K. S. INSTITUTE OF TECHNOLOGY

An Autonomous Institution under VTU, Approved by AICTE

Department of Mechanical Engineering

FIRST / SECOND SEMESTER SYLLABUS

Course : Computer Aided Engineering Drawing for ME Stream		Semester	I/II
Course Code	**25BCED103C / 203C**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	**2:0:2:0**	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Laboratory**		

Course Objectives (Course Skill Set)

1. Generate orthographic projections of points, lines, planes, and solids manually and with computer aided tools.
2. Develop the lateral surfaces of solids for real-world applications.
3. Draw isometric views and convert isometric drawings to orthographic views.
4. Create basic 3D models of engineering components and parts.
5. Demonstrate of 3D printing components

Module-1

Introduction: Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.

Orthographic Projections of Points, Lines and Planes: Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only as per BIS) Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).

Number of Hours:8

Module-2

Orthographic Projection of Solids: Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.

Number of Hours:8

Module-3

Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (*Concepts only and No Problems for practice)*

Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.

Number of Hours:8

Module-4

Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block.

Number of Hours:8

Module-5

Conversion of simple isometric drawings into orthographic views: Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.

Concept of Part Design (For CIE Only): 3D Modeling: Simple machine parts / engineering components. (Applying material properties and rendering for realistic visualization) Sheet Metal & Surface Design: Automotive panels, HVAC ducting Concept of Industrial drawing

Demonstration of working of 3-D printing Machine. Each section students will be demonstrated with a specific model for printing (between 8thand 10thweek of course).The details step of making the CAD model, converting it to suitable machine language and operating the 3-D printer will be demonstrated. A model will be printed using 3-D printing Machine and will be displayed. *(For practice only, not for CIE and SEE).*

Number of Hours:8

Course outcome (Course Skill Set)

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

CO1: **Make us of** the standards and conventions in Engineering Drawings to obtain projections of simple points and lines.

CO2: **Obtain** the orthographic views of different types of lamina kept on Horizontal and Vertical plane.

CO3: **Construct** the orthographic view of regular Solids resting on Horizontal plane at different angles.

CO4: **Build** isometric projections of solids and combination of two simple solids to obtain three dimensional appearances.

CO5: **Develop** the lateral surface of various solids and **make use of** 3D printing machine to print a simple 3D model.

Suggested Learning Resources:

Books (Name of the author/Title of the Book/Name of the publisher/Edition and Year) Text Books:

1. K. R. Gopalakrishna, & Sudhir Gopalakrishna: A Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
2. 2. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd Edition, Charotar Publishing House Pvt. Limited, 2023.

Reference Books

1. Warren. J. Luzadder, Jon M Duff, Fundamentals of Engineering Drawing, 11th edition, Prentine-Hall of India Pvt Ltd.
2. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes, 1997.
3. R K Hegde and Niranjan Murthy, Computer Aided Engineering Drawing, Revised edition 2010, Sapna Book House Publications.
4. N H Dubey, Computer Aided Engineering Drawing, Revised edition, Himalaya Publishing House,First Edition, 2006.
5. A Primer on Computer Aided Enginerring Drawing 2006, published by VTU, Belagaum.
6. S Trymbaka Murthy, Computer Aided Engineering Drawing, Third Edition 2006, I. K. International Publishing House.
7. Gibson Ian., David Rosen, Brat Stucker, Additive Manufacturing Technologies, 2nd Edition, Springer Publication, 2015.

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/112104172
- https://nptel.ac.in/courses/112102304
- https://nptel.ac.in/courses/112105294
- https://www.coursera.org/courses?query=3d%20modeling&utm
  https://www.classcentral.com/subject/sheet-metal-design?utm

Teaching-Learning Process (Innovative Delivery Methods)

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching- learning process and facilitate the achievement of course outcomes.

1. Share **short videos/tutorials** on CAD basics before class.
2. **Theory + Hands-on**: Start each session with a short conceptual lecture (principles of projection, dimensioning, tolerances, etc.) followed by live software demonstrations.
3. Use **projected screen-sharing** to demonstrate CAD commands in real time.
4. Use **3D printed parts or real machine components** to explain orthographic projections and sectional views.

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and Semester End Examination (SEE), with each carrying 50% weightage.

• To qualify and become eligible to appear for SEE, in the **CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.**

• To pass the **SEE**, a student must score at least **35% of 50 marks, i.e., 18 marks.**

• Notwithstanding the above, a student is considered to **have passed the course**, provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Internal Evaluation (CIE):

CIE shall be evaluated for 50 marks as detailed below:

The final CIE (50) = Class work marks (30) + Test marks (20)

• Class work marks should comprise of continuous evaluation of Drawing work of students as and when the Modules are covered based on the weightage as shown in the following table.

Module	**Max. Marks Weightage**	**Evaluation Weightage in marks**	
		Computer display and printout(a)	**Sketching (b)**
Module 1	**20**	**15**	**5**
Module 2	**30**	**25**	**5**
Module 3	**25**	**20**	**5**
Module 4& 5	**25**	**20**	**5**
Total	**100**	**80**	**20**
Consideration of Class work		**Total of [(a)+(b)] =100 Scale down to 30 marks**	

At least one Test covering all the modules is to be conducted for 100 marks and evaluation to be based SEE pattern, and the same is to be scaled down to 20Marks.

Semester End Examination (SEE):

• SEE shall be conducted in batches similar to practical's and evaluated for maximum of 100 Marks. Obtained marks shall be accounted for SEE final marks, reducing it by 50%.

• **Two full questions** shall be set from Modules 1, 2, 3 and 4. Students need to answer one full quest from each module.

• Two full questions set from each Module shall cover the entire topic of the respective module.

• Question papers shall be provided by the **COE office, KSIT** for each batch as per schedule.

• SEE shall be conducted by one Internal and one External Examiner.

• Evaluation shall be carried out jointly by both the examiners.

• **The student to be awarded marks, according to weightage mentioned in the table(*for solution on computer display and sketch*).**

Module	**Max. Marks Weightage**	**Evaluation Weightage in marks**	
		Computer display and printout(a)	**Sketching(b)**
Module 1	**20**	**15**	**05**
Module 2	**30**	**25**	**05**
Module 3	**25**	**20**	**05**
Module 4& 5	**25**	**20**	**05**
Total	**100**	**80**	**20**
Consideration of SEEMarks		**Total of [(a)+(b)] ÷ 2 = Final SEE marks**	

Suggest Innovative Deliver Methods may include (but are not limited to):

- Flipped Classroom
- Problem-Based Learning (PBL)
- Case-Based Teaching
- Simulation and Virtual Labs
- Partial Delivery of course by Industry expert/ industrial visits
- ICT-Enabled Teaching
- Role Play