GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester- I/II/III

Course Title: Computer Applications and Graphics
(Course Code: 4300019)

Diploma programmer in which this course is offered	Semester in which offered
Mechanical (CAD/CAM)	First
Mechanical Engineering, Automobile Engineering, Fabrication Technology, Renewable Energy, Marine Engineering	Second
Mechatronics Engineering	Third

1. RATIONALE

The objective of this subject is to make the students understand and applythe functioning of office application software, basic engineering drafting software. It will provide the student hands-on experience on different application software used for office automation and improve day-today problem-solving skills using online resources for creating business documents, data analysis, graphical representations and creating, editing and printing technical drawings. It will also enable the student to use Internet services for different communication. Development of sketching ability strengthens effective engineering communication & presentation. This course helps to develop the skills in student to generate various digital production drawings as required in industry using various CAD software.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Develop basic skills using various IT software tools for creating professional documents, analyzing data, preparing multimedia presentation and use internet services.**
- **Prepare production drawings using computer and relevant software following standards codes and norms.**

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 theachievement of the following COs:

a) Utilize various computer hardware, peripheral devices and software tools.
b) Create professional documents, analyzing data and presentation using various IT

software tools.

c) Interpret cyber security in use of internet services for various applications.

d) Draw simple Mechanical components/assembly in 2D using CAD software.

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	00	00	25*	25	50

(*): For this practical only course, 25 marks under the practical CA have two components i.e. the assessment of micro-project, which will be done out of 10 marks and the remaining 15 marks are for the assessment of practical. This is designed to facilitate attainment of COs holistically, as there is no theory ESE.

***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 thesub-components of the Course Outcomes (Cos).All PrOs are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Identify and prepare report document including sample specifications that contains brief information regarding various components of computer systems and peripheral devices available in the institute's computer labs.	I	02
2	Demonstrate the installation procedure of computer peripheral devices/software in Desktop/Laptop from the following list: - Computer Mouse & Keyboard (Wired/Wireless) - Webcam - Microphone - Scanner - Printer - Projector - Data Storage Devices (USB/Portable Hard Disk drive) - Operating systems/software tools	I	02
3	Install preferable web browser in the computer system and perform various use of web browser for accessing the internet facility.	I	02
4	Demonstrate participation in any three Digital India Platforms from the following list. Digital India Platforms: BHIM, Dig-Locker, mParivahan,The Unique Identification Authority of India (UIDAI), Digital Gujarat.	I	02
5	Create a text document incorporating various page setup feature, font, language and character feature, pictures-shape-icons-smart-	II	06

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
	art feature, header-footer with page number feature, using an equation and symbols, plot data table and chart/graph with referring published technical paper or any technical survey/Project report. Submit the completed report in PDF format.		
6	Create spreadsheet document with use of sort & filter features, conditional formatting features, font & alignment setting, cell property and formatting features, analyze data using formulas and functions and present it through charts with referring student's results data sheet. Submit the completed spreadsheet in PDF format.	II	06
7	Create slide presentation of relevant topic using basic formatting features, insert and design slide, drawing tools, shape and picture style, object fill and effects, data table or 2D-3D charts, animation and transition effects, short media clip and hyperlink. Submit the completed presentation in PDF format.	II	06
8	Study of the features of firewall in providing network/cyber security and to set Firewall Security in computer operating system and visit site https://cert-in.org.in/	III	02
9	Draw and edit 4 simple problems of different geometrical shapesin AutoCAD software using Drawing Tools, Modifying tools, Dimensioning tools, etc. Submit the completed drawings in PDF format.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.	IV	4
10	Prepare orthographic production drawings of minimum four mechanical components with all necessary views, dimensions, tolerances, notes, title block, etc. using CAD software (Real industrial component may be selected by student as student activity and approved / assigned by teacher.) Submit the completed drawings in PDF format.Write steps to prepare each drawing/component. Steps must include followings. A. Sketch of components at each step with dimensions. B. Sequence of commands with name, options and values.	IV	12
11	Prepare 2D drawings of minimum one mechanical assemblyand its components with all necessary views, dimensions, tolerances, notes, title block, etc. using CAD software. (Following are some samplesfor reference, teacher may assign any other branch specific assembly). Take print out of the same using printer/plotter. 1. Drawing of cotter joint assembly 2. Drawing of knuckle joint assembly 3. Drawing of Flanged coupling assembly	V,VI	12

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
	4. Drawing of Machine vice assembly Write steps to prepare each drawing/component/assembly. Steps must include followings. A. Sketch of components at each step with dimensions. B. Sequence of commands with name, options and values.		
			56

Note

*i. More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.*

The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the COs and ultimately the competency.

Sr. No.	Sample Performance Indicators for the PrOs	Weightage in %
1.	Lab Records and regularity	20
2.	Question answer / Writing steps of exercise	20
3.	Execution of exercise	20
4.	Printout/Result	10
5.	Viva voice	30
Total		**100**

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipments with broad specificationsfor the PrOsis a guide to procure them by the administrators to user in uniformity of practical's in all institutions across the state.

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1.	Computer system with latest configuration.	All
2.	Laser printer-scanner, plotter.	All
3.	Related software. (OS, open office, CAD software, MS office, Auto CAD, Anti-Virus software, Gujrati-Hindi language input tool software etc.).	All

7. AFFECTIVE DOMAIN OUTCOMES

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

a) Work as a leader/a team member.
b) Follow safety practices while using electrical and electronics equipment.
c) Maintain tools and equipment.
d) Realize importance of E-waste management. (Environment related).

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit-I **Basics of Computer Systems & Internet and applications**	1a Describe computer system and its components. 2a Explain functions of CPU, ALU and memory unit of a computer system. 3a Describe basic terminologies of Internet. 4a Utilize the internet for various applications.	1.1 Computer system block diagram, concept of hardware and software. 1.2 CPU, control unit, Arithmetic Logic Unit(ALU), memory unit, power unit and interfacing ports. 1.3 Input Output unit: monitor, keyboard, external hard disk, mouse, printers, plotters, scanner, projectors, webcam, Mic, etc. 1.4 Introduction to internet and basic internet terminologies: browser, webpage, website, URL. 1.5 Google search engine introduction and search query. 1.6 Applications of Internet Digital Platforms. (BHIM, Digi-Locker, mParivahan, NSDL, Digital Gujarat, Passport seva, UIDAI.)

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit-II Documenta-tions, Spreadsheet & Presentation using Software.	2a. Write steps for text formatting, page Setup features, checking spelling and grammar, with header and footer for a text document. 2b. Write steps for inserting graphics/clipart, shapes and table in a text document. 2c. Write steps to mail merge documents for inviting students. 2d. Write steps for creating spreadsheet and representing in the form of chart. 2e. Write steps to setup page as per given layout and print a spreadsheet sheet. 2f. Write steps for creating presentation and apply basic formatting features using spreadsheet. 2g. Write steps to insert objects,	**Using Text Processing** 2.1. Basics of font type, size, color, effects and other text formatting features. 2.2. Page settings and margins including header and footer in word document. 2.3. Spelling and grammatical checks. 2.4. Table and its options, inserting rows or columns, merging and splitting cells, arithmetic calculations in a table. 2.5. Working with pictures, drawings and word-art, Mail merge. **Using Spreadsheet** 2.6. Introduction to data, cell address, data types, formatting, number, text and date concept of hyperlink in spreadsheet. 2.7. Understanding formulas, operators and common spreadsheet functions. 2.8. Types of graphics: art, auto shapes, Images, charts. 2.9. Concept of print area, margins, header, footer and other page setup options. **Using Professional Presentation** 2.10. Creating new slides, working with text boxes, fonts, tables, Layouts, themes, effects, background and colors. 2.11. Selecting, deleting, moving, copying, resizing and arranging objects. 2.12. Working with drawing tools, applying shape or picture styles, applying object borders, object fill, object effects, clip art collection and modifying clip art. 2.13. Embed a video, link to a video, size a video, video playback options. 2.14. Configuring a sound playback, assigning sound to an object, adding a digital music sound track, transition effects and timings. **Using Gujarati/Hindi IME** 2.15. Installation of Guajarati/Hindi IME software. 2.16. How to change language English to Gujarati/Hindi.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
	clips, video, audio, with special effects and hyperlink in a multimedia presentation. 2h. Write steps for installing Indic IME Gujarati for creating a document.	2.17. Introduction about the Gujarati/Hindi keyboards. 2.18. Introduction about the Gujarati IME and create Documents in Gujarati/Hindi.
Unit-III Information Security.	3.a. Explain concepts of Information Security for Data Protection. 3.b. Write various methods tosecure your personal computer Describe cyber laws for data protection and IPR.	3.1. Need for Information Security. 3.2. Definition of various terms of Information Security. - Cryptography - Vulnerability - Threat - Attack - Encryption - Decryption 3.3. Security services. 3.4. Cyberattacks: Introduction of common types of attacks. 3.5. Preventing Tools: Antivirus, Firewall. 3.6. Cyber Law: IT Amendment Act 2008 (Section 66 & 67).
Unit–IV Creatingdigitaldrawingsusing aComputerAided Drafting(CAD)Software.	4.a. Start Computeraideddraftingsoftware(AutoCAD). 4.b. InvokecommandsinAutoCAD. 4.c. Setlimits&Coordinatesystems. 4.d. Useobjectselection. 4.e. Create basic & advance 2D entitiesClose & save work	IntroductiontoBasicDraw CommandsinanyComputerAidedDraftingsoftwarelikeAutoCADPowerdraft,Microstation: 4.1. Systemrequirements &Understandingtheinterface. 4.2. Explain Drawing standards.(IS-696 /SP 46) (Drawing/ printing/ storage). 4.3. Componentsof aCADsoftwarewindow:SuchasQuick Access Toolbar, Ribbon, Command Bar, Orientation tools, Status bar, Different Menu / Tools / commands, etc. 4.4. Filefeatures:Newfile,savingthefile,Openinganexistingdrawingfile,CreatingTemplates,Quit. 4.5. Settingupnewdrawing:Units,Limits,Grid, Snap,

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
		4.6. MethodsofSpecifyingpoints-AbsolutecoordinatesandRelativeCartesian&Polarcoordinates. 4.7. Use of objectSnap 4.8. Conceptofmodel spaceandpaperspace. 4.9. Standardsizesofsheet.Selectingvariousplottingparameterssuchas Papersize,paperunits,Drawingorientation,plotscale,plotoffset,plotarea, printpreview. 4.10. Creatingviewportsinmodel spaceandcreatingfloatingviewportinpaperspace.Shiftingfrommodel spacetopaperspaceandviceversa. 4.11. Take print outs from a CAD Software.
Unit–V EditingDrawingusingaCADsoftware.	5a. Modifyexisting2Dentities. 5b. Usedifferentarraysinexisting2Ddrawing. 5c. Viewgivendrawingentitiesproperly. 5d. Enquireaboutvariousattributes ofexisting2Dentities.	IntroductiontoBasicEdit,InquiryanddisplayCommands. 5.1. Copy,Rotate,Move,Erase,Mirror,Array,Trim,Break,Extend,Chamfer,Fillet. 5.2. Zoom window,Zoom in-out,PAN. 5.3. List,Dblist,Area,Massprop.
Unit–VI Advanceeditingofadrawingusing aCADSoftware.	6a. Uselayersforpropermanagement ofdrawings. 6b. Setpropertiesofexistingdrawingentitiesasperrequirement. 6c. Abletodimensiongiven2Dentities withperfection. 6d. UseBlockseffectivelytocreateperfectdrawings.	IntroductiontoAdvancedModify&otherutility CommandsinanyComputerAidedDraftingsoftwarelikeAutoCADPowerdraft,Microstation: 6.1. Properties,Linetype,color,lineweight 6.2. ConceptofLayers. 6.3. ConceptofBlocks. 6.4. ConceptofHatch. 6.5. Dimensioning:Typesofdimensioning:Linear-Horizontal,Vertical,Aligned,Rotated,Baseline,Continuous,Diameter,Radius,AngularDimensions. 6.6. Dimscale variable. 6.7. Editingdimensions. 6.8. TextStyles: Selectingfont,size,alignmentetc.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTIONPAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Not applicable						

Legends: *R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)*

10. SUGGESTED STUDENT ACTIVITIES

Other than the laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

a) Undertake micro-projects in team/individually.
b) Encourage Students for creating and designing forms related to Departmental work.
c) Prepare a portfolio for the Digital India platform and identify digital services for Indian citizens.
d) Students are encouraged to register themselves in various MOOCs such as: Swayam, edx, Coursera, Udemy etc. to further enhance their learning.
e) 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. (For Ex.No10).
f) Select at least one simple mechanical assembly in group of 5-6 students, each made up of minimum 5-6 components. Get them approved by teacher. Measure and sketch them in report pages with dimensions. (For Ex.No.11).
g) Bring Actual assembly from workshop/industry, measure dimensions, sketch it and make 2D production drawing for the same.(For Ex.No.11)
h) Prepare the Charts that classify recycling process for electronic waste and plastics.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide student(s) in undertaking micro-projects.

   About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature may be given to the students for ***self-learning***, but to be assessedusing different assessment methods.

   Guide students on addressing the issues on environment and sustainability using the knowledge of this course.
c) Introduce IS Codes of drawing for self-study.
d) Guide studentsfor keeping the drawings in digital form and reduce use of paper.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-projects are group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The duration of the micro project should be about **14-16** ***(fourteen to sixteen) student engagement hours*** during the course. The students ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs.Similar micro-projects could be added by the concerned course teacher:

a) Word documents: Prepare Subject teacher shall assign document/Reports to be prepared by each student covering all the major features of word processing software.
b) Slide Presentations: Prepare slides show with all Presentation features such as: classroom presentation, presentation about department, presentation about institute, presentation of report. (Subject teacher shall assign a presentation to be prepared by each student).
c) Spreadsheets: Prepare Pay bills/salary statements, tax statement, student's assessment record, Students fees system, earning and expenditure statement of a company to ascertain profit-loss etc. using spreadsheet. (Teacher shall assign a spreadsheet to be prepared by each student).
d) Bring an industrial production drawing/component from workshop. Learn to interpret and List the commands to be used to draw it.
e) Sorting of e-waste: Compile a reportfor sorting different types of electronic and plastic waste.

13. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1.	Fundamentals of Computers, Sixth Edition	Rajaraman V, Adabala N	Prentice Hall India Learning Private Limited. ISBN: 8120350677
2.	Computer Course	R Taxali	Tata McGraw Hills. New Delhi. ISBN: 9780070700376

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
3.	INFORMATION TECHNOLOGY	Dennis P. Curtin, Kim Foley, Kunal Sen, Cathy Morin	Tata McGraw Hills Publication. ISBN: 978-0074635582
4.	MS-Office for Dummies	Wallace Wang	Wiley India, New Delhi. ISBN: 9788126578559
5.	Sams Teach Yourself Internet and Web Basics All in One	Ned Snell, Bob Temple, Michael Clark	Sams Publishing, Indiana, USA, ISBN:0672-32533-0
6.	Computer Fundamentals	R.S. Salaria	Khanna Book Publishing Company ISBN: 978-9381068533
7.	MachineDrawingincludingAutoCAD	Ajeet Singh	McGrawhill
8.	ProductionDrawing	KLNarayan	NewAgePublication
9.	FundamentalofGeometricToleranceanddimensioning	AlexKrulikowski	Cengage Learning
10.	EngineeringGraphicswithAutoCAD	Sarkar.A.K	PHIindia
11.	EssentialsofEngineeringDrawingandGraphicsusing AutoCAD	Jeyapoovan	Vikaspublication
12.	AutoCADUser Guide	Autodesk	AutodeskPress.

14. SOFTWARE/LEARNING WEBSITES

a. https://www.tutorialspoint.com
b. https://edu.google.com/intl/ALL_in/teacher-enter/products/forms/?modal_active=none
c. www.w3schools com
d. https://support.microsoft.com/en-us/training
e. https://edu.gcfglobal.org/en/topics/googleapps/
f. https://www.udemy.com
g. https://www.coursera.org/
h. https://www.digitalindiaportal.co.in/
i. https://getintopc.com/

j. https://nptel.ac.in/
k. https://magazine.opensourceforu.com/
l. https://www.electronicsforu.com/
m. https://www.redhat.com/en
n. https://www.netacad.com/
o. https://www.cert-in.org.in/
p. https://www.youtube.com/results?search_query=engineering+drawing
q. https://www.youtube.com/c/MechanicalEnggSubjectsGTU/playlists
r. https://youtu.be/MT1T31GtGpg
s. https://youtu.be/WEwkepkv6mg
t. https://youtu.be/trJQIvatIpI
u. https://nptel.ac.in/courses/112/103/112103019
v. https://nptel.ac.in/courses/112/105/112105294
w. https://en.wikipedia.org/wiki/Engineering_drawing
x. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
y. https://www.scribd.com/search?content_type=tops&page=1&query=engineering%20drawing&content_types=tops,books,audiobooks,summaries,articles,documents,sheet_music,podcasts
z. http://www.cognifront.com/tools.php
aa. https://www.youtube.com/watch?v=bmAlJAMndwM
bb. https://www.youtube.com/watch?v=904_RPjGJg4
cc. https://www.youtube.com/watch?v=jzlDouas0Wc
dd. https://www.youtube.com/watch?v=VuHdV38fyjc
ee. https://www.youtube.com/watch?v=iOzlIJge_G0
ff. https://www.youtube.com/watch?v=-l0iRdH3MbA
gg. https://www.youtube.com/watch?v=vI5xhCD5mXQ
hh. https://www.youtube.com/watch?v=GDrD9nEZ9LY

15. PO-COMPETENCY-CO MAPPING

Semester I	Instrumentation Workshop (Course Code: 4311702)						
	POs						
Competency & Course Outcomes	**PO 1 Basic & Discipline specific knowledge**	**PO 2 Problem Analysis**	**PO 3 Design/ develop-ment of solutions**	**PO 4 Engineering Tools, Experimen-tation&Testing**	**PO 5 Engineering practices for society, sustainability & environment**	**PO 6 Project Manage-ment**	**PO 7 Life-long learning**
Competency 1. Develop basic skills using various IT software tools for	3		2	2	2		2

creating professional documents, analyzing data, preparing multimedia presentation and use internet services.							
2. Prepare production drawings using computer and relevant software following standards codes and norms.	3		2	2	2	1	2
CO 1) Utilize various computer hardware, peripheral devices and software tools.	3			2			2
CO 2) Create professional documents, analyzing data and presentation using various IT software tools	3	1	2	2	2		2
CO 3) Use internet services for various applications.	2			2	2		2
CO 4) Draw simple Mechanical assembly in 2D using CAD software.	3		2	2	2	1	2

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

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

Sr. No.	Name and Designation	Institute	Contact No.	Email
5.	Dr.S.H.Sundarani BOS Chairman HOD Mechanical Engg.	Government Polytechnic Ahmedabad	9227200147	gpasiraj@gmail.com
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Sr. No.	Name and Designation	Institute	Contact No.	Email
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3.	Prof. H.V.Patel, Lecturer in Automobile Engineering.	SIR Bhavsinhji Polytechnic Institute, Bhavnagar	9978872090	hvpautodept@gmail.com
4.	Prof. R.B.Zapadiya, Lecturer in Fabrication Techmology	SIR Bhavsinhji Polytechnic Institute, Bhavnagar	9033219351	rohan.zapadiya@gmail.com

BOS Resource Persons