COMPUTER AIDED DRAFTING
Course Code : 313006

Programme Name/s	: **Mechanical Engineering/ Production Engineering**
Programme Code	: **ME/ PG**
Semester	: **Third**
Course Title	: **COMPUTER AIDED DRAFTING**
Course Code	: **313006**

I. RATIONALE

With the advent of technology, the process of drafting and design has transitioned from manual techniques to digital methods. The study of Computer Aided Drawing and Drafting (CADD) is representing the forefront of this evolution, providing designers with powerful tools to streamline the creation, modification, and visualization of technical drawings.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Create technical drawings using CADD software accurately and efficiently according to industry standards in multidisciplinary teams.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Use basic commands in CADD software.
- CO2 - Draw complex 2D drawings in CADD software using draw and modify tools.
- CO3 - Draw isometric drawings using CADD software.
- CO4 - Use software to dimension and write text on 2D geometric entities.
- CO5 - Plot given 2D entities using proper plotting parameters in CADD.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme						Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH	Credits	Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
313006	COMPUTER AIDED DRAFTING	CAD	SEC	-	-	4	-	4	2	-	-	-	-	-	25	10	25#	10	-	-	50

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

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Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Describe the importance of computer in drafting and designing. TLO 1.2 Set the CADD workspace and interface. TLO 1.3 Prepare drawing using User Coordinate System (UCS) and World Coordinate System (WCS) TLO 1.4 Apply different object selection methods in a given situation. TLO 1.5 Use various commands in application menu bar.	**Unit - I Fundamentals of CAD Drawing** 1.1 Fundamentals of Computer Aided Drafting and its applications, Various Software for Computer Aided Drafting. 1.2 CADD Interface: Application Menu, Quick Access Toolbar, Ribbons, InfoCenter, Command Window, Graphical Area, Status Bar 1.3 CADD initial setting commands: Snap, grid, Ortho, Osnap, Dynamic input, Limits, Units, Ltscale, Object tracking. 1.4 Co-ordinate System- Cartesian and Polar, Absolute and Relative mode, Direct Distance Entry, UCS, WCS. 1.5 Object Selection methods- picking, window, crossing, fence, last and previous. 1.6 Opening, saving and closing a new and existing drawing.	Video Demonstrations Presentations Hands-on
2	TLO 2.1 Use viewing commands. TLO 2.2 Apply formatting commands. TLO 2.3 Draw simple 2D entities using given draw commands. TLO 2.4 Determine coordinates, distance, area, length, centroid of the given 2D entity.	**Unit - II Zoom, Draw, Formatting and Enquiry Commands** 2.1 Zoom Commands – all, previous, out, in, extent, Realtime, dynamic, window, pan. 2.2 Draw Command - Line, Polyline, arc, circle, rectangle, polygon, ellipse, spline, block, hatch. 2.3 Formatting commands - Layers, block, linetype, lineweight, color. 2.4 Enquiry commands – distance, area.	Video Demonstrations Presentations Hands-on
3	TLO 3.1 Draw given complex 2D entities using modify commands. TLO 3.2 Use grip command to manipulate given 2D entity.	**Unit - III Modify and Edit Commands** 3.1 Modify Command - Erase, trim, extend, copy, move, mirror, offset, fillet, chamfer, array, rotate, scale, lengthen, stretch, measure, break, divide, explode, align. 3.2 Editing Objects by Using Grips - Moving, Rotating, Scaling, Mirroring and Stretching.	Video Demonstrations Presentations Hands-on
4	TLO 4.1 Draw isometric entities. TLO 4.2 Draw isometric object from given orthographic views. TLO 4.3 Use Layers for 2D drawings. TLO 4.4 Draw and modify blocks for given 2D entities. TLO 4.5 Use blocks in same and in another given file.	**Unit - IV Isometric Drawings, Layers, and Blocks** 4.1 Isometric drafting- Isometric grid & snap, Isometric axis & plane, Polyline, Isocircle. 4.2 Dimensioning Isometric drawings. 4.3 Text writing on Isometric drawing. 4.4 Layer, Layer properties and applications. 4.5 Blocks: create, modify and use in same file and in another file.	Video Demonstrations Presentations Hands-on
5	TLO 5.1 Use various dimensioning styles to drawn 2D entities. TLO 5.2 Apply Geometric and dimension tolerance symbols on the given entity. TLO 5.3 Write text on given 2D entity. TLO 5.4 Insert table in drawing. TLO 5.5 Prepare new template for drawing as per requirement. TLO 5.6 Plot given 2D entities using proper plotting parameters.	**Unit - V Dimensioning, Text and Plot Commands** 5.1 Dimensioning commands - Dimension styles, Dimensional Tolerances and Geometrical Tolerances, Modify dimension style. 5.2 Text commands - dtext, mtext command. 5.3 Insert table – table, tablestyle command. 5.4 Template Drawing- Standard template, loading template, create new template. 5.5 Plotting a drawing – adding plotter/printer, page setup, plot style commands.	Video Demonstrations Presentations Hands-on

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VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Use basic commands in CADD software. LLO 1.2 Draw 2D entities in CADD software.	1	*Drawing 2-D entities like Line, Polyline, Circle, Rectangle, Polygon and Ellipse by using CADD software.	4	CO1 CO2
LLO 2.1 Use basic commands in CADD software. LLO 2.2 Draw 2D entities in CADD software using Draw commands individually.	2	Drawing simple 2-D objects using any combination of 2 or more commands, like polygon+circle, line+circle, etc.	4	CO1 CO2
LLO 3.1 Use basic commands in CADD software. LLO 3.2 Draw 2D entities in CADD software using Draw, Edit and Modify commands.	3	Drawing complex 2-D objects like pulley/ gear.	4	CO1 CO2
LLO 4.1 Use basic commands in CADD software. LLO 4.2 Draw 2D entities in CADD software using Draw, Edit and Modify commands. LLO 4.3 Apply dimension and write text on 2D geometric entities.	4	*Drawing complex 2-D object like coupling/joints.	4	CO1 CO2 CO4
LLO 5.1 Use basic commands in CADD software. LLO 5.2 Draw 2D entities in CADD software. LLO 5.3 Apply dimension and write text on 2D geometric entities.	5	* Drawing any two problems of orthographic projections using first angle method of projection.	4	CO1 CO2 CO4
LLO 6.1 Use basic commands in CADD software. LLO 6.2 Draw 2D entities in CADD software. LLO 6.3 Apply dimension and write text on 2D geometric entities.	6	Drawing any two problems of orthographic projections using third angle method of projection.	4	CO1 CO2 CO4
LLO 7.1 Use basic commands in CADD software. LLO 7.2 Draw 2D entities in CADD software. LLO 7.3 Apply dimension and write text on 2D geometric entities.	7	* Drawing any two problems of sectional orthographic projections using First angle method of projection.	4	CO1 CO2 CO4
LLO 8.1 Use basic commands in CADD software. LLO 8.2 Draw 2D entities in CADD software. LLO 8.3 Apply dimension and write text on 2D geometric entities.	8	Drawing any two problems of sectional orthographic projections using third angle method of projection.	4	CO1 CO2 CO4

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 9.1 Use basic commands in CADD software. LLO 9.2 Draw 2D entities in CADD software. LLO 9.3 Apply dimension and write text on 2D geometric entities.	9	Drawing any two problems of development of solids.	4	CO1 CO2 CO4
LLO 10.1 Use basic commands in CADD software. LLO 10.2 Draw 2D entities in CADD software. LLO 10.3 Apply dimension and write text on 2D geometric entities.	10	Drawing any two problems on Auxiliary views.	4	CO1 CO2 CO4
LLO 11.1 Use basic commands in CADD software. LLO 11.2 Draw 2D entities in CADD software. LLO 11.3 Apply dimension and write text on 2D geometric entities.	11	*Drawing an assembly drawing from the given detailed drawing showing assembly dimensions, part number and bill of Material.	8	CO1 CO2 CO4
LLO 12.1 Use basic commands in CADD software. LLO 12.2 Draw 2D entities in CADD software. LLO 12.3 Apply dimension and write text on 2D geometric entities.	12	Drawing working drawings from given assembly drawing showing conventional representation, dimensions, geometrical tolerances and machining symbols.	8	CO1 CO2 CO4
LLO 13.1 Use basic commands in CADD software. LLO 13.2 Draw isometric drawings using CADD software.	13	Drawing isometric views of given two objects containing lines, arcs, circles, holes, ribs and slots.	8	CO1 CO3
LLO 14.1 Use basic commands in CADD software. LLO 14.2 Draw isometric drawings using CADD software	14	*Drawing Isometric drawings from given Isometric views and dimension it.	8	CO1 CO3 CO4
LLO 15.1 Use basic commands in CADD software. LLO 15.2 Write text in title block.	15	*Prepare a template for your institute of predefined paper size with title block and institute logo.	4	CO1 CO4
LLO 16.1 Use basic commands in CADD software. LLO 16.2 Take printout by using plot option	16	*Plot the drawings from Sr. 3 to 13 on Paper with title block and institute logo	4	CO1 CO5

Note : Out of above suggestive LLOs –

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

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Not Applicable

- Not Applicable

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Networked Licensed latest version of Computer Aided Drafting software.	All
2	CAD workstation with latest configurations for each student.	All
3	Plotter/Printer with latest versions.	All
4	LCD projector and Screen/ Interactive board.	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table) : NOT APPLICABLE

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Termwork Each practical will be assessed considering - - 60% weightage to process and - 40% weightage to product Continuous assessment based on process and product related performance indicators, laboratory experience.

Summative Assessment (Assessment of Learning)

- Practical Exam of 25 marks

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	-	-	1	-	-	1			
CO2	2	1	1	-	-	-	1			
CO3	2	1	1	-	-	-	1			
CO4	2	-	-	-	-	-	1			

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CO5	1	-	-	1	1	1	1		

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Prof. Sham Tickoo	AutoCAD 2021 for Engineers & Designers, Basic & Intermediate	Publisher: BPB Publications, 21 February 2021, ISBN-10: 9389898986, ISBN-13: 978-9389898989
2	Sankar Prasad Dey	Autocad 2014 for Engineers Volume 1	Publisher: Vikas, 21 December 2021, ISBN-13: 978-9325983373
3	Prof. Sham Tickoo	AutoCAD 2024: A Problem-Solving Approach, Basic and Intermediate	Dreamtech Press publication, August 20, 2023, ISBN-10 1640571779, ISBN-13 978-1640571778
4	Kulkarni D.M	Engineering Graphics with AutoCAD	Publisher: Prentice Hall India Learning Private Limited, 1 January 2010, ISBN-10: 8120337832, ISBN-13: 978-8120337831
5	Cadfolks	AutoCAD 2021 For Beginners	Publication: Kishore, 5 May 2020, ISBN-10 819419539X ISBN-13: 978-8194195399
6	Luke Jumper, Randy H. Shih	AutoCAD 2024 Tutorial First Level 2D Fundamentals	SDC Publication, June 27, 2023, ISBN-10 1630575852, ISBN: 978-1-63057-585-4
7	Sharad K. Pradhan, K K Jain	Engineering Graphics , AICTE Prescribed Textbook	Khanna Book Publishing; First Edition, 1 January 2023, ISBN-10 9391505503, ISBN-13 978-9391505509

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.autodesk.com/education/online-learning	Tutorials, courses, and resources for AutoCAD
2	https://www.cadtutor.net/	Tutorials, articles, forums and downloadable resources covering various CAD software applications.
3	https://www.cadin360.com/	Video tutorials, articles, and downloadable resources to enhance CAD skills.
4	https://ocw.mit.edu/courses/mechanical-engineering/	Lectures, assignments and projects covering topics such as engineering design, CAD/CAM, and product development.
5	https://www.engineering.com/LearningCenter/CAD.aspx	Tutorials, articles, and videos covering CAD software, simulation tools, and engineering design concepts.
6	https://www.youtube.com/watch?v=cmR9cfWJRUU	Introductory tutorial for beginners to AutoCAD, covering topics such as interface navigation, basic drawing commands and setting up units and layers.
7	https://www.youtube.com/watch?v=QuR-VKis3jU	2D mechanical drawings in AutoCAD, including drawing parts, adding dimensions, annotations and creating detailed technical drawings.
8	https://www.youtube.com/watch?v=IWYKfzx-M1E	2D mechanical drawings in AutoCAD, including drawing parts, adding dimensions and annotations, and creating detailed technical drawings.
9	https://www.youtube.com/watch?v=RA0O6AZewTc	Isometric drawings in AutoCAD
10	https://www.youtube.com/playlist?list=PLYEkKxSL5Gt1hR6Jg0ZiQSlc7vn-HTd7h	Isometric drawings in AutoCAD

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Sr.No	Link / Portal	Description
11	https://www.youtube.com/watch?v=PHSmwXQriIc	Isometric drawings in AutoCAD

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

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