GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester-I
Course Title: Fundamentals of Information and Communication Technology (FICT)
(Course Code: 1313201)

Diploma programme in which this course is offered	Semester in which offered
Information and Communication Technology	First

1. RATIONAL

Nowadays, Information and Communication Technology (ICT) is used in all walks of life. The potential of ICT is widely used in science, business, industry, and education. This course envisages the development of basic skills in the use of information and communication technologies. It will provide students with hands-on experience with different office automation applications to create business documents and to develop programming skills from scratch to improve daily problem-solving skills.

2. COMPETENCY

The purpose of this course is to help students acquire the following industry-recognized competencies through a variety of teaching experiences.

- **Develop basic skills in ICT to create professional documents, analyze data, prepare multimedia presentations and test different algorithm through scratch programming.**

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:

a) Classify computer systems and their peripherals and create forms using Google applications.
b) Prepare professional documents, analyze data, and create presentations
c) Use Scratch to solve simple problems.
d) Understand the use of different blocks in Scratch
e) Apply decision, loop, and list concepts in Scratch.

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	25*	25	50

(*): For this practical only course, 25 marks under the practical CA has 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 the 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

The following practical outcomes (PrOs) are the sub-components of the COs. *These PrOs need to be attained to achieve the COs.*

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required.
1	Identify parts of computer systems and peripherals.	I	02
2	Learn about various operating systems (OS) and install Windows/Linux operating systems.	I	04
3	Use the various tools/utilities provided in the Windows/Linux operating system accessories.	I	04
4	Install printer, scanner, and projector with the computer system	I	02
5	Create, share and Manage Files and Folders in Google Drive	I	02
6	Create and design admissions/inquiries google form for students	I	02
7	Create text documents with different formatting features, insert shapes, SmartArt, images, tables, set page layout and background according to the given examples.	II	04
8	Use the mail merge feature for sending invitation letters for an expert lecture to 10 industries.	II	02
9	Create spreadsheets, analyze data using formulas and functions, and present them in charts.	II	04
10	Create Pay bills/ Pay slips/ Electricity bills/student mark sheets using a spreadsheet and take a printout.	II	04
11	Create professional presentations with various formatting features, insert tables and charts, use drawing tools, apply shape and picture styles, apply object borders, the object fills, and object effects.	ii	04
12	Explore Scratch's project editor interface.	III	02
13	Write a script to perform basic arithmetic operations.	III	02
14	Write a script to simulate dice.	III	02
15	According to Ohm's law, When a current I flows through a resistance R, voltage across R is given by V=IR. Write a script that reads I and R and calculates V.	III	02
16	Write a script to find the value of V using the expression $V = A \sin\theta$ for a given value of A, Θ (take the value of Θ in degree).	III	02
17	Write a script that asks the user to enter a temperature in degrees Celsius. The script will convert the temperature to degrees Fahrenheit and display the result to the user with an appropriate message. (Hint: F° = (1.8 × C°) + 32.)	III	02
18	Write a script to draw a rectangle of given width and height.	IV	02

19	Write a script to connect each of the following sets of points in order to reveal the final shape: (20,-40), (-160,-40), (20,160), (140,-40), (20,-40), (20,-60), (-120,-60),(-80,-100), (80,-100), (120,-60), (20,-60).	IV	02
20	Write a script for pattern draw application with the following instruction. a) Move the sprite 10 step forward when 'Up Arrow Key' is pressed b) Move the sprite 10 step backward when 'Down Arrow Key' is pressed c) Turn the sprite clockwise when 'Right Arrow Key' is pressed d) Turn the sprite anticlockwise when 'Left Arrow Key' is pressed	IV, V	02
21	Write a script to draw a polygon for a given number of sides and side length.	IV, V	02
22	Write a script that asks the user to enter three numbers. The script will then determine and print the largest of the three numbers.	V	02
23	Write a script that calculates and displays the sum of all odd integers between 1 and 20.	V	02
24	Write a script to check whether the given number is prime or not and display an appropriate message.	V	02
25	Write a script to display the Fibonacci Series of 0 to N numbers.	V	02
26	Write a script to find the factorial of a given number.	V	02
27	Write a script to count the number of vowels in a given string.	V	02
28	Write a script to check whether the given number/string is palindrome or not and display an appropriate message.	V	02
29	Write a script to display days of a week using a list.	V	02
30	Write a script to check whether a given string/number is in a list or not and display an appropriate message.	V	02
31	Write a script to find the maximum number in a list of numbers.	V	02
32	Write a script to find the average value of a list of numbers.	V	02
33	Write a script to perform a linear search in a list of strings.	V	02
34	Write a script to count how many times an item appears in a list.	V	02
35	Write a script to perform bubble sort in a list.	V	02
	Total	**56 Hours**	

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.*

ii. *Care must be taken in assigning and assessing the study report as it is a first-year study report. The study report, data collection, and analysis report must be assigned in a group. A teacher has to discuss about the type of data (which and why) before the group starts their market survey.*

*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 Indicator for the PrOs	Weightage in %
1	Installation of Operating System and Software setup	**10**
2	Use of Google Application	**10**
3	Designing ability for the given problem using related MS-Office tools	**20**
4	Identify a suitable approach to implement logic	**30**
5	Use concepts of Scratch to implement efficient program	**30**
	Total	**100**

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipment with broad specifications for the PrOs is a guide to procure them by the administrators, so uniformity for conducting practical's can be maintained across the state.

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1	Computer with basic configuration and Internet Facility	All
2	Window/ Linux as operating system	All
3	Word, Excel, and PowerPoint Software	7-11
4	Scratch Software (open source)	12-35

7. AFFECTIVE DOMAIN OUTCOMES

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

a) Demonstrate working as a leadership team member.
b) Follow ethical practices.

The ADOs are best developed through 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 is formulated for the development of COs and competency. If required, more such UOs could be included by the course teacher to focus on the attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics

Unit – I **Computer Systems Fundamentals and Google Applications**	1a) Explain functions of CPU, ALU, memory unit, and Input/output unit of a computer system 1b) Operating System(OS): Types of OS, Types of Mobile OS 1c) Write the steps to install Windows, and Linux operating Systems on PC 1d) Write the procedure for creating an Email Account. 1e) Explain different features of google drive 1f) Write the procedure to create a Google form with validation checks.	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, Scanner, Projectors, etc. 1.4. Operating system concepts, purpose, functions, and characteristics. 1.5. Operations of Windows Linux Installation on PC and Basic Terminal Commands 1.6. Installation of various Application Software. 1.7. Gmail: Create an account; Adding Contacts; Composing an Email; Creating and Managing Labels, Filters, and Signature. 1.8. Drive: Create a folder, Upload and Download Files/folders, and Sharing Files/Folders. 1.9. Forms: Create a Form; Validate a Form; Share a Form, Managing Response.
Unit – II **Documentation and Presentation tools**	2a) Write steps for text formatting, page Setup features, checking spelling and grammar, inserting header and footer, graphics clipart, Shapes, and Table for a Word Document 2b) Write steps to mail merge documents and create Google Document	**MS Word:** 2.1 Basics of text formatting: font type, size, color, effects, typography, Paragraph tool, WordArt, and Drop Cap, Symbol, and Equations. 2.2 Insert Table, Pictures, Shapes Smart Art and Chart options, Inserting rows or columns, merging and splitting cells,

	2c) Write steps for creating an excel worksheet, uses basic functions, representing it in the form of a chart, steps to setup page as per given layout and print an excel sheet 2d) Write steps for creating a presentation and apply basic formatting features using Google Spreadsheet. 2e) Write steps to insert objects, clips, video, and audio, with special effects and hyperlinks in a PowerPoint presentation.	Arithmetic Calculations in a Table. 2.3 Page settings and margins including header and footer in the word document. 2.4 Spelling and Grammatical checks (use: Grammarly Software) 2.5 Use of Mail merge tool 2.6 Google Docs sheet: creating and sharing **MS Excel:** 2.7 Introduction to data, Cell address, Excel Data Types, formatting 2.8 Understanding formulas, Operators, Common spreadsheet functions and Types of 2D charts. 2.9 Concept of print area, margins, header, footer, and other page setup options 2.10 Overview of Google Spreadsheets and how to create Spreadsheets **MS PowerPoint:** 2.11 Creating new Slides, Working with text boxes, fonts, tables, Layouts, themes, effects, background, and Colors 2.12 Selecting, deleting, moving, copying, resizing and arranging objects. 2.13 Working with drawing tools, Applying shape or picture styles, Applying object borders, object fill, object effects, clip art collection, and modifying clip art 2.14 Configuring a sound playback, Assigning sound to an object, Adding a digital music soundtrack, Transition effects and timings
Unit – III	3a) Write features of graphical programing language	3.1 Scratch: A graphical programing language

Introduction to Scratch	3b) Identify different toolbars in Scratch's project editor interface. 3c) Edit backdrop and costume of sprite, set center of a costume. 3d) Develop mathematical functions using arithmetic operators. 3e) Write different data types in Scratch. 3f) Create a variable, assign and change the value of a variable.	3.2 Scratch Programming Environment: The stage, Sprite, Backdrop, Sprite list, Blocks tab, Scripts area, Costumes tab, Sounds tab, Sprite info, Scratch toolbar 3.3 Paint Editor: Create/edit costumes and backdrop, Setting center of a costume. 3.4 Arithmetic Operators and Functions: Arithmetic operators, Mathematical Functions, Random Numbers. 3.5 Data types in Scratch: Boolean, Number, String. 3.6 Variables: What is a variable? Creating a variable, scope of a variable, and use of a variable.
Unit-IV **Different Blocks in Scratch**	4a) Classify different blocks available from scratch. 4b) Move and rotate sprite on the stage using different motion blocks. 4c) Draw different artistic, and geometric patterns using pen blocks. 4d) Create animations and apply the graphic effect to costumes and backdrop. 4e) Add a sound effect to scratch applications.	4.1 Scratch blocks: Command blocks, Function blocks, Trigger blocks, and Control blocks. 4.2 Motion blocks: go to, glide to, set x to, set y to, point in the direction, point towards, move, turn, change x by, change y by, set rotation style. 4.3 Pen blocks: stamp, pen down, set pen color to, set pen size to, and erase all. 4.4 Looks blocks: say, think, switch costume to, next costume, switch backdrop to, next backdrop, change the size by, set size to, change different effects, set different effects, clear graphic effects, show, hide. 4.5 Sound blocks: play sound until done, start sound, stop sound, change pitch effect by, set pitch effect to, clear

		sound effect, change volume by, set volume to.
Unit –V **Procedures, Decision making, Looping, and concept of Lists in Scratch**	5a) Apply structured programming techniques to solve complex problems. 5b) Use event blocks to implement procedures. 5c) Test the relationship between two values using comparison operators. 5d) Construct logical expression to evaluate given conditions. 5e) Develop a loop structure to perform repetitive tasks. 5f) Create and manipulate lists, initialize and access individual elements in a list.	5.1 Concept of structured programming: Procedures, Custom blocks, passing parameters to custom blocks, recursive procedure. 5.2 Event Blocks: when the key is pressed, when this sprite is clicked, broadcast, broadcast, and wait when I receive. 5.3 Comparison operators: less than, greater than, equal to. 5.4 Logical operators: and, or, not 5.5 Control blocks: wait, repeat, forever, if, if-else, wait until, repeat until stop. 5.6 Lists: Creating lists, List commands (Add, Delete, Insert, and Replace), Accessing list elements, and the Contains block.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

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

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, the following are the suggested student-related ***co-curricular*** activities that can be undertaken to accelerate the attainment of the various outcomes in this course: Students should perform the following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidence 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) Encourage students to participate in the Microsoft Office Specialist World Championship.
d) Students are encouraged to register themselves in various MOOCs such as Swayam, edx, Coursera, Udemy, etc. to further enhance their learning.
e) Undertake a survey of different graphical programming languages used to develop animations, mobile apps, games etc.

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) Guide student(s) in undertaking micro-projects.
b) Diagnosing Essential Missed Learning concepts that will help students to improve their performance.
c) Guide Students to do Personalized learning so that students can understand the course material at their pace.
d) Encourage students to do Group learning by sharing so that learning can be enhanced.
e) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature are to be given to the students for ***self-learning*** but to be assessed using different assessment methods.
Guide students on addressing the issues of environment and sustainability using the knowledge of this course.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her at the beginning of the semester. In the first four semesters, the micro-project are group-based (groups 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, integration of PrOs, UOs, and ADOs. Each student will have to maintain a dated work diary consisting of individual contributions to 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:

1. Use the Google app to prepare any feedback form on any topic given by the subject teacher, covering all the main features of Google Forms.
2. Prepare an MS word document on any subject given by the subject teacher, covering all the main features of MS word.
3. Use spreadsheets to prepare salary statements, tax statements, student assessment records, student expense systems, company income, and expense statements to determine profit and loss, covering all major features of MS Excel.
4. Prepare 15-20 slide presentations with department and institute information covering key features of MS PowerPoint.
5. Develop a small story and animation in scratch.
6. Develop a small game, simulation in scratch.

13. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with the place, year and ISBN
1	Fundamentals of Computers, Sixth Edition	Rajaraman V, Adabala N	Prentice Hall India Learning Private Limited, ISBN: 8120350677
2	MS-Office for Dummies	Wallace Wang	Wiley India, New Delhi, ISBN: 9788126578559

3	Learn to program with Scratch: A Visual Introduction to Programming with Games, Art, Science, and Math	Majed Marji	No Starch Press, Inc. ISBN: 9781593275433
4	Scratch Programming for Teens	Jerry Lee Ford, Jr.	Delmar Cengage Learning ISBN: 9781598635362

14. SOFTWARE/LEARNING WEBSITES

a) https://support.microsoft.com/en-us/training
b) https://www.coursera.org/search?query=MS%20office&
c) https://www.udemy.com/courses/search/?src=ukw&q=MS+office
d) https://scratch.mit.edu
e) https://en.scratch-wiki.info
f) https://nptel.ac.in/courses/106106182 (contents of Week 1)

15. PO-COMPETENCY-CO MAPPING

Semester-I	**Fundamentals of Information and Communication Technology (FICT) (Course Code: 1313201)**						
	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-station &Testing**	**PO 5 Engineering practices for society, sustainability & environment**	**PO 6 Project Manage-ment**	**PO 7 Life-long learning**
Competency ***Use Fundamentals of Computer and Scratch Programming in various engineering applications***							
Course Outcomes CO a) Classify computer systems and their peripherals and create forms using Google applications.	3	2	2	2	2	1	2
CO b) Prepare professional documents, analyze data, create presentations.	2	2	2	1	2	2	2
CO c) Use Scratch to solve simple problems.	2	2	2	2	-	2	2
CO d) Understand the use of different blocks in Scratch.	3	2	2	2	-	2	3

CO e) Apply decision, loop, and list concepts in Scratch.	3	2	2	2	-	2	3

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
1.	Mr. Pinkesh G. Kalariya	Government Polytechnic for Girls, Ahmedabad	8000244134	kalaria.pinkesh@gmail.com
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