Course Title:	**COMPUTER AIDED ENGINEERING DRAWING FOR COMPUTER SCIENCE AND ENGINEERING**	Semester	I/II
Course Code:	**BCEDK103/203**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	03

Course Learning Objectives

CLO 1. To understand the basic principles and conventions of engineering drawing

CLO 2. To use drawing as a communication mode

CLO 3. To generate pictorial views using CAD software

CLO 4. To visualize engineering components

CLO 5. To understand the application of engineering graphics in circuit branches.

Teaching-Learning Process

- Students should be made aware of engineering graphics as communication tool.
- Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc. can be used.
- Using CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

Module-1: Introduction to Orthographic Projections (8 hours)

Introduction (for CIE only): Significance of Engineering drawing. Co-ordinate system and reference planes HP, VP, RPP & LPP.

Introduction to Computer Aided Drafting software: Selection of drawing sheet size and scale. Commands on creation of points, lines, axis, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.

Projections of Planes:

Orthographic projections of planes: triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).

Self-study: Orthographic projections of points and orthographic projection of Lines.

Applications: Blueprint Creation, PCBs.
(RBT Levels: L1, L2 and L3)

Module-2: Projection of Solids (8 hours)

Solids: Prisms (triangle, square, pentagon and hexagon) resting on HP on base edges or corners. Pyramids (triangle, square, pentagon and hexagon) resting on HP on base edges or corners. Cones, Cubes & Tetrahedron.

Self-study: Orthographic projection of freely suspended solids.

Applications: Product Design and Prototyping, Manufacturing and Fabrication, Construction Plans.
(RBT Levels: L2, L3 and L4)

Module-3: Isometric Projection (8 hours)

Isometric Projection: Isometric scale, Isometric projection of combination of two simple solids - hexahedron (cube), right regular prisms, right regular pyramids, cylinders, cones and spheres.

Self-study: Conversion of simple isometric drawings into orthographic drawing.

Applications: 3D Visualization, Assembly, Architectural Visualization.
(RBT Levels: L2, L3 and L4)

Module-4: Development of Lateral Surfaces (8 hours)

Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular prisms, pyramids, cylinders and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations. (Without combination)

Self-study: Development of lateral surfaces of funnels, trays, circular duct and rectangular duct.

Applications: Sheet Metal Fabrication, Packaging Design.
(RBT Levels: L2, L3 and L4)

Module-5: Data Flow Diagrams & Algorithms (8 hours)

(For CIE Only)
Drawing Data Flow Diagrams (DFD): Drawing simple data flow diagrams (DFD) to represent processes and flow of information in software systems.
Drawing Flowcharts for Algorithms: Creating flowcharts for algorithms and basic program designs (sorting, searching algorithms, etc.)

Self-study: Drawing of simple analog and digital circuits such as amplifiers, oscillators, and logic gates.

Applications: Software Modeling
(RBT Levels: L1, L2 and L3)

Course outcomes

At the end of the course the student will be able to:

1. Demonstrate the fundamentals of orthographic projections and effectively use Computer-Aided Drafting (CAD) software to create geometrical shapes.
2. Develop orthographic projections of solids in the first quadrant.
3. Develop the ability to create accurate isometric projections of solids.
4. Develop the lateral surfaces of the object.

5. Represent logical workflows and information processes in engineering and software systems by creating data flow diagrams and flowcharts.

Course Assessment and Evaluation Details (both CIE and SEE)

Continuous Internal Evaluation (CIE)

CIE shall be evaluated for max. marks of 100 and later the same shall be scaled-down to 50 marks. CIE component should comprise of Continuous evaluation of Drawing work of students as and when the Modules are covered based on below detailed weightage.

Continuous Internal Evaluation: 50 marks

Module	**Max. Marks Weightage**	**Evaluation weightage in marks**	
		Computer display and printout	**Sketching**
Module 1	20	10	10
Module 2	20	10	10
Module 3	20	10	10
Module 4	20	10	10
Module 5	20	00	20
Total	**100**	**40**	**60**

- The above class work of students is to be scaled down to 25 marks.
- One Lab test covering all the modules is to be conducted for 100 marks and scaled down to 25 marks.
- The final CIE = class work marks + test marks

Semester End Examination (SEE)

- SEE shall be conducted and evaluated for maximum marks 100 and later the same shall be scaled-down to 50 marks.
- Questions are framed for students to do sketching only.
- One full question shall be set from Modules 1, 2, 3 and 4 as per the below weightage.

Module	**Max. Marks Weightage**
Module 1	20
Module 2	30
Module 3	25
Module 4	25
Total	**100**

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Model creation of 2D planes like square, triangle, pentagon and hexagon etc.
- Creation of simple three-dimensional solids like prisms and pyramids.
- Use of real objects to create scaled drawings.

Suggested Learning Resources:

Text Books

- Engineering Visualization, S.N. Lal, & T Madhusudhan, 1st Edition, Cengage, Publication.
- Engineering Drawing, Parthasarathy N. S., Vela Murali, Oxford University Press, 2015.

Reference Books

- Textbook of Computer Aided Engineering Drawing, K. R. Gopalakrishna, & Sudhir Gopalakrishna, 39th Edition, Subash Stores, Bangalore, 2017.
- Engineering Drawing: Plane and Solid Geometry, Bhatt, N.D., 53rd edition, Charotar Publishing House Pvt. Limited, 2019.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill
- Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press

Web links and Video Lectures (e-Resources):

https://www.youtube.com/@bunkcna/playlists
https://www.youtube.com/@engineeringvisualization1005/playlists
https://online.vtu.ac.in/course-details/Engineering-Drawing-and-Computer-Graphics

COs and POs Mapping

COs	PO's											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	0	0	3	1	0	1	1	3	0	2
CO2	3	2	0	0	3	1	0	1	1	3	0	2
CO3	3	2	0	0	3	1	0	1	1	3	0	2
CO4	3	2	0	0	3	1	0	1	1	3	0	2
CO5	3	2	0	0	3	0	0	0	1	3	0	2

Note: 1. CO'S & PO'S to be mapped by individual faculty.
2. Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped