>• What is Microsoft excel, identify the items on the excel program screen, know how to use tool bars, customize toolbars, &amp; work with sheets.</li> <li>• Open an existing saved excel sheet, convert excel to pdf, work on multiple sheets, enter data, inset and delete rows/ columns.</li> <li>• Inserting picture/ hyperlinks/ symbols, enter a formula, import, and filter and sort the data, freeze/ unfreeze worksheets, use pivot tables.</li> </ul> </li> </ul> <p><b>Contents:</b></p> <p>1.3 Ms office power point (30 marks)</p> <ul style="list-style-type: none"> <li>• What is power point , identify the items on the power point windows, key board short cuts, create a presentation , saving document in power point,</li> <li>• Selecta slide design, slide lay out, inserting and formatting text and objects, insert a hyperlink, add slide transition, &amp; add animation to slide content.</li> <li>• Insert sound and video to a slide presentation, using the slide master, view a presentation using slide show7 print a presentation.</li> </ul>	15	100
--	----	-----

<b>Topic 5: Auto CAD</b>	35	100
<b>MAJOR CHAPTERS</b>		
➤ 2D & 3D sketches (30 Marks)		
➤ Dimensioning (30 Marks)		
➤ 3D Modeling (40 Marks)		
<b>Contents:</b>		
➤ 5.1 2D & 3D sketches (30 Marks)		
• Setting of paper size,		
• different types of lines,		
• Coordinate system & text.		
• functional keys		
• Tool line, circle, and rectangle, modify tools, trim, offset, fillet & chamfer.		
• Layers & discussion on layer management.		
• Poly line, rectangle, polygon, and arc, modify tools, mirror, pattern, copy.		
• Hatch, copy & move.		
<b>Contents:</b>		
➤ 5.2 Dimensioning (30 Marks)		
• Scale tools and thread representation.		
• Dimension and attribute text.		
• Ellipse, arc, and poly line.		
• Arc, aligned text, spline, & dimension setting.		
• Dimension style and dimensional tolerance & limits.		
• UCS, WCS		
<b>Contents:</b>		
➤ 5.3 3D Modeling (40 Marks)		
• Isometric view by wire frame.		
• Extrude, Revolve, Union, and Subtraction & Intersection, sweep, and extrude face.		
• Solid primitives, solid editing command (move face, offset face).		
• Assembly drawing & attribute text.		
• Annotation, block & w-block & leader.		
• Extension files used (.dwt, .scr, and slide).		
• Primitives used in solid modeling.		

<b>Topic 6: SOFT SKILL</b>	30	100
<b>MAJOR CHAPTERS</b>		
➤ Introduction (20 marks)		
➤ Communication skill (40 marks)		
➤ Personal & Professional Goal- Setting (40 marks)		
<b>Content:</b>		
➤ 6.1 Introduction (20 marks)		
• About soft skills& learning style		
• self-assessment activates/formal introduction		
<b>Content:</b>		
➤ 6.2 Communication Skill (40 marks)		
• Method of communication, verbal, oral, written communication, body language session, personality/ behaviour activity.		
• Barriers to effective communication, perceptual basis, interpersonal relationship& cultural difference.		
• Fundamental characteristics' of personality, public speaking / presentation skill & test, doing self-awareness discussion about rules of G.D.		
<b>Content:</b>		
➤ 6.3 Personal & Professional Goal- Setting (40 marks)		
• Motivated think & de motivated think, H.R introduce discussion session. positive think		
• Define your goal setting mission, steps for setting effective goals		
• creating goals, make open H.R interviews session& life skill session		
<b>Total</b>	300	600

**Intellectual Skills:**

1. Prepare working drawing
2. Use proper measuring tool
3. Use proper tool for proper machining
4. Process plan of manufacturing job.

**Motor Skills:**

1. Manufacture tool selecting different manufacturing methods.
2. Manufacture tool selecting different manufacturing operation & different conventional machine.
3. Develop working drawing using auto cad.
4. Develop Project Report Using M S Word.

**List of Practical:**

1. Portable vice
2. Candle Stand
3. Tool Maker's Vice
4. All cutting Exercise

**Learning Resources:****1. Books:**

<b>Sr. No.</b>	<b>Author</b>	<b>Title</b>	<b>Publisher</b>
1	S.k. Hazra chowdhury	Workshop Technology	Media promoters and publishers pvt ltd
2	N.D Bhatt	Engineering drawing	Charotar publishing house
3.	R.K Jain	Engineering metrology	Dhanpath rai and sons
4.	Guy Hart-Davis	Beginning Microsoft Office 2010	Apress