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. | 8.1  Learns 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 system  o Hierarchical model  o Network model  o Relational model  o 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 | |  | |  |  |
| 8.2  Describes the main components of the relational database model | * Relations / Tables   o Attributes / Columns  o Tuples / Rows  o Relationships   * Types of Constraints   o A NOT NULL Constraint  o A Unique Constraint  o A Primary Key Constraint  o A Foreign Key Constraint  o 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 | |  | |  |  |
| 8.3  Analyzes the main components of a database system | * Data Base Management System * Data definition language (DDL)   o Introduction to SQL  o Classification of SQL  o 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, attributes  o Entity identifiers  o Relationships  o 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 | |  | |  |  |
|  | 8.5  Designs the logical schema of a database | * Definition of the logical schema * Database schema design   o Relational schema  o Relation instances  o Candidate key  o Primary key  o Alternate key  o 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 | |  | |  |  |
|  | 8.6  Transforms 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 | |  | |  |  |
| 8.7  Normalizes database schema to improve performance | * Need for normalization-   o Redundancies and anomalies   * Insert * Update * Delete * Functional dependencies   o Full dependency  o Partial dependency  o Transitive dependency   * Levels of normalization   o Zero normal form  o First normal form  o Second normal form  o 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 | 9.1  Uses 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 | |  | |  |  |
| 9.2  Explores 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 | |  | |  |  |
| 9.3  Uses algorithmic approach to solve problems | * Algorithms   o Flow charts  o Pseudo codes  o 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 | |  | |  |  |
| 9.4  Compares and Contrasts different programming paradigms | * Evolution of programming languages * Programming paradigms   o Imperative languages  o Declarative languages  o 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 | |  | |  |  |
| 9.5  Explores the need of program translation and the type of program translators | * Need of program translation * Source program * Object program * Program translators   o Interpreters  o Compilers  o 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 | |  | |  |  |
|  | 9.6  Explores integrated development environment (IDE) to identify their basic features | * Basic features of IDE * Instructions to use   o Opening and saving files  o 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 | |  | |  |  |
| 9.7  Uses 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 keyboard  o 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 | |  | |  |  |
| 9.8  Uses control structures in developing programs | * Control Structures   o Sequence  o Selection  o 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 | |  | |  |  |
| 9.9  Uses sub-programs in programming | * Types of subprograms   o Built in  o 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 | |  | |  |  |
|  | 9.10  Uses data structures in programs | * Data structures   o Strings  o Lists  o Tuples  o Dictionaries | * Briefly explains the use of data structures * Uses relevant data structures in programming | 8 | Teacher guide, Multimedia projector, Pre prepared presentations, Activity sheets | |  | |  |  |
| 9.11  Handles 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 | |  | |  |  |
| 9.12  Manages 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 | |  | |  |  |
| 9.13  Searches 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) | 10.1  Explores the need for web | * The world wide web (www) * Types of web sites   o Information, news  o Personal, educational, commercial, Research  o 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 | |  | |  |  |
| 10.2  Analyses 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 | |  | |  |  |
| 10.3  Identifies 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 | |  | |  |  |
|  | 10.4  Uses 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 lists  o Unordered lists  o 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 Audio  o 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 | |  | |  |  |
| 10.5  Uses 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 fonts  o Links  o Lists  o 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 | |  | |  |  |
|  | 10.6  Uses 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 | |  | |  |  |
| 10.7  Creates dynamic web pages using PHP and MySQL | * Introduction to dynamic web pages * Embedding PHP code into web page   o Variables  o Arrays  o Control structures  o Functions  o Database connectivity  o Working with databases   * Forms   o Input element   * Type attribute * Name attribute * Value attribute   o Text input (Password)  o Radio buttons  o Check box  o Selection  o Submit buttons  o Reset button  o Action attribute  o Method attribute   * Get * Post   o Grouping form data using <fieldset> tag  o 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 | |  | |  |  |
| 10.8  Publishes and maintains web sites | * Local publishing   o Own computer, intranet   * Internet publishing   o Connecting to the web Service provider  o 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 | 11.1  Acquires 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 | |  | |  |  |
|  | 11.2  Explores 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 | 12.1  Explores 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 ICT  o Human resource and ICT  o Production and ICT  o Marketing & sales and ICT  o Supply chain management and ICT  o Business communication and ICT  o 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 Privacy  o 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 | |  | |  |  |
| 12.2  Analyses the relationship between ICT and business operations | * E-Commerce and e-business   o The scope of e-commerce and e-business  o 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 | |  | |  |  |
| 12.3  Analyses the ICT in terms of generating and delivering an improved products and services to consumers | * E-marketing   o Concepts of marketing  o Use of ICT in marketing   * Web advertising etc * Databases in marketing   o Predicting customer behavior with Al tools and techniques  o 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 | 13.1  Explores 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 | |  | |  |  |
| 13.2  Explores 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 | |  | |  |  |
| 13.3  Analyzes 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