GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2023 (COGC-2023)
Semester-VI

Course Title: Mechanical Engineering (CAD/CAM) Project-II
(Course Code: 4366501)

Diploma program in which this course is offered	Semester in which offered
Mechanical Engineering (CAD/CAM)	6th Semester

1. RATIONALE

This course enables the students to exercise some of the knowledge and/or skills developed during the program to new situation or problem for which there are number of engineering solutions. This course include planning of the tasks which are to be completed within the time allocated, and in turn, helps to develop ability to plan, , use, monitor and control resources optimally and economically. By studying this course abilities like creativity, imitativeness and performance qualities are also developed in students. Leadership development and supervision skills are also integrated objectives of learning this course.

2. COMPETENCY

The course content should be taught and implemented to develop different skills so that students can acquire the following competency.

- Plan, use, monitor and control resources optimally and economically.
- Identify the problem and apply innovative, creative and logical approach for problem solving.

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge, and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

CO	CO Statement
CO-1	Plan and identify materials, processes and other resources optimally.
CO-2	Develop innovative and creative ideas.
CO-3	Develop leadership, interpersonal skill and team work.
CO-4	Develop sense of environmental responsibility.
CO-5	Purchase raw material/standard parts.
CO-6	Interpret the drawings, manufacture, assemble, inspect & if necessary modify the parts/unit/assembly of the project work.

CO-7	Familiar with fast changes in technology.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
0	0	4	2	0	0	50	50	100

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

5. SUGGESTED PRACTICAL EXERCISES

Following practical outcomes (PrOs) are the subcomponents of the Course Outcomes (COs). Some **POs** marked **'*'**are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to the 'Psychomotor Domain.'

A project awareness program will be arranged at the end of semester 4 or well before the start of semester-5 to initialize the Project-I Activities

Guide students to follow steps given below to gather the data in search a project:

1. Go through the syllabus of mechanical engineering Project-I and Project–II.
2. Start by conducting a thorough research in the field or explore an online platform to get an idea of what type of mechanical engineering projects are currently being done. Show case them previously completed projects. Look for relevant resources such as journals, websites, and blogs that focus on mechanical engineering projects.
3. Seek advice from faculties, guide, industry professionals or anybody who have expertise in the field of mechanical engineering. They can guide you in finding suitable projects and even suggest potential project topics.
4. Attend workshops or seminars related to mechanical engineering projects, if any to learn about the latest trends and techniques used in this field.
5. Check with local companies or industries to see if they have any projects that you can work on.

Pr. No.	Practical Outcomes (PrOs)	Approx. Hrs.
01	**Preparatory Activity:** a. Keep project report of V semester course Mechanical Engineering Project-I 4351904. b. Appreciate the importance of course outcomes. c. Recall and strengthen know-how for engineering drawing fundamentals which includes: i. Most used limits and fits with values. ii. Various machining processes and surface roughness symbols. d. Evaluate all the projects (Mechanical Engineering Project –I- 4351904) drawings and select feasible project for execution in batch. (Total projects will be equal to number of students in a batch. Evaluate and select in such a way that selected project will be executed in groups. That is, there may be 3-5 projects,	06

Pr. No.	Practical Outcomes (PrOs)	Approx. Hrs.
	remaining will be dropped, and for selected project, there will be distribution of the students in group.) Attach selected project drawings. e. Recheck and correct (Minor corrections) if necessary, project production drawings of selected projects (The project drawings of the student prepared in course Mechanical Engineering Project –I- 4351904).	
02	**Work allocation matrix:** Prepare work allocation matrix along with provision of follow-up remarks and notes. (Suggested format of work allocation matrix with provision of follow-up is attached herewith in Annexure -I).	04
03	**Project execution:** Execute project preparation activities as per work allocation matrix. (Option of flexi time based work can also be practiced. For this option, it may not be necessary to exactly follow the time table slots. This can be on continuous base also.)	40
04	**Documentation and presentation:** a. Prepare a computerized project report with following guidelines. PAGE : A4 (Compulsory print on both side) MARGIN : TOP 15mm BOTTOM 15mm RIGHT 15mm LEFT 30mm (mirror margining) FONT : ARIAL FONT SIZE: TITLE:12 BOLD, CONTENT:12, SPACING :18pt HEADER: PROJECT TITLE, PAGE No ON TOP RIGHT. FOOTER : ACADEMIC YEAR, SHORT NAME **Documentation of final project report which includes following in sequence.** a. Title page- b. Certificate – c. Index. d. Preface/Acknowledgement. e. Course outcomes. f. Project title. g. Assembly and detail production drawings. h. List of activities and work allocation matrix. i. Plant layout with dimensions. j. List and specifications of machineries, equipments and tools. k. Bill of material with make or buy decision. l. Specifications of bought out parts. m. Process sheets-As per format given in course Industrial engineering. n. Flow process charts. o. Specification and consumption of consumables. p. Details of inspection / testing carried out. q. Details of rework / rectifications carried out. r. Cost estimation. s. Monitoring and control report/sheet. t. Notes on troubleshooting. u. Notes on individual achievement of skills / experience /problems / solutions.	06

Pr. No.	Practical Outcomes (PrOs)	Approx. Hrs.
	v. References. w. Day to day logbook. x. Presentation including moments at work-video/photographs in action. **SAMPLE FORMAT OF PROJECT-II REPORT** • The Report may include the following. Text shown in the square bracket [] is an explanation on the chapter/topic. 1. Abstract: [A brief summary of the project, including its objectives, methodology, and results.] 2. Introduction: [An introduction to the project, including its background and scope.] 3. Literature Review: [A review of the existing literature related to the project, including any relevant theories or concepts. This may include Prior Art Search.] 4. Methodology: [A description of the research methodology used in the project, including data collection and analysis methods.] 5. The Outline of the solution: [This may include Product specification, Details & Assembly production drawing, User Manual, Operation Process Chart (OPC), Group's work allocation for entire Project-I duration, statements/plans of soft/hard resources requirement at various stages of manufacturing, Process Plans, Budget/cost estimation etc.] 6. Results and Discussion: [A presentation of the project's probable results, including any statistical analyses, charts, or graphs. This section should also include a discussion of the results and their implications.] 7. Conclusion: [A summary of the project's main findings and conclusions.] 8. Recommendations: [Suggestions for future research or improvements to the project.] 9. References: [A list of all sources cited in the report.] 10. Appendices: [Any additional materials that support the report, such as photographs, technical drawings, circuits, software or data sets.] b. Print Project-II report in required numbers, after guide's approval. c. Submit Hard copy of Project-I report, Original Project-II Logbook, Soft copy of Project-I report/records. Note: 1. Each project group will present their work after completion of each exercise as per department's plan. 2. Projects may be showcased in Institutional/regional level events.	
Total (Hours)		**48**

Note:

a. Term work (hard copy) should also include experience logbook duly certified by workshop instructors (as applicable), Industry/Market/Field personnel (as applicable) and subject teachers.

b. Term work has to be defended (along with term work of V semester and VI semester) by practical / oral examination to be conducted by external and internal examiners. Power point presentation is also to be included.

6. Sample rubrics Performance Indicators for the PrOs

Criteria	%	4	3	2	1
Logbook	10%	Always maintains proper order of meetings and assigned tasks	Consistently maintains proper order of meetings and assigned tasks	Sometimes maintains proper order of meetings and assigned tasks	Rarely maintains proper order of meetings and assigned tasks
Conclusion, Future Scope	10%	Conclusion derived appropriately	Conclusion derived but partial	Not relevant conclusion	No conclusion
Report write-up	10%	Always preparer basic category/section and summary	Consistently preparer basic category/section and summary	Sometime preparer basic category/section and summary	Rarely preparer basic category/section and summary
Oral Presentation	10%	Always discuss all contain with outline and methodology used	Consistently discuss all contain with outline and methodology used	Sometime discuss all contain with outline and methodology used	Rarely discuss all contain with outline and methodology used
Budget Analysis	10%	Always list parts used assembly and costing with competitive rates	Consistently list parts used assembly and costing with competitive rates	Sometime list parts used assembly and costing with competitive rates	Rarely list parts used assembly and costing with competitive rates
Work allocation matrix	10%	Work Distribute Satisfactory & Corporate Team	60-79 % corporate to team	40-59 % corporate to team	Do not corporate to team
Part Manufacturing	15%	Contribute in part manufacturing	60-79 % Contribute in part manufacturing	40-59 % Contribute in part manufacturing	No Contribute in part manufacturing
Assembly	10%	Satisfactory assemble all part	60-79 % assemble all part	40-59 % assemble all part	Not assemble any part
Testing Result	15%	Satisfactory test the result	60-79 % test the result	40-59 % test the result	Not test any result

7. MAJOR EQUIPMENT/INSTRUMENTS REQUIRED

Sr. No.	Equipment Name	PrO. No.
1.	Computer with word processor software	4

8. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above COs and PrOs. More can be added to fulfill the development of this course competency.

a. Work as a leader/team member.

b. Follow safety practices.

c. Follow ethical practices

d. Maintain tools and equipment

e. Practice environment-friendly methods and processes.(Environment Related)

9. SOFTWARE/LEARNING WEBSITES

- https://www.theengineeringprojects.com/
- https://asmedigitalcollection.asme.org/mechanicaldesign
- https://blog.creationcrate.com/mechanical-engineering-projects/

10. PO-COMPETENCY-CO MAPPING

Semester V	POs						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Competency & Course Outcomes	Basic & Discipline-specific knowledge	Problem Analysis	Design/development of solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability & environment	Project Management	Life-long Learning
Competency	**Apply systematic approach for problem identification and its selection; to provide qualitative, cost effective, sustainable solution for the selected problem.**						
Plan and identify materials, processes and other resources optimally.	3	2	3	2	3	3	2
Develop innovative and creative ideas.	2	3	3	2	2	3	3
Develop leadership, interpersonal skill and team work.	-	-	-	-	-	3	3
Develop sense of environmental responsibility.	2	-	3	2	3	3	3
Purchase raw material/standard parts.	2	-	-	2	3	3	-
Interpret the drawings, manufacture, assemble, inspect & if necessary modify the parts/unit/assembly of the project work.	3	2	3	2	-	3	3
Familiar with fast changes in technology.	3	-	3	2	2	3	2

Legend:'3' for high, '2' for medium, '1' for low, and '-'for no correlation each CO with PO.

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE (GTU Resource Persons)

Sr. No.	Name and Designation	Institute	Contact No.	Email
1.	Muhammad Azharuddin U Badi, Lecturer Mechanical Engineering	627 - Government Polytechnic, Porbandar	9558800951	muhammadabadi92@gmail.com

12. BOS Resource Persons

Sr. No.	Name and Designation	Institute	Contact No.	Email
1	Dr. S. H. Sundarani, BOS Chairman & HOD Mechanical	Government Polytechnic, Ahmadabad	9227200147	gpasiraj@gmail.com
2	Dr. Rakesh D. Patel, BOS Member & HOD Mechanical	B. & B. Institute of Technology, V. V. Nagar	9825523982	rakeshgtu@gmail.com
3.	N.G.Parmar, BOS Member	R.C.Technical Institute, Ahmedabad	9426333054	ng_parmar@yahoo.co,

ANNEXURE-I

WORK ALLOCATION MATRIX (SUGGESTED)

ER NO | | | | | | | | | | | | | **NAME :-**_____**GROUP:-**_____

Sr No	Short Description of Activity	Who Will Perform?	Planned Date		Actual Date		Who Has /Have Performed	Reason/S for Any Delay from Plan	Sign of Guide
			Start	End	Start	End			
1.	Preparing and maintaining logbook as per Annexure-V.								
2.	Finalization of assembly and detail drawings (This must be production drawings with suitable scale along with dimensions, tolerances, surface roughness symbols, heat treatment / other treatments required, material, quantity per assembly for components drawings, etc.								
3.	Preparing master schedule and work allocation matrix in group.								
4.	Preparation of bill of material.								
5.	Collecting data and specifications of available resources-mainly material and machineries / equipment / facilities and tools.								
6.	Make or Buy decision.								
7.	Preparing specifications of bought-out parts.								
8.	Preparation of process planning (sheets) for all components in standard format.								
9.	List, quantities and specifications of consumables.								

Sr No	Short Description of Activity	Who Will Perform?	Planned Date		Actual Date		Who Has /Have Performed	Reason/S for Any Delay from Plan	Sign of Guide
			Start	End	Start	End			
10.	**Preparation of list of required tools cutting tools, jigs, fixtures, measuring instruments and other tools along with necessary specifications and sketches if required.**								
11.	**Identifying and locating required resources like material, machineries / equipments / facilities and tools.**								
12.	**Preparing plant layout.**								
13.	**Manufacturing of components.**								
	a. <name of component 1>								
	b. <name of component 2>								
	d. <name of component 3>								
	e. ..								
	n. <name of component n>								
14.	**Details of inspection carried out.**								
15.	**Assembly.**								
16.	**Details of testing carried out.**								
17.	**Rework / rectification activities if required.**								
18.	**Costing.**								
19.	**Preparation of notes on troubleshooting.**								
20.	**Preparation of notes individually on** **a. Extent to which he/she has achieved learning outcomes.** **b. Own experience in executing project.** **c. He/ She has faced technical**								

Sr No	Short Description of Activity	Who Will Perform?	Planned Date		Actual Date		Who Has /Have Performed	Reason/S for Any Delay from Plan	Sign of Guide
			Start	End	Start	End			
	problems during execution of project and solutions found.								
21.	Preparation of list of references.								
22.	Preparation of project report.								
23.	Presentation.								