GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum

COMPUTER AIDED MACHINE DRAWING
(Code: 3331906)

Diploma Programme in which this course is offered	Semester in which offered
Mechanical/Marine Engineering	3rd Semester

1. RATIONALE

The students of mechanical engineering programme are mainly involved in drafting, manufacturing, inspection and planning activities (such as preparing process plans, preparing bill of materials, etc.) in industries. For all such activities, reference document is the drawing of component/assembly to be manufactured. In this context, it is of utmost importance to prepare, read and interpret these drawings correctly for production of components and assemblies accurately and precisely. The industrial practices of drafting are also important for the students to make them aware of drafting practices, symbols, codes, norms and standards generally used in industries.

Development of sketching ability also strengthens effective engineering communication & presentation. Now a days the market driven economy demands frequent changes in product design to suit the customer needs. With the introduction of computers the task of incorporating frequent changes as per requirement is becoming simpler. This course has been introduced at Diploma level in order to develop the skills in student so that they can generate various digital production drawings as required in industry using various CAD software.

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2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency.

- **Prepare production drawings using computer and relevant software and following standards codes and norms.**

3. 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	100
0	0	4	04	0	0	40	60	

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit – I Introduction	1.a Interpret drafting, tolerance and geometrical symbols in given production drawings. 1.b Appreciate AutoCAD (Mechanical) environment in context to production drawings.	1.1 Basic knowhow of computer hardware, software and peripherals. 1.2 Concept and need of machine drawings. 1.3 Drafting, tolerance and geometrical symbols used in machine drawing. 1.4 AutoCAD (Mechanical) screen, library, symbols, templates in context of machine drawing. 1.5 Drawing standards.(IS-696 /SP 46) (Drawing/ printing/ storage)
Unit – II 2D production drawings	2.a Prepare and plot 2D production machine drawings using AutoCAD (Mechanical).	2.1 Simple 2D production drawings of 6-7 Mechanical components made up of minimum 5-6 manufacturing operations using Auto CAD (Mechanical). 2.2 2D assembly productions drawing of any one simple mechanical assembly having minimum 5-6 components each made up of 5-10 manufacturing operations using AutoCAD (Mechanical). 2.3 Take print outs of above drawings using Printer/plotter.
Unit – III 2D parametric drawings	4.a Prepare 2D parametric drawings of simple machine components using Pro/E or Solid Edge.	3.1 Concept and examples of parametric and non parametric models. 3.2 Concept, examples and applications of constraints and relations. 3.3 Simple 2D parametric drawings of 6-7 machine components made up of minimum 5-6 manufacturing operations each using sketcher mode.
Unit – IV Project work	4.b Prepare assembly drawing of mechanical components with codes, standards and symbols using AutoCAD (Mechanical)	4.1 Prepare one assembly drawing having 4-5 mechanical components, draw orthographic projections of each component with Institute template and take print out of it. (Group of 5-7 students).

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Not Applicable

6. SUGGESTED LIST OF PRACTICAL/EXERCISES

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills (Course 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 course outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of programme outcomes/course outcomes in affective domain as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those programme outcomes/course outcomes related to affective domain.

Ex. No.	Unit No.	Practical/Exercises	Approx. Hrs. Required
1	I	a. Identify parts of computers. Recall basic knowledge to use computers. Use input devices. b. Prepare a report in tabular form on following. i. All parts of computer, specifications and uses of each part (Namely keyboard, mouse, monitor, processor, RAM, SMPS, Motherboard, etc.)	4
2	II	a. Prepare orthographic production drawings of 6-7 mechanical components (Minimum two should be based on real industrial components selected by student as student activity and approved by teacher) each made up of minimum 5-6 manufacturing operations using AutoCAD (Mechanical). Also take print outs of the same. b. Prepare report on following. i. Select at least two physical mechanical components (approved by teacher). Sketch them with dimensions. ii. Write steps to prepare each drawing using AutoCAD (Mechanical). Steps must include followings. A. Sketch of components at each step with dimensions. B. Sequence of commands with name, options and values.	16
3	III	a. Prepare assembly drawing made up of 5-6 mechanical components using AutoCAD (Mechanical) and take print out of it. b. Prepare report on following:	14

Ex. No.	Unit No.	Practical/Exercises (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx. Hrs. Required
		i. Select physical mechanical assembly in group of 5-6 students (approved by teacher). Measure and draw them with dimensions. i. Write steps to prepare each drawing using AutoCAD (Mechanical).Steps must include followings. A. Sketch of each components and assembly for the same. B. Sequence of commands with name, options and values..	
4	IV	a. Prepare 2D parametric drawings of 6-7 mechanical components (Minimum two should be based on physical components selected by student and approved by teacher as student activity) each made up of minimum 5-6 manufacturing operations using Pro/E (Creo)/Solid Edge. Use constraints and relations also for preparing at least two drawings. Also take print outs of the same. b. Prepare report on following. i. Select at least two mechanical components. (Approved by teacher). Sketch them with dimensions. ii. Write steps to prepare each drawing. Steps must include followings. A. Sketch of components at each step with dimensions. B. Sequence of commands with name, options and values.	08
5	V	a. Prepare given project (as specified in Unit IV) in group of 7-8 students using AutoCAD (Mechanical). Prepare orthographic drawings. b. Identify various parts of given project. c. Prepare report on following: i. Measure dimensions of parts and draw their sketches. ii. Use drawing template and make orthographic assembly drawings.	14
Total Hours			56

Notes:

a. Production drawing include surface roughness values, tolerances, limits, geometrical tolerances/ symbols, heat treatment/ surface treatment notes, etc.
b. It is compulsory to perform students' activities given in table number 7.
c. Submission includes objects, parts/assembly, print outs of drawings prepared, reports and student activities performed. (Term work must not include any photocopy/ies, printed manual/pages (except printouts of drawn

parts/assemblies), litho, etc. It must be hand written/hand drawn (wherever required) by student only.

d. The components and assembly for production drawing must be varied for each student/group (as applicable) in batch so that each student will have different problem.

e. Keep "Westernmann Table" (Revised to Indian Standards, New Age International Publishers) during practice periods.

f. For 40 marks under Practical Marks ESE, students are to be assessed for competencies achieved. Students are to be given data for practical ESE to:

   i. Prepare production drawings using AutoCAD and Pro-E software.
   ii. Interpret given production drawing/s.
   iii. Refer and interpret data from data book/codes/standards/ Westernmann Table.

7. SUGGESTED LIST OF STUDENT ACTIVITIES

SR.NO.	ACTIVITY.
1	Select at least four simple mechanical components each made up of minimum 5-6 manufacturing operations. Get them approved by teacher. Measure and sketch them in report pages with dimensions. (2 to be used for Ex.No.2 and 2 for Ex.No.4).
2	Select at least one simple mechanical assembly in group of 5-6 students, each made up of minimum 5-6 manufacturing operations. Get them approved by teacher. Measure and sketch them in report pages with dimensions. (For Ex.No.3).
3	Bring Actual assembly from workshop/industry, measure dimensions, sketch it and make 2D production drawing for the same.(For Ex.No.5).

8. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

Sr. No.	Unit	Strategies	
1	I	Introduction	• Show actual desktop and laptop computer system and detail out the functions of each component. • Demonstrate how to connect different parts of a desktop computer and finally its connection with printer. • Demonstrate the procedure of loading the AutoCAD software on a computer system • Give IS Codes of drawing for self study.
2	II	2D Production Drawings	• Bring actual industrial production drawings from nearby industry and distribute them among group of students for self study and interpretation. • Ask students to practice these drawings using AutoCAD software.
3	III	2D Parametric Drawings	• Bring small real components like Nut-Bolt, Washers, Cotter-knuckle Joints, Couplings, Pulleys in the class. • Ask students to use Vernier calliper to measure the dimensions and formulate relations between them.

			• Practice same relations with AutoCAD/Pro-E software to draw 2D/3D models of these component.
4	IV	Project Work	• Take the students for industrial visit. • Hands-on practice with drafting software to create a production drawing of an assembly.

9. SUGGESTED LEARNING RESOURCES

A. List of Books:

Sr. No.	Title of Books	Author	Publication
1	Machine Drawing including AutoCAD	Ajeet Singh	McGraw hill
2	Production Drawing	K L Narayan	New Age Publication
3	Fundamental of Geometric Tolerance and dimensioning	Alex Krulikowski	Cengage Learning
4	Engineering Graphics with AutoCAD	Sarkar .A.K	PHI india
5	Essentials of Engineering Drawing and Graphics using AutoCAD	Jeyapoovan	Vikas publication
6	Pro Engineer Wildfire 5.0 For Engineers And Designers	Sham Tickoo	Dream Tech press
7.	AutoCAD User Guide	Autodesk	Autodesk Press.

B. List of Major Equipment/Materials:

i. CAD Workstation.

ii. 24" colour or mono plotter.

iii. Laser Jet printer.

C. List of Software:

i. Autodesk AutoCAD Mechanical (Educational network licensed latest Version).

ii. Pro/Engineer or Solid edge (Educational network licensed latest Version).

D. Learning Websites.

i. Autodesk Exchange/ AUGI.

ii. PTC university tutorials.

iii. Video tutorials from YouTube and other resources

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. S.H. Sundarani**, Lecturer in Mechanical Engineering, Government Polytechnic, Ahmedabad.
- **Prof. J.B. Patel**, Lecturer in Mechanical Engineering, Sir Bhavsinhji Polytechnic Institute, Bhavnagar.
- **Prof. J.M. Patel,** Lecturer in Mechanical Engineering, B.S. Patel Polytechnic, Kherva.
- **Prof. D.B. Patel,** Lecturer in Mechanical Engineering, Government Polytechnic, Valsad.
- **Prof. T.B. Patel,** Lecturer in Mechanical Engineering, Government Polytechnic, Valsad.

Coordinator and Faculty Members from NITTTR Bhopal

- **Prof. Sharad Pradhan**, Associate Professor & Head Department of Mechanical Engineering.
- **Dr. C.K. Chugh,** Professor, Department of Electronic Media.