SARVAJANIK UNIVERSITY

Sarvajanik College of Engineering and Technology

Bachelor of Technology

Mechanical Engineering Department

B. Tech. Semester V

Course Name: **Solid Modelling** **Course Code: BTME19552**

Type of course: **Minors – Computer Aided Modeling and Simulation**

Prerequisite: Engineering Graphics & Design

Rational of course: This course will enable the students to acquire the knowledge needed to complete the process of designing models from conceptual sketching, through to solid modeling, assembly design and drawing preparation.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
0	2	4	4	--	--	--	60	40	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Contents:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Design Software Interface and Essentials:** Fundamental of computer design, A typical product cycle, CAD tools for the design process of the product cycle, Design for assembly and manufacturing, computer peripherals, concept of coordinate systems, orthographic and isometric projection's view, graphical user interface.	2	5%
2.	**Basic Sketch and Part Modeling:** Sketch with different sketch commands, reference planes, modify given parts to match design needs, constraints, inspect, explore different materials for prototype models, prototype model's mass, volume, and center of gravity, electronic design,	12	40%

Sr. No.	Topics	Teaching Hrs.	Module Weightage
	design parts which are to be fabricated with sheet metal, controlling parameters, sheet metal design tools.		
3.	**Assembly Tools:** Creating components, reusing components, positioning components, importing components from the browser, move, copy process, assembly constraints, introducing joints – using the rigid joint type, working with the different types of joints, creating rigid groups, understanding contact set, enabling motion linking, standard parts insert: McMaster-Carr component.	**6**	**20%**
4.	**Drawing Tools:** Drawing settings and preferences, interpret different drawing annotations, drawing symbols, additional drawing views: base view, projected view, section view, detail's view, break view and exploded views, dimensioning method, linear, part list of tables (BOM).	**4**	**14%**
5.	**Rendering , Animation and Manufacture Tools:** Rendering: Physical material and appearance, scene setting, IN CANVAS RENDER. Animation: Storyboard, transform, annotation, view and publish. Manufacture: Product data exchange, file types (IEGS, STEP, ACIS, DXF, PARASOLID, STL, etc.)**.**	**4**	**14%**
6.	**Introduction to Manufacturing Domain:** Drawing symbols used in various engineering fields, industry based components modeling and drawing, introduction to CAE, FEM, FEA and CAM, rapid prototyping.	**2**	**7%**

Percentage Distribution of Marks as per Bloom's Taxonomy (Theory/Practical):

Percentage Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**15**	**25**	**15**	**15**	**20**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

Learning Resources:

Sr. No.	Title of book /article	Author(s)	Publisher	Publication Year	Publication Edition
1.	Autodesk Fusion 360 For Beginners: Part Modeling, Assemblies, and Drawings	Tutorial Books	Kishore	2019	Illustrated edition
2.	Autodesk Fusion 360 Basics Tutorial	Tutorial Books	CreateSpace Independent Publishing Platform	2018	2nd
3.	Autodesk Fusion 360: A Power Guide for Beginners and Intermediate Users	John Willis, Sandeep Dogra,	Cadartifex	2020	4th
4.	Mastering SolidWorks	Matt Lombard	Sybex	2018	1st
5.	Autodesk Inventor Exercises	Bob McFarlane	Routledge	2017	1st

Course Outcomes (CO):

Sr. No.	CO Statements After learning this subject, students will be able to	Marks % weightage
CO-1	Observe the modelling features available in software.	5
CO-2	Create 2D and 3D Model using CAD software tools.	40
CO-3	Create an assembly of a given object.	20
CO-4	Prepare an assembly drawing and details views of drawing.	14
CO-5	Develop animation and render of an object.	14
CO-6	Apply the concepts of manufacturing process.	7

Mapping of (CO's) with Program Outcomes (PO's):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO-1	3	1	2	2	3	1	1	1	2	2	1	2
CO-2	3	3	3	2	3	1	1	1	2	2	2	2
CO-3	3	3	3	2	3	2	1	1	3	2	2	1
CO-4	1	1	1	1	2	1	1	1	3	3	1	2
CO-5	3	3	3	2	3	1	1	1	2	2	2	2
CO-6	3	1	2	2	3	1	1	1	2	2	1	1
Rationale*	**16**	**12**	**14**	**11**	**17**	**7**	**6**	**6**	**14**	**13**	**9**	**10**

*** Rationale - Mapping of CO's with PO's:**

This course will focus on the basic concept and application of 3D modeling software. It also helps to design/development of components with the help of parametric 3D modeling software. It focuses on individual and team work for better communication.

This course highly maps with Program outcomes 1,2,3,5,9,10. It states that the course will develop Engineering knowledge, Problem analysis, Design / development of solutions, Modern tool usage, Individual and teamwork, Communication.

SARVAJANIK UNIVERSITY

Sarvajanik College of Engineering and Technology

Bachelor of Technology

List of Practical:

1. Prepare drawing symbols used in various engineering fields using CAD software tools
   (a) Symbolic representation of electrical and electronic elements
   (b) Symbolic representation of weld, brazed and soldered joints
   (c) Symbolic representation of bars and profile sections
   (d) Symbolic representation of piping joints and fittings
2. Prepare drawings of building designs in accordance with structural building codes using CAD software tools;
   a) Layout of existing upper floor plan in proportion
   b) Plumbing fixtures on layout
   c) Main sewer line
   d) Identification of flow from fixtures to main stack
   e) Connection of property pipe to main sewer line
   f) Labelling of structures and fitting
3. To create flange, bend, extrude, hole, tread, pattern, modify using sheet metal tools
4. To construct the 3D part model and create the rendering of the object
5. To prepare the assembly of the object
6. To prepare the part drawing and assembly drawing as per the industry standard
7. To create the animation and the exploded views in CAD drawing sheet of the objects
8. To prepare the design report and presentation of the solid model for the evaluation

Student Activities:

Student should conduct following activities in group:

1. **2D Sketch:** Prepare 2D drawing of the objects.
2. **Solid Modeling:** Prepare 3D part of the objects. (eg. ratchet wheel, geneva gear index, yoke, wheel, transition pipe, lens barrel)
3. **Assembly:** Prepare the 3D model of part and assembly of part (eg. Enclosure for PCB , shaft assembly: the assembly consists of three parts: the shaft , handle, and a hinge)
4. **Drawing:** Prepare detail drawings of part model and assembly for manufacturing purposes
5. **Rendering & Animation:** Prepare animation and rendering of part model and assembly.

Equipment's available:

1. Computational facilities

List of Open Source/learning website:

1. youtube.com/c/AutodeskFusion360/featured
2. https://help.autodesk.com/view/fusion360/ENU/courses/

List of Software: 3D Modeling Software