

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: COMPUTER AIDED GRAPHICS
(COURSE CODE: 3362002)**

Diploma Programme in which this course is offered	Semester in which offered
Mechatronics	Sixth

1. RATIONALE

The diploma engineers are supposed to get involved in modeling, designing, manufacturing, inspection and planning activities (such as preparing design and production drawing, process plans, preparing bill of materials, etc.) in industries. For production of components and assemblies accurately and precisely it is of utmost importance to prepare, read and interpret different drawings correctly. It is also important for diploma engineers to understand the industrial practices of modeling and designing and for this they should be aware of modeling and designing practices, symbols, codes, norms and standards generally used in industries. This course has been therefore designed to develop the skills in the students so that they may generate models and digital production drawings using CAD software. It is therefore a key course for mechatronics engineers.

2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop required skills in the students so that they are able to acquire the following competency:

- **Develop production and other drawings using CAD software.**

3. COURSE OUTCOMES (COs)

The experiments should be carried out in such a manner that students are able to acquire required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes:

- Select hardware and software for CAD workstation.
- Draw and modify 2D production drawings of mechanical components.
- Develop 3D models of machine parts and assemblies.
- Develop 2d Drawings from 3d models.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
0	0	4	4	0	0	40	60	100

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit, ESE -End Semester Examination; PA - Progressive Assessment.

5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Fundamentals of CAD	1a. Describe the use of CAD application 1b. Distinguish the hardware and software for CAD workstation	1.1 CAD – Concept and Need 1.2 Functional Areas of CAD 1.3 Specifications of CAD work station 1.4 Input- Output devices 1.5 Features of CAD software.
Unit – II 2D Production Drawing	2a. Differentiate standards based design with traditional methods. 2b. Use various tools of AutoCAD mechanical for preparation of production drawings.	2.1 AutoCAD and AutoCAD Mechanical 2.2 Requirement of production drawings 2.3 Content library 2.4 Construction features 2.5 Use of layers and Annotations
Unit – III Parametric Modeling	3a. Differentiate parametric and non-parametric sketcher environments. 3b. Use various sketch tool and solid modeling tools of available parametric software	3.1 Parametric and non-parametric modelling. 3.2 2D sketch environment of parametric software and non-parametric software. 3.3 Parametric software in industries and their features 3.4 Sketching and solid modelling tools
Unit – IV Advance Modeling techniques	4a. Apply advance modeling tools to generate complex parts.	4.1 Advance tool and basic solid modelling tools. 4.2 Various advance modelling tools (sweep, loft-blend, helical sweep, pattern, boundry, Standard holes wizard) 4.3 Error rectification.
Unit – V Assembly Modeling and Drawing	5a. Use assembly module. 5b. Apply various assembly constraints 5c. Animate assembly 5d. Apply drawing module to generate 2D production drawing 5e. Plot drawing on standard sheet	5.1 Basic Assembly constraints 5.2 Mechanical Assembly constraints 5.3 2D production drawing using drawing modules with various orthographic views (may have sectional views) 5.4 Generation of Bill Of Material with balloons 5.5 Plotting of assembly and drawing details on standard paper with title block mentioning scale of plot.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

Not Applicable

7. SUGGESTED EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical Exercises (outcomes in Psychomotor Domain)	Approx. Hours Required
1	I	Demonstration of AutoCAD Mechanical environment and its commands.	1
2	II	Prepare 2D production drawing and plot on paper using AutoCAD Mechanical-(At least Four parts)	8
3	III	Demonstration of Parametric software environment and its commands.	1
4	III	Prepare 2D drawing using parametric software(At least Four parts)	4
5	III	Prepare 3D Solid Models using parametric softwares (includes base features like extrude, revolve, cut, shell, chamfer, rib, fillet etc) (At least Eight parts)	16
6	IV	Prepare 3D Solid Models using parametric softwares (Includes advance features like sweep, blend (loft), pattern	8
7	V	Prepare 2D production drawing of given components prepared in exercise 5 and 6 and take print using plotter. (at least four components)	4
8	V	Prepare 3D solid modeling of given Assembly and animate.(must have 4 to 6 components) (at least four assemblies)	14
Total Hours			56

Notes:

- It is compulsory to prepare log book of exercises. It is also required to get each exercise recorded in logbook, checked and duly dated signed by teacher. PA component of practical marks is dependent on continuous and timely evaluation and submission of exercises.
- Term work report must not include any photocopy / ies, printed manual/pages, litho, etc. It must be hand written / hand drawn by student only.
- Mini project and presentation topic/area has to be assigned to the group of specified students in the beginning of the term by batch teacher, if applicable.

- d. For practical ESE part, students are to be assessed for competencies achieved. They should be given experience/part of experience to perform as under.

8. SUGGESTED STUDENT ACTIVITIES

Sr. No.	Activity
1	Bring Actual mechanical assembly from industry /real life/scrap shop/garage/etc. (made up of at least 4 to 5 mechanical components),dismantle the same, measure Dimensions and draw it
2	Download tutorials from websites

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

S. No.	Unit	Unit Name	Strategies
1	I	Introduction	a. Demonstrate various input and output devices of cad work station. b. Explain installation of software
2	II	2D production drawing	Ask students to bring and analyze actual production drawings of any mechanical component.
3	III,IV andV	Parametric modeling advanced modeling techniques, assembly modeling and drawing.	a. Show steps for creation of various components in any modeling softwares. b. Demonstrate different constraints with help of actual assembly.
4	I to V	All	Teach in the computer lab and use LCD projector to explain use of different commands for drawing and ask students to follow the commands on their computers.

10. SUGGESTED LEARNING RESOURCES

A. Books

S. No.	Author	Title of Book	Publication
1.	Tickoo, Sham	Creo 2.0 for designer and engineers	Dreamtech press, New Delhi
2.	Rider, Michel J	Designing with Creo Parametric 2.0	SDC Publications, Kansas, USA
3.	Tickoo, Sham	AutoCAD for engineers and Designers	Dreamtech press, New Delhi
4.	Narayan, K.L.	Production drawing	New Age publication, New Delhi

B) Major Equipment/ Instrument with Broad Specifications

S. No.	Resource With Brief Specification.
1	CAD work station (With latest compatible specification required for latest version of softwares.)
2	Plotter (A2 size)
3	Latest version of AutoCAD Mechanical
4	Educational version of creo, solidworks, inventor, solid edge(any one)

C. Software/Learning Websites

- i. <http://www.cadcim.com/>
- ii. <https://www.youtube.com/watch?v=6glpCzXvCbw>
- iii. <https://www.youtube.com/watch?v=xMjUCq8kNf8>
- iv. <https://www.youtube.com/watch?v=SMVSSzAGyn>
- v. <https://www.youtube.com/watch?v=Smh5CjjeNxY>
- vi. <https://www.youtube.com/watch?v=zNDwvsU5Dko>

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics.**

- **Prof. K. P. Patel**, Head of Department, Mechanical Department, B. S. Patel Polytechnic, Kherva, Mehsana.
- **Prof. J. M. Patel**, Sr. Lecturer, Mechanical department, B.S.Patel Polytechnic, Kherva, Mehsana

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. V. Somkuwar**, Associate Professor, Department of Mechanical Engineering.
- **Dr. Joshua Earnest**, Professor, Department of Electrical and Electronics Engineering.