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	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					

	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** • **Hi 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,**	**14**					

			modify retrieve, update and delete data. • Uses appropriate DML commands to query data according to the requirements						
	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					

	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**					
	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**					
	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**	**6**					

			• Explains the abnormalities which are reduced after the second normal form • Explains the abnormalities which are reduced after the third normal form						
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					
	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					

	9.3 Uses algorithmic approach to solve problems	• **Algorithms** **Hi 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**					
	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**					
	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**					

	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**					
	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**					

	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**					
	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**					

	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**					
	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**					
	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**					

	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**					
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**					
	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**					

	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** ** ** ** ** **Underline, bold, italic** ** ** **– 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**					
	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>** o**Merging columns and rows** • **Multimedia objects**	• **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**					

		o Audio o Video							
	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					
	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					
	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	• 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					

		▪ 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							
	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					

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**					

	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**					
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** o **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**	• **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**					

		– Data encryption – Micro credit payments (bit coin etc.) • Threats and opportunities in ecommerce o Privacy o Product commercialization							
	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					
	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					

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**					
	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**					
	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**					

Date :- ..... **.....**

Signature of the Principal