Teacher’s Name :- School :-

Year :- 2022 / 2023 Subject :- Information & Communication Technology

Grade :- 13

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| **Competency** | **Competency Level** | **Content** | **Learning Outcomes** | **No. of Periods** | **Quality Inputs** | **Expected Date** | **Taught Date** | **Others** |
| Competency 8:Designs and develops database systems to manage data efficiently and effectively. | 8.1Learns the basics of information and data, and the need for databases | * Data vs. information
* Structured Vs. unstructured data
* Definition of database
* Database models

o Flat file systemo Hierarchical modelo Network modelo Relational modelo Object relational model* Comparison of database models
 | * Distinguishes data and information
* Defines database
* Lists and briefly describes the database models
* Compares and contrasts database models in terms of their features
 | 2 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 8.2Describes the main components of the relational database model | * Relations / Tables

o Attributes / Columnso Tuples / Rowso Relationships* Types of Constraints

o A NOT NULL Constrainto A Unique Constrainto A Primary Key Constrainto A Foreign Key Constrainto A (Table) Check Constraint | * Defines relations / tables
* Names and describes main components of a relational database
* Describes the relationships in terms of relational database model
* Briefly explains the types of constrains
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 8.3Analyzes the main components of a database system | * Data Base Management System
* Data definition language (DDL)

o Introduction to SQLo Classification of SQLo Creating, using relational database using DDL* Creating table
* Alter table

 - Inserting and deleting attributes - Adding and deleting foreign key and primary key* Drop tables
* Drop databases
* Data manipulation Language (DML)

o DML Features in SQL* Inserting, modifying, retrieving, updating deleting data

o Select Query* Extracting rows and columns from single table
* Extracting rows and columns from multiple tables using inner join operation
* Insert Query
* Update Query
* Delete Query
 | * Lists and briefly describes the component of a database system
* Describes the database management system
* Defines SQL
* Distinguishes between DDL vs. DML
* Uses appropriate SQL commands for creating and using database
* Uses appropriate commands to create tables with suitable fields and data types
* Sets primary key and foreign key while creating table
* Uses primary key and foreign key after completion of a table
* Creates relationships among tables
* Uses appropriate SQL commands to Insert and delete columns, delete foreign key / primary key and to drop table
* Uses appropriate SQL commands to drop database
* Uses appropriate commands to Insert, modify retrieve, update and delete data.
* Uses appropriate DML commands to query data according to the requirements
 | 14 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 8.4. Designs the conceptual schema of a database | * ER (Entity Relationship) diagrams

o Entities, attributeso Entity identifierso Relationshipso Cardinality* Introduction to EER (Extended ER) diagrams
 | * Describes ER diagram
* Describes the components of an ER diagram (entities, attributes)
* Describes entity identifiers
* Lists and describes relationships
* Describes cardinality
* Identifies the requirements of a given scenario
* Selects entities, attributes and according to the requirement
* Draws the ER diagram
* Explains the EER diagrams
 | 12 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
|  | 8.5Designs the logical schema of a database | * Definition of the logical schema
* Database schema design

o Relational schemao Relation instanceso Candidate keyo Primary keyo Alternate keyo Foreign key* Domain
 | * Defines logical schema of a database
* Describes relational schema
* Describes relational instances
* Briefly describes Candidate key, primary key, alternate key and foreign key
 | 6 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
|  | 8.6Transforms ER diagrams to logical schema | * Entity transformation
* Attribute transformation
* Relationship transformation
 | * Describes the methods of transformation ER diagram to logical schema
* Transforms ER diagrams (entity, attribute, relationships) to logical schema
 | 6 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 8.7Normalizes database schema to improve performance | * Need for normalization-

o Redundancies and anomalies* Insert
* Update
* Delete
* Functional dependencies

o Full dependencyo Partial dependencyo Transitive dependency* Levels of normalization

o Zero normal formo First normal formo Second normal formo Third normal form | * Describes the functional dependencies and categorizes them
* Describes abnormalities of an improperly designed table when modifying in terms of insert, update and delete
* Describes the zero normal form
* Explains the abnormalities which are reduced after the first normal form
* Lists the conditions for executing the second normal form
* Explains the abnormalities which are reduced after the second normal form
* Explains the abnormalities which are reduced after the third normal form
 | 6 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| Competency 9 :Develops algorithms to solve problems and uses python programming language to encode algorithms  | 9.1Uses problem-solving process | * Understanding the problem
* Defining the problem and boundaries
* Planning solution
* Implementation
 | * Describes the steps of problem solving process
* Implements the solution
 | 2 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.2Explores the top down and stepwise refinement methodologies in solving problems | * Modularization
* Top down design and stepwise refinement
* Structure charts
 | * Uses stepwise refinement methodology to solve problems
* Draws structures charts to illustrate a solution for a system
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.3Uses algorithmic approach to solve problems | * Algorithms

o Flow chartso Pseudo codeso Hand traces | * Briefly describes algorithms
* Identifies the standard symbols used to draw flow charts
* Draws flow charts to illustrate solutions to a given problem
* Writes pseudo codes to illustrate solutions to a given problem
* Uses hand traces to verify the solutions
 | 6 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.4Compares and Contrasts different programming paradigms | * Evolution of programming languages
* Programming paradigms

o Imperative languageso Declarative languageso Object oriented languages | * Describes the evolution of programming language in terms of generations
* Compares and contrasts imperative, declarative, object oriented languages
 | 2 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.5Explores the need of program translation and the type of program translators | * Need of program translation
* Source program
* Object program
* Program translators

o Interpreterso Compilerso Hybrid approach* Linkers
 | * Describes the need of translation of a program
* Compares the source and object program
* Lists and briefly describes the types of program translators
* Briefly describes the function of linkers
 | 2 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
|  | 9.6Explores integrated development environment (IDE) to identify their basic features | * Basic features of IDE
* Instructions to use

o Opening and saving fileso Compiling, executing programs* Debugging facilities
 | * Basic features of IDE
* Instructions to use

o Opening and saving files* o Compiling, executing programs
* Debugging facilities
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.7Uses an imperative programming language to encode algorithms | * Structure of a program
* Comments
* Constants and Variables
* Primitive data types
* Operator categories

o Arithmetical, relational,* logical, bitwise
* Operator precedence
* Input / output

o Input from keyboardo Output to standard devices | * Identifies the structure of a program
* Uses comments to identify the usage of code for future reference
* Uses constants and variables in a program
* Learning outcomes
* Periods
* o Output to standard devices
* appropriately
* Identifies the primitive data types of a given program language
* Identifies and uses operators in a program
* Identifies precedence of operators
* Writes programs with the facilities of input from keyboard and output to standard devices
 | 10 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.8Uses control structures in developing programs | * Control Structures

o Sequenceo Selectiono Repetition* Iteration
* Looping
 | * Briefly describes control structures
* Lists and briefly describes the types of control structures
* Uses control structures appropriately in programming
* Applies nested control structures in programs
 | 12 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.9Uses sub-programs in programming | * Types of subprograms

o Built ino User defined* Structure
* Parameter passing
* Return values
* Default values
* Scope of variables
 | * Briefly describes the functions
* Lists and briefly describes the types of functions
* Identifies the structure of a function
* Compares local and global variables
* Identifies the behavior of a variable in terms of life time
* Identifies the need of return values and writes functions to obtain the appropriate return value
* Writes functions using relevant parameters and arguments
* Uses user defined functions
 | 10 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
|  | 9.10Uses data structures in programs | * Data structures

o Stringso Listso Tupleso Dictionaries | * Briefly explains the use of data structures
* Uses relevant data structures in programming
 | 8 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.11Handles files and databases in programs | * File handling

 o Basic file operations | * Uses basic file operations (open, close, read write and append)
 | 6 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.12Manages data in databases | * Connecting to a database
* Retrieve data
* Add, modify and delete data
 | * Embeds SQL statements in programming languages to retrieve, add, modify and delete data
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 9.13Searches and sorts data | * Searching techniques

 o Sequential search* Sorting techniques

 o Bubble sort | * Uses sequential searching technique appropriately
* Implements bubble sort technique appropriately
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| Competency 10:Develops websites incorporating multi-media technologies (using HTML 5) | 10.1Explores the need for web | * The world wide web (www)
* Types of web sites

o Information, newso Personal, educational, commercial, Researcho Web portals | * Describes www
* Analyses the systematic arrangements of contents and structure of a web
 | 8 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 10.2Analyses user requirements (multimedia contents) | * Defining the objectives of a website
* Contents to be displayed
 | * Creates effective and appropriate information layout of a website
* Identifies the web pages of a website
* Identifies the contents of a web page
* Identifies navigation structure
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 10.3Identifies appropriate HTML tags to design a single web page | * Building blocks of a web page

o Page definition <html> </html>o Head section <head></head> <title></title>o Body section <body></body>* Background color

o Text formatting <h1>…<h6> tags <p></p> <br/> Underline, bold, italic <font> </font> – Size and color* Adding comments
 | * Analyses the arrangement of contents of a web page
* Analyses the organization of contents in a web page
* Creates a simple web page
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
|  | 10.4Uses HTML to create linked web pages | * Contents of a website

 o Home page o Linked pages o Hyperlink* Different sections of the same page(book mark)
* Different pages of a same site(local link)
* Pages of different sites (External link)
* Lists

o Ordered listso Unordered listso Definition lists* Image
* Tables

o <table></table>o <th></th>o <tr> </tr>o <td></td>o <caption>oMerging columns and rows* Multimedia objects

o Audioo Video | * Explains hypertext markup language
* Identifies the standards of HTML
* Saves the source document with suitable extensions
* Designs the web page by inserting appropriate multimedia objects according to user requirements
* Organizes data using lists and tables in the web page
* Links pages and multimedia objects to the web page
 | 16 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 10.5Uses Style sheet to change the appearance of web pages | * Introduction to style sheet
* CSS

o Syntax, comments* CSS selectors

o element, id, class, group* Ways of inserting CSS

o Internal, external, inline* Appearance formatting

o Background (color, image)o Text and fontso Linkso Listso Tables | * Briefly explains style sheet and its usage
* Uses the comments and correct syntax in CSS
* Uses appropriate selectors to select elements in CSS
* Inserts CSS in HTML web pages to improve the appearance
* Applies various CSS formatting in HTML web pages to improve the appearance
 | 8 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
|  | 10.6Uses an authoring tool to create web pages | * Introduction to web authoring tools
 | * Briefly explains web authoring tools
* Creates web pages using a web authoring tool
 | 10 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 10.7Creates dynamic web pages using PHP and MySQL | * Introduction to dynamic web pages
* Embedding PHP code into web page

o Variableso Arrayso Control structureso Functionso Database connectivityo Working with databases* Forms

o Input element* Type attribute
* Name attribute
* Value attribute

o Text input (Password)o Radio buttonso Check boxo Selectiono Submit buttonso Reset buttono Action attributeo Method attribute* Get
* Post

o Grouping form data using <fieldset> tago Saving form data into database* Creating data source and entering data
* Creating PHP code to retrieve data from MySQL database
* Set form values using retrieved data
 | * Defines dynamic web pages
* Creates data source and enters data
* Creates PHP code to save/retrieve data to and from MySQL
* Develop simple web based information systems
 | 6 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 10.8Publishes and maintains web sites | * Local publishing

o Own computer, intranet* Internet publishing

o Connecting to the web Service providero Publishing web Pages on web server* Factors affecting performance of website
 | * Publishes the developed website locally
* Identifies free web hosting sites from the Internet
* Publishes the developed website through a free web hosting site
* Investigates the factors affecting performance of website
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| Competency 11:Explores IoT and identify the building blocks of digital systems to develop simple applications | 11.1Acquires the knowledge of basic building blocks of digital systems | * Microprocessor Development Systems (MDS) (Arduino Board, Raspberry Pi board, board with etc.)

o Introduction* Microprocessor Development Systems vs. traditional computer systems

o Features* Analog Input
* Digital Input
* Microprocessor
* Digital Output
* RX and TX Pins
* USB Port
* Power supply
* Reset Switch

o Connect to the computer* USB Connectivity
* IDE Software (code editor, compiler and programmer)

 o Simple applications* Switch on/off a LED
* Sending ambient light intensity with a LDR and switching on LEDs on light intensity
* Sensing the room temperature with temperature sensor and switching on a fan on high temperature and off
* Door open/close detection with magnet switch
 | * Identifies and lists Microprocessor Development Systems
* Describes available features on Microprocessor Development Systems
* Identifies necessary software and download them from the Internet to design and write programs into Microprocessor Development System
* Develops simple applications using to Microprocessor Development Systems

- Switch on/off LEDs on ambient light intensity- Door open/close detection with magnetic switch- Run a fan on high temperature | 8 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
|  | 11.2Explores the Internet of Things (IoT) to create a simple application | * Introduction to IoT

○ Definition○ Needs○ IoT applications○ Enabling technologies* Simple IoT application to construct a remote switch
 | * Defines IoT (Internet of Things)
* Identifies the needs of IoT to make day to day smart
* Discusses the various applications of IoT
* Identifies the enabling technologies for IoT
* Designs and Implements an IOT application to remotely control a device through Internet Example:- ON/OFF a television
 | 7 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| Competency 12: Explores applicability of ICT to business organizations and the competitive marketplace | 12.1Explores the role of ICT in the world of business | * Digital economy
* New business methods in digital economy
* Reverse auctions
* Group purchasing
* e-Marketplace
* Pure brick, brick and click, and pure click organizations
* Business functions and the role of ICT

o Accounting and ICTo Human resource and ICTo Production and ICTo Marketing & sales and ICTo Supply chain management and ICTo Business communication and ICTo Secure payment mechanisms* Payment gateways
* Secure credit card payments
* Third party systems
	+ PayPal etc
* Mechanisms

 – Data encryption – Micro credit payments (bit coin etc.)* Threats and opportunities in ecommerce

o Privacyo Product commercialization | * Defines digital economy
* Lists and describes new business methods in digital economy
* Identifies the concepts behind pure brick, brick and click, and pure click organizations
* Describes the role of ICT in business functions of an organization
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 12.2Analyses the relationship between ICT and business operations | * E-Commerce and e-business

o The scope of e-commerce and e-businesso Types of e-business transactions* B2B, B2C, C2C, C2B, B2E, G2C
* E-Business

 o Virtual storefronts o Information brokers o Online marketplace o Content provider o Online service provider o Portal o Virtual Community* Advantages and disadvantages of e-business
 | * Distinguishes the e-commerce and e-business
* Investigates the scope of e - commerce and e- business
* Lists and briefly describes the types of e- business transactions
* Identifies the advantages and disadvantages of e- business
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 12.3Analyses the ICT in terms of generating and delivering an improved products and services to consumers | * E-marketing

o Concepts of marketingo Use of ICT in marketing* Web advertising etc
* Databases in marketing

o Predicting customer behavior with Al tools and techniqueso Gaining competitive advantages through ICT* Mobile Marketing
 | * Defines e- marketing
* Identifies the role of ICT in e-marketing
* Investigates the usage of database in marketing activities
* to improve the product and services according to the requirements of the customers
* Identifies the ways of gaining competitive advantages using ICT
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| Competency 13:Explores new trends and future directions of ICT | 13.1Explores new trends and future directions in computing | * Intelligent and emotional computing
* Artificial intelligence
* Man-machine coexistence
* Machine to machine coexistence
 | * Describes intelligent and emotional computing.
* Explains artificial intelligences
* Appreciates man- machine coexistences
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 13.2Explores the fundamentals and applications of agent technology | * Software agents
* Multi-agent systems
* Applications of Agent systems
 | * Briefly describes software agents and their characteristics
* Briefly describes multi-agent systems and their characteristics
* Identifies the applications of agent systems
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |
| 13.3Analyzes the existing models of computing and proposes new models | * Beyond von-Neumann computer
* Nature inspired computing
* Biology inspired computing
* Fundamentals of quantum computing
* Applications
 | * Predicts the technologies beyond von-Neumann computers
 | 4 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets |  |  |  |

Date :- ……………………........ …………………….......... Signature of the Principal