

STUDY & EVALUATION SCHEME FOR CERTIFICATE PROGRAMME IN CAD/CAM

Code	Units	Study Scheme Total Hrs.		Credits	Marks Evaluation Scheme								Total Marks
		Th	Pr		Internal Assessment			External Assessment					
					Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
CMEE5-101	Communication Skills	8	-	1	25	-	25	25	1	-	-	25	50
CMEE5-101P	Communication Skills Lab.	-	24	1	-	25	25	-	-	50	3	50	75
CMEE5-102	Introduction	20	-	1	25	-	25	50	2	-	-	50	75
CMEE5-102P	Introduction Lab.	-	60	2	-	50	50	-	-	100	4	100	150
CADEE5-103	CAD/CAM	30	-	1	25	-	25	50	2	-	-	50	75
CADEE5-103P	CAD/CAM Lab.	-	92	3	-	50	50	-	-	100	4	100	150
CMEE5-104	Tool Geometry	32	-	1	25	-	25	50	2	-	-	50	75
CMEE5-104P	Tool Geometry Lab.	-	90	3	-	75	75	-	-	100	4	100	175
CMEE5-105	Safety	16	-	1	25	-	25	50	2	-	-	50	75
CMEE5-105P	Safety Lab.	-	92	5	-	75	75	-	-	100	4	100	175
CMEE5-106P	#Student Centre Activity	-	48	2	-	25	25	-	-	-	-	-	25
CMEE5-107P	+4-Week Industrial Training at the end of Semester	-	-	4	-	-	-	-	-	100	3	100	100
	TOTAL	106	406	25	125	300	425	225	-	550	-	775	1200

SCA will comprise of co-curricular activities like extension lectures on entrepreneurship, Industrial tour, environment, sports, hobby club, such as, photography, etc., seminars, declamation contest, educational field visits, NCC, NSS, cultural activities, etc.

+Industrial Training

Before completion of the semester, the students will go for training in a relevant industry/field organization for a minimum period of 4 weeks and prepare a diary. The student will prepare a report at the end of training. This report will be evaluated by the concerned instructor in the presence of one industry representative from the relevant trade/field.

Total weeks per semester: 16, Total working days per week: 5, Total hours per day: 7, Total hours in a semester: 16x5x7 = 560

One credit is defined as one hour of lecture per week or two hours of practical per week in the programme.

GUIDELINES FOR ASSESSMENT OF STUDENT CENTRED ACTIVITIES (SCA)

The maximum marks for SCA should be 25. The marks may be distributed as follows:

- i) 5 marks for general behavior and discipline
(by Principal or HOD in consultation with the instructor(s)/trainers)
- ii) 5 marks for attendance as per following
(by the instructors/ trainers of the department)
 - a) Up to 75% Nil
 - b) 75% to 80% 02 marks
 - c) 80% to 85% 03 marks
 - d) Above 85% 05 marks
- iii) 15 marks maximum for sports/ NCC/ NSS/ Cultural/ Co-curricular activities as per following:
(by In-charge of Sports/ Cultural/ NCC/ NSS/ Co-curricular activities) 15 marks -
for National level participation or inter-university competition 10 marks -
participation any two of the activities
05 marks – participation at the internal sports of the institute/college/university
Note: There should be no marks for attendance in the internal sessional of different subjects.

SALIENT FEATURES OF THE PROGRAMME

1	Sector	Mechanical Industry
2	Name of the Certificate Programme	CAD/CAM
3	Entry Qualification	Matriculation or equivalent NSQF level as prescribed by MRSPTU, Bathinda
4	Duration of Programme	Six months
5	Intake	30
6	Pattern of Programme	Semester Pattern
7	NSQF level	Level III
8	Ratio of Theory & Practice	20:80

UNIT – I
SUBJECT CODE: CMEE5-101
COMMUNICATIONSKILLS

Learning Outcomes:

After undergoing this unit, the students will be able to:

1. Speak confidently.
2. Overcome communication barriers.
3. Write legibly and effectively.
4. Listen in proper prospective.
5. Read various genres adopting different reading techniques.
6. Respond to telephone calls effectively.

Practical (24 Hours)	Theory (08 Hours)
	Basics of Communication <ul style="list-style-type: none"> • Process of communication • Types of communication-formal and informal, oral and written, verbal and non-verbal • Objectives of communication • Essentials of communication • Barriers to communication <p style="text-align: right;">(1 hour)</p>
<ul style="list-style-type: none"> • Looking up words in a dictionary (meaning and pronunciation) <p style="text-align: right;">(2 hours)</p>	Functional Grammar and Vocabulary <ul style="list-style-type: none"> • Parts of speech • Tenses • Correction of incorrect sentences <p style="text-align: right;">(2 hours)</p>
<ul style="list-style-type: none"> • Self and peer introduction • Greetings for different occasions <p style="text-align: right;">(1 hour)</p>	Listening <ul style="list-style-type: none"> • Meaning and process of listening • Importance of listening • Methods to improve listening skills Speaking <ul style="list-style-type: none"> • Importance • Methods to improve speaking • Manners and etiquettes <p style="text-align: right;">(2 hours)</p>
<ul style="list-style-type: none"> • Newspaper reading <p style="text-align: right;">(1 hour)</p>	Reading <ul style="list-style-type: none"> • Meaning • Techniques of reading: skimming, scanning, intensive and extensive reading <p style="text-align: right;">(1 hour)</p>
<ul style="list-style-type: none"> • Vocabulary enrichment and grammar exercises • Exercises on sentence framing accurately <p style="text-align: right;">(6 hours)</p>	Functional Vocabulary <ul style="list-style-type: none"> • One-word substitution • Commonly used words which are often misspelt • Punctuation • Idioms and phrases <p style="text-align: right;">(2 hours)</p>

<ul style="list-style-type: none"> • Reading a loud articles and essays on current and social issues • Comprehension of short paragraph <p style="text-align: right;">(5 hours)</p>	
<ul style="list-style-type: none"> • Write a short technical report • Letter writing <p style="text-align: right;">(3 hours)</p>	
<ul style="list-style-type: none"> • Participate in oral discussion • Respond to telephonic calls effectively • Mock interview <p style="text-align: right;">(6 hours)</p>	

Means of Assessment

1. Assignments and quiz/class tests
2. Mid-term and end-term written tests
3. Laboratory and practical work
4. Viva-voce

UNIT-II
SUBJECT CODE: CMEE5-102
INTRODUCTION

Learning Outcomes:

After undergoing study of this unit the students will be able to

1. Different types of lathe and difference between them
2. Understand Measurement standards
3. Maintenance importance for lathe machine

Practicals	60 hrs.	Theory	20 hrs.
<ul style="list-style-type: none"> • Practice on Lathe dismantling & mounting of chuck. • Practice on Lathe on calibration of measuring instruments. • Checking geometrical accuracies of lathe • Practice on calibration of measuring instruments. • Measurement of components by Vernier caliper. • Practice of cleaning, preventive maintenance of machine. • Mount work piece between centres, in chuck, or to faceplate, manually or using hoist. • alignment of work piece on machine, using measuring instruments, such as rules, gauges, or calipers. • Periodical lubrication procedure on lathe, testing of accuracy of alignment. Procedure of checking accuracy of lathe, preventive maintenance of lathe. • Operate lathe machine and identify different parts 		<ul style="list-style-type: none"> • Types of Lathe machine & its accessories • Turret & Capstan Lathe • Lathe specifications, Lathe cutting tools, speed, feed, depth of cut & machining time. • Precision measuring instruments. • Routine Maintenance on lathe machine. • Introduction to CNC and NC machines 	

Means of Assessment

1. Assignment and quiz/class tests
2. Mid-term and end-term written tests
3. Viva– voce
4. Practical work

UNIT-III
SUBJECT CODE: CMEE5-103
CAD/CAM

Learning Outcomes:

1. AUTOCAD
2. Solid Works

Practical	92 hrs.	Theory	30 hrs.
<ul style="list-style-type: none"> • Features of SolidWorks, Various products available in SolidWorks for Product Design, Simulation, Communication SolidWorks Graphical User Interface - Feature manager design tree, Handles, Confirmation corner, mouse buttons, Command Manager • Sketch Entities – Centerline line, Line, Circle, Arc, Ellipse, Rectangle, Slots, Polygon, Parabola, Ellipse, Partial Ellipse, Spline, Spline tools, Points, Text, Construction geometry • Sketch Tools - Fillet, Chamfer, Offset, Convert entities, Trim, Extend, Mirror, Move, Copy, Rotate, Scale, Stretch, Sketch pattern, Sketch picture • Blocks – Make block, Edit block, Insert block, Add/Remove Entities, Rebuild, Save, • Explode Relations - Adding Sketch Relation, Automatic relations, • Dimensioning - Smart, Horizontal, Vertical, fully define sketch.3D Sketching • Creating Extrude features – Direction1, Direction2, from option, Thin feature, applying draft, Selecting contours • Creating Revolve features – Selecting Axis, Thin features, selecting contours Creating Swept Features-Selecting, Profile and Path, Orientation/twist type, Thin feature, Creating reference planes 	<ul style="list-style-type: none"> • Engineering Drawing: Introduction and its importance, Relationship to other technical drawing types - Conventions –Viewing of engineering drawing sheets • Drawing Instruments: their Standard and uses - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins /clips • Lines: - Definition, types and applications in Drawing Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line – Methods of Division of line segment • Drawing of Geometrical Figures: Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements 		

- Creating Loft features – Selecting Profiles, Guide curves, Start/End Constraints,
 - Centerline parameters, Close loft.
 - Selecting geometries – Selection Manager, Multiple Body concepts
 - Creating Reference - points, axis, coordinates
 - Creating curves -Split line, Project curve, Composite curve, Helix and Spiral
 - Creating Fillet Features-Inserting Hole types
- Creating Chamfer, Creating Shell, Creating Rib
- Creating Pattern - Linear pattern, Circular pattern, Sketch driven pattern, Curve driven pattern, Table driven pattern, Fill pattern, mirror
- Advanced Modeling Tools- Dome, Deform, indent, Flex
 - Introduction to Assembly Modeling & Approaches – Top down and Bottom up Approach Applying Standard Mates- Coincident, Parallel, Perpendicular, Tangent, Concentric, Lock, Distance, Angle.
- Applying Advanced Mates – Symmetric, Width, Path Mate, Linear/Linear Coupler, and Limit Mate.
- Applying Mechanical Mates – Cam, Hinge, Gear, Rack Pinion, Screw, and Universal Joint. Applying Smart mates
- Applying Mate reference
- Manipulating Components - Replacing Components, Rotating Components, Move Components, Collision Detection, Detecting Interference
- Creating Pattern - Assembly Pattern, Mirror
 - Creating Exploded Views Top Down Assembly
 - Smart Fasteners
 - Creating Extrude, Revolve, Swept, loft, Boundary surface. Inserting Planar Surface, Offset Surface, Free form Extending a surface, Surface fill, Ruled Surface, Trim Surface, Replace Face, Delete face, Untrim surface, knit surface, Thickening a Surface
 - Generating Drawing Views
 - Introduction to Angle of Projection
 - Generating Views - Generating Model View, Projected Views, Inserting Standard 3View, Auxiliary Views, Detailed Views,

- **Lettering and Numbering:** Single Stroke, Double Stroke, inclined, Upper case and Lower case.
- **Dimensioning:** Definition, types and methods of dimensioning (functional, nonfunctional and auxiliary) - Types of arrowhead -Leader Line with text
- **Method of Presentation of Engineering Drawing:** Pictorial View -Orthogonal View - Isometric view
- **Construction of Scales and diagonal Scale-**Title Block
- **Introduction to Engineering Drawings**
- Applications of AutoCAD (Machine drawings, Production drawings, Part drawings, Assembly drawings)
- Introduction to AutoCAD and AutoCAD Mechanical
- Co-ordinate systems
- **Display Control:** Zoom, Pan, Redraw, Regen, Clean Screen, Steering wheels
- **File Management:** New, Open, Save, Save as, Close, Exit
- **Drawing Settings:** Units, Limits, Drafting settings: Snap and Grid, Polar tracking, Object snap, Dynamic input (F1 to F12 Function keys)
- **Drawing Tools:** Line, Circle, Arc, Ellipse, Donut, Polygon, Rectangle
- **Modify Tools:** Erase, Undo, Redo, Move, Copy, Rotate, Mirror, Array, Scale, Stretch, Lengthen, Trim, Extend, Break, Join, Chamfer, Fillet, Object selection
- **Object Properties:** Properties window, Color, Line type, Line weight, Match properties
- **Drawing Tools:** Multiline, Poly line, Spline, Construction Line, Revision cloud, Layer Management Adding / Removing Layers Layer Status
- **Object Selection Methods:** Select, Q select, Filter
- **Hatching Utilities:** Hatch, Hatch edit, Gradient, Boundary, Fill

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| <ul style="list-style-type: none"> • Crop view, Broken –Out Section, Section View, Alternate Position View, Working assembly specific view, Drawing properties, Manipulating views | <ul style="list-style-type: none"> • Inquiry Commands: Id, Dist, List, Radius, Angle, Area • Isometric Drawings: Isometric snap and Isometric drawings • Dimensions: Linear, Aligned, Radius, Diameter, Angle, Arc length, Continuous, Baseline, Dimension Space, Dimension Break, Inspection, Jogged radius, Ordinate dimensions, Oblique, Quick dimension • Leader: Multi leader, Multi leader style • Annotation Tools: Text, Style, Multiline Text, Scale Text, Spell, Table, Table style, Table edit Dimension Style Manager • Parametric Modeling: Geometric Constraints, Dimensional, Constraints, Delete constraints Create Block, Write block, Insert, Design Center, and Tool Palette • Attributes: Attribute definition, Etransmit, Layout, Page setup • Viewports, Model space Plot styles and Plot (Print) in Model and Layout area • AutoCAD 3D Introduction, Solid Modeling, Surface Modeling • Basic Modeling Tools: Primitives, Extrude, Sweep, Revolve, Loft, Press pull Blend, Patch, Surface Offset, Surface Trim • Basic Editing Tools: Union, Subtract, Intersect, Slice, Extrude Faces, Shell, Fillet, Chamfer • UCS Co-ordinates, Viewport controls, View controls, Visual controls, Section, Import & Export options • Layout: Base View from Model space and |
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UNIT-IV
SUBJECT CODE: CMEE4-104
TOOL GEOMETRY

Learning Outcomes:

After undergoing study of this unit the students will be able to

- Correctly and safely handle different tools
- Tool wear and its prevention
- Understand about tool parts and its uses

Practical	90 hrs.	Theory	32 hrs.
<p>Tools grinding Practice Side Cutting Tools Offset turning tools Parting tools select and install pre-set tooling in tool posts, turrets or indexing heads, and automatic-tool-change magazine, in sequence specified on process sheet how to replace worn tools, and sharpen dull cutting tools and dies using bench grinders or cutter-grinding machines. install, align & secure tools, attachments, fixtures & work pieces on machines, using hand tools & precision measuring instruments Position, and align cutting tools in tool holders on machines using hand tools and verify their position with measuring instruments. Turning practice by using indexable inserts. Methods of measuring cutting forces. Practice of negative rake tool on non-ferrous metals. Produce job using various cutting tools involving different operations. Grinding of cutting tools used on a lathe machine</p>		<p>Importance of tool geometry of single point cutting tool Drilling tools and broaching tools. Introduction to latest cutting tools, materials, their properties and applications types of tool wear tool life variables affecting the tool life Introduction about merchant theory. determination of tool life exponents machinability</p>	

Means of Assessment

1. Assignment and quiz/class tests
2. Mid-term and end-term written tests
3. Viva- voce
4. Practical work

UNIT-V
SUBJECT CODE: CMEE5-105
SAFETY

Learning Outcomes:

1. After undergoing study of this unit the students will be able to
2. Recognize & comply safe working practices, environment regulation and housekeeping.
3. Advantages of safety devices
4. Important terms used for safety in industry
5. safe work environment importance in industry

Practical	92 hrs.	Theory	16 hrs.
<ul style="list-style-type: none"> • Health, Safety and Environment guide lines, legislations & regulations as applicable. • Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. • Basic safety introduction, Personal protective Equipment (PPE): Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. • Preventive measures for electrical accidents & steps to be taken in such accidents. • Describe hazard, including the different types of health and safety hazards in the workplace • Use of Fire extinguishers. • Explain the importance of maintaining high standards of health, safety and security • Follow the Safety, Health and Environment related practices • Uses of Safety gloves, Safety shoes, les, Earplugs • Use the health, safety and accident reporting Procedures and the importance of these. • report any identified breaches in health, safety, and security policies and procedures to the designated person. 		<ul style="list-style-type: none"> • Study of importance of complying health safety and environmental regulation at workplace. • Study of hazards associated with lathe machines operations. • Safety equipment. • Precautions and remedies. • Response to emergencies e.g.; power failure, fire, and system failure. • Read and understand the safety signs and instructions on the lathe machine, Identify job-site hazards and apply good housekeeping practices, Organisation's emergency procedures for accident, fires or any other natural calamity. 	

Means of Assessment

1. Assignment and quiz/class tests
2. Mid-term and end-term written tests
3. Viva- voce
4. Practical work

SUBJECT CODE: CMEE5-107P
INDUSTRIAL TRAINING– I (4 Weeks)

The purpose of industrial training is to:

1. Develop understanding regarding the size and scale of operations and nature of industrial/field work in which students are going to play their role after completing the courses of study.
2. Develop confidence amongst the students through first-hand experience to enable them to use and apply institute based knowledge and skills to perform field activities.
3. Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

It is needless to emphasize further the importance of Industrial Training of students during their certificate programme. It is industrial training, which provides an opportunity to students to experience the environment and culture of world of work. It prepares students for their future role as skilled person in the world of work and enables them to integrate theory with practice.

An external assessment of 100 marks have been provided in the study and evaluation scheme of 1st Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

The instructor along with one industrial representative from the concerned trade will conduct performance assessment of students. The components of evaluation will include the following:

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| a) Punctuality and regularity | 20% |
| b) Industrial training report | 50% |
| c) Presentation and viva-voce | 30% |