

VI Semester BCA w.e.f 2026-27 and onwards

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Part	Course Code	Subject Name	Teaching Hrs / week	Practical Hrs / week	Examination				Credits
					Exam Duration Hrs	Marks			
						IA	Theory/ Practical	Total	
Part I DSC [#]	SEPBCADSCT 6.1	Data Warehousing and Mining	4	-	3	20	80	100	3
	SEPBCADSCT6.2	Cloud Computing	4	-	3	20	80	100	3
	SEPBCADSCT6.3	Mobile Application Development	4	-	3	20	80	100	3
Part II SPEC [*]	SEPBCASPET 6.4	Artificial Intelligence & Machine Learning	4	-	3	20	80	100	3
	SEPBCASPEP 6.5	Artificial Intelligence & Machine Learning Lab	-	4	3	10	40	50	2
	SEPBCASPEP 6.6	Project work	-	12	3	60	240	300	10
Part II SEC	SEPBCASECT 6.7	Digital Marketing	2	-	2	10	40	50	2
Total			18	14				800	26

DSC : Discipline Specific Courses, SEC : Skill Enhancement Courses, SPEC : Specialization.

Note : For the SEPBCASECT 6.7 the semester-end examination will consist of multiple-choice questions.

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Year	III	Course Code: SEPBCADSCT 5.1		Credits	03
Semester	V	Course Title: Software Engineering (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.		
Course Outcomes	After the successful completion of the course, the student will be able to: - Understand the fundamentals of Software Engineering. - Analyze and compare various SDLC models. - Learn techniques for gathering and documenting functional and non-functional requirements. - Understand the principles of good software design. - Evaluate software testing methodologies.				
Unit No.	Course Content			Hours	
UNIT I	Introduction to Software Engineering: Defining Software, Software Application Domains, Software Engineering Layers, Software Myths. Process Models: The Waterfall Model, Incremental process model, Evolutionary Process Model – Prototyping and The Spiral model.			10	
UNIT II	Software Requirement: Functional and non-functional requirement, Software requirements document, requirements specification. Requirements Engineering Process: Requirements elicitation and analysis, requirements validation, Requirements management. System Models: Behavioral models, Object Models.			10	
UNIT III	Design Engineering: Design Concepts, Architectural Styles, Architectural Design. Modeling Component-level design: designing class –based components, conducting component-level design. User Interface Design: Golden rules, User interface analysis and design			10	
UNIT IV	Testing Strategies: A strategic approach to software testing, Validation testing, System testing. Testing Conventional Applications: White-Box Testing (Basis Path Testing), Black Box Testing (Equivalence Partitioning, Boundary Values Analysis).			08	
UNIT V	Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM plan. Software Quality Assurance: Software Reviews, Formal technical Reviews, Statistical Software quality Assurance, Software reliability.			10	

Recommended Learning Resources
Text Books:
1. Ian Somerville, Software Engineering, 9th Edition, Pearson Publication Ltd. 2011 2. Roger Pressman, Software Engineering – A practitioner's approach 6th edition McGraw Hill 2010.
Reference Books:
1. Carlo Ghejgietal, Fundamentals of software – engineering, Pearson Education. 2. Panakaj Jalote, An Integrated approach to software engineering – Narosa Publishing house.

Year	III	Course Code: SEPBCADSCT 5.2		Credits	03
Semester	V	Course Title: Web Content Management (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.		
Course Outcomes	After the successful completion of the course, the student will be able to: • Understand content development basics; • Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting • Host websites and develop content for social media platforms such as wiki and blog • Understand e-publications and virtual reality • Use of e-learning platform Moodle and CMS applications Drupal and Joomla				
Unit No.	Course Content			Hours	
UNIT I	Web Content Development and Management: Content Types and Formats, Norms and Guidelines of Content Development, Creating Digital Graphics, Audio Production and Editing			10	
UNIT II	Web Hosting and Managing Multimedia Content: Creating and Maintaining a Wiki Site. Presentation Software Part I, Presentation Software Part II, Screen casting Tools and Techniques, Multilingual Content Development.			10	
UNIT III	Planning and Developing Dynamic Web Content Sites: Website Design Using CSS Creating and Maintaining a WIKI Site, Creating and Managing a Blog Site			10	
UNIT IV	E- Publication Concept: E- Pub Tools, Simulation and Virtual Reality Applications, Creating 2D and 3D Animations. Introduction to Moodle, Creating a New Course and Uploading,			10	
UNIT V	Create and Add Assessment: Add and Enroll User and Discussion Forum, Content Management System: Joomla, Content Management System: Drupal			08	
Recommended Learning Resources					
Text Books:					
1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane Barker.					
2. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.					
3. Moodle for Learning Management System (LMS): A Practical and Visual Guidebook of Administrator and Instructor for Distance Education Paperback – October 12, 2020 by James Koo					
4. Using Joomla!: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia					
Reference Books:					
1. https://onlinecourses.swayam2.ac.in/cec20_lb09/preview					

Year	III	Course Code: SEPBCADSCT 5.3		Credits	03
Semester	V	Course Title: Cyber Security (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.		
Course Outcomes	After the successful completion of the course, the student will be able to: • Understand cyber-crime, its origin and cyber security privacy issues • To understand various types of cyber-attacks and cyber-crimes • Analyze the threats and risks within context of the cyber security • Evaluate the defensive techniques against these attacks • Understand cyber security act and laws				
Unit No.	Course Content			Hours	
UNIT I	Introduction to Cybercrime: Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime.			09	
UNIT II	Cyber offenses & Cybercrime: How criminal plan the attacks, Social Engg, Cyber stalking, Cybercafé and Cybercrimes, Botnets, Attack vector, Cloud computing, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones.			10	
UNIT III	Tools and Methods Used in Cyberline: Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Steganography, DoS DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft) Cybercrimes and Cybersecurity:			10	
UNIT IV	Understanding Computer Forensics: Digital Forensics Science, The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting of a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, The Security/Privacy Threats, Forensics Auditing, Anti Forensics			10	

UNIT V	The Legal Perspectives: Why do we need Cyberlaw: The Indian Context, The Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment. Cybercrime and the Indian ITA 2000, A global Perspective on cybercrime.	09
Recommended Learning Resources		
Text Books:		
1. Sunit Belapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81-265-21791, 2011, First Edition (Reprinted 2018)		
Reference Books:		
1. Kenneth J. Knapp, Cyber Security & Global Information Assurance Information Science		

Year	III	Course Code: SEPBCASPET 5.4		Credits	03
Semester	V	Course Title: Data Analytics with R (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.		
Course Outcomes	After the successful completion of the course, the student will be able to: • Understand Data analytics, its types and its applications. • Gain knowledge of R programming fundamental concepts like variables, data types, operators. • Apply the basics in R programming in terms of functions, loops, decision making and data structure. • Design various experiments based on graphs and charts for data visualization in R programming. • Analyze of statistical computations for data analytics.				
Unit No.	Course Content			Hours	
UNIT I	Introduction to Data Analytics : Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.			09	
UNIT II	R Programming Structures: Overview of R programming, Variables and Data Types, Operators. Control Statements, Looping, Vectors, Arrays, Matrices, List and Data Frames. User defined Functions. Built in Functions: Math Functions, Statistical functions, String functions.			10	
UNIT III	Basic Statistics : Mean, Median and Mode, Variance and Standard Deviation, Descriptive Analysis, Normal Distribution, T test, Analysis of Variance (ANOVA) Test: One Way & Two Way ANOVA, Regression: Linear and Multiple Linear Regression, Logistic Regression. Time Series Analysis.			10	
UNIT IV	Data Preparation : Datasets, Importing and Exporting files, Accessing Databases, Data Cleaning and Transformation.			10	
UNIT V	Data handling and Visualization using R: Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatterplots, Pie Charts.			09	

Recommended Learning Resources

Text Books:

1. “Big Data Fundamentals” Thomas Erl, Wajid Khattak, and Paul Buhler:: Concepts, Drivers and techniques , Pearson, Latest Edition
2. “R for Everyone”, Jared P Lander, Pearson Education 2017, Latest Edition.
3. R Programming: An Approach to Data Analytics, G. Sudhamathy and C. Jothi Venkateswaran, MJP Publishers, 2019.
4. “Beginning R: An Introduction to Statistical Programming”-Larry Pace, Latest Edition”.

Reference Books:

1. “Introductory Statistics with R”, P Dalgaard, Second edition.
2. “Beginning R-The statistical Programming language”, Mark Gardner, John Wiley & Sons 2012, Latest Edition.
3. “An Introduction to R” , Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16). URL: <https://cran.rproject.org/doc/manuals/r-release/R-intro.pdf>

Year	III	Course Code: SEPBCASPET 5.5		Credits	03
Semester	V	Course Title: C# using .NET Framework (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80		Duration of ESA: 03hrs.	
Course Outcomes	After the successful completion of the course, the student will be able to: • Describe Object Oriented Programming concepts like Inheritance and Polymorphism in C# programming language. • Interpret and Develop Interfaces for real-time applications. • Build custom collections and generics in C#. • Design and develop GUI based applications in C#.				
Unit No.	Course Content				Hours
UNIT I	C# Language fundamentals: Introducing the Building Blocks of the .NET Platform(CLR, CTS and CLS). Anatomy of C# program. The System. Environment Class. The System. Console Class, Understanding Value Types and Reference Types, The System Data types, Operators, Decision Constructs, Iteration Constructors, The System.String data types, String Builder, .NET Array Types, Defining Classes and Creating objects, Pillars of OOP, C#'s Inheritance Support, C#'s Polymorphic Support, Understanding C# Partial types, Understanding Boxing and Unboxing Operations.				12
UNIT II	Object Life time and Exception handling: Understanding Object Lifetime classes, Objects and References, the basics of Object Lifetime, System.GC typr, Building Finalizable Objects, Building Disposable Objects, Ode to Errors, Bugs and Exceptions, The Role of .NET Exception Handling, throwing generic exceptions, catching exceptions, Configuring the state of an exception, System – Level Exception, Application - Level Exception, Processing Multiple Exception, Generic catch statements, Inner exceptions, Finally Block.				12
UNIT III	Interfaces, Collections, Delegates & Events: Defining Interfaces in C#, Implementing an Interface in C#, Contrasting Interfaces to Abstract Base Classes, Collections: Introducing Collections, Benefits of Collection Classes, Understanding and using commonly used collections, Interfaces of the System.Collections Namespace, .NET Delegate type, defeining a Delegate in C#, System.Delegate Base Classes, Delegate examples, C# Events.				08
UNIT IV	GUI using Windows Forms and Database Programming: Controls- TextBox, label, Button, checkbox, radiobutton, listbox, combobox, Datetime picker, Common properties. methods and events, menus, context menus. Menustrip, Graphics and GDI, SDI and MDI, Dialog boxes; Database Programming Understanding the Role of Managed Provider and ADO.NET Objects Connecting to Database. Performing Insert, Update and Delete Operations, Executing Select Statements.				08

UNIT V	Understanding .NET Assemblies and file handling: Assemblies-The Role of NET Assemblies, Understanding the format of .NET Assemblies, single file assembly, multifile assembly. Private and Shared Assemblies; File handling: The System IO Namespace, Directory (Info) and File (Info) types, Working with Directory Info, Directory Type, File Info, File Type Classes, Abstract Stream Class, Stream Writers and Stream Readers, String Writers and String Readers, Binary Writers and Binary Readers.	08
Recommended Learning Resources		
Text Books:		
1. Andrew Troelsen: Pro C# with .NET 3.0, Special Edition aPress, India, 2007. 2. E. Balagurusamy: Programming in C#. 5th Reprint, Tata McGraw Hill.2004. 3. Herbert Schildt: The Complete Reference C#, Tata McGraw Hill, 2004		
Reference Books:		
1. C# 2008 programming cogent learning solutions Inc. DreamtechPress. 2. C#2008 Programming covers .net 3.5 Black Book Beginners Edition cogent learning solutions Inc. DreamtechPress.		

Year	III	Course Code: SEPBCASPET 5.6		Credits	03
Semester	V	Course Title: Full Stack Development (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80		Duration of ESA: 03hrs.	
Course Outcomes	After the successful completion of the course, the student will be able to: • Design dynamic and interactive web pages and websites. • Run PHP scripts on the server and retrieve results. • Handle databases like MySQL using PHP in Website • Develop applications using object oriented concepts. • Implement advanced web security and Data Optimization techniques.				
Unit No.	Course Content				Hours
UNIT I	Fundamentals of PHP and Web Development: Introduction to Web Development (Frontend, Backend, Full-Stack), Understanding Client-Server Architecture & HTTP Protocol, Setting up Local Server (XAMPP, WAMP, LAMP), Basics of PHP: Syntax, Variables, Data Types, Control Structures (if-else, switch, loops), Functions in PHP (User-defined , String & Math Built-in)				09
UNIT II	Advanced PHP Concepts: String Manipulation & Regular Expressions, PHP Arrays (Indexed, Associative, Multidimensional), Form Handling with PHP (GET, POST), PHP File Handling (Read, Write, Append, Delete), PHP Sessions & Cookies Management, Error Handling & Exception Handling in PHP, Working with Date & Time Functions				09
UNIT III	MySQL Database & PHP Integration: Introduction to Databases & MySQL, Setting up MySQL with PHP, Database Design & Normalization Concepts, MySQL Commands (DDL, DML, DCL), Connecting PHP with MySQL using MySQLi , CRUD Operations (Create, Read, Update, Delete), Advanced SQL Queries (Joins, Subqueries, Indexing), Working with Stored Procedures & Triggers, Importing & Exporting Data (CSV, JSON, XML), Sending Emails using PHP (PHPMailer)				10
UNIT IV	Object-Oriented Programming (OOP) in PHP: Classes & Objects, Inheritance, Polymorphism, Encapsulation, Static Methods & Properties Password Hashing & Encryption (bcrypt, Argon2), Preventing SQL Injection, XSS, CSRF Attacks, Secure File Upload Handling (Image Uploading), Integrating Third-Party APIs (Payment Gateway, SMS, Email)				09

UNIT V	Advanced Web Security & Performance Optimization: User Authentication & Authorization - Role-Based Access Control (RBAC), API Authentication (JWT, OAuth), PHP Performance Optimization: Optimizing PHP Code for Speed & Efficiency, Reducing Memory Usage, Using Opcode Caching (APCu, OPcache), Profiling PHP Code (Xdebug, Blackfire). Database Optimization Techniques : Query Optimization & Indexing, Using Connection Pooling & Persistent Connections, Caching Database Queries. Working with Web Services & APIs : Consuming RESTful APIs in PHP, Creating APIs with PHP	11
Recommended Learning Resources		
Text Books:		
1. PHP A Beginner's Guide, VIKRAM VASWANI,Tata McGraw-Hill, 2008. 2. The PHP Complete Reference, Steven Holzner –Tata McGraw-HillEdition,2010 3. Spring into PHP5, Steven Holzer, Tata McCraw HillEdition,2005		
Reference Books:		
1. "PHP and MySQL Web Development" – Luke Welling & Laura Thomson 2. "PHP Objects, Patterns, and Practice" – M. Papantonio & M. Schumacher 3. "The Joy of PHP: A Beginner's Guide" – Alan Forbes 4. "Modern PHP: New Features and Good Practices" – Josh Lockhart 5. "Laravel: Up & Running" – Matt Stauffer		

Year	III	Course Code: SEPBCASPEP 5.7			Credits	02
Semester	V	Course Title: Data Analytics with R - Lab				
Course Pre-requisites, if any			NA			
Formative Assessment Marks: 10			Summative Assessment Marks: 40		Duration of ESA: 03hrs.	

Practice Programs:

- R Program to find Factorial of given number using recursion.
- R program for finding stationary distribution of markanov chains.
- R Program for implementing Quick Sort for Binary Search.
- R Program Generate random numbers from Standard Distribution.
- R Program to check Prime numbers.
- R Program to check Leap year.

Part A

1. R program to Illustrate with if-else statement and how does it operate on vectors of variable length.
2. R program Illustrate with for loop and stop on condition, to print the error message.
3. R Program to implement T-Test for Anova.
4. R Program Compute mean values for vector aggregates defined by factors tapply and sapply.
5. R program to implement different string manipulation functions.
6. R Program Illustrate Reading & Writing Files.
7. R program for any visual representation of an object with creating graphs using graphic functions also demonstrate the legends: Plot(),Hist(),Linechart(),Pie(),Boxplot(),Scatterplots()..

Part B

1. R program for with any dataset containing data frame objects, and employ manipulating and analyzing data.
2. Program to create an application of Linear Regression in multivariate context for predictive purpose.
3. R Program to Find Mean, Mode , Median , Variance and Standard Deviation.
4. R program that performs data cleaning and transformation effectively using a sample dataset. (It covers handling missing values, removing duplicates, renaming columns, filtering, sorting, and adding new columns.)
5. Design a data frame in R for storing about 20 employee details. Create a CSV file named “input.csv” that defines all the required information about the employee such as id, name, salary, start_date, dept. Import into R and do the following analysis.
 - a) Find the total number rows & columns
 - b) Find the maximum salary
 - c) Retrieve the details of the employee with maximum salary
 - d) Retrieve all the employees working in the IT Department.
 - e) Retrieve the employees in the IT Department whose salary is greater than 20000 and write these details into another file “output.csv”
6. R program to create a matrix using vectors and perform following operations.
 - a) Find transpose of a matrix ii) Find row and column sum of matrix
 - b) Find row and column index of maximum and minimum value in the given matrix.
 - c) Find sum of principal diagonal elements.
7. R program to create a Data Frame with following details and do the following operations.

itemCode	itemCategory	itemPrice
1001	Electronics	700
1002	Desktop Supplies	300
1003	Office Supplies	350
1004	USB	400
1005	CD Drive	800

- a) Subset the Data frame and display the details of only those items whose price is greater than or equal to 350.
- b) Subset the Data frame and display only the items where the category is either “Office Supplies” or “Desktop Supplies”
- c) Create another Data Frame called “item-details” with three different fields itemCode, ItemQtyonHand and ItemReorderLvl and merge the two frames.
8. R program to perform time series analysis on the monthly airline passenger dataset (AirPassengers) from 1949 to 1960. The program should:
 - a) Visualize the time series data.
 - b) Decompose the time series into trend, seasonal, and residual components.
 - c) Build a forecasting model using the ARIMA (AutoRegressive Integrated Moving Average) model.
 - d) Predict the next 12 months' passenger traffic

Instructions:

- Certified Journal is mandatory for every student to appear for the examination.
- Student has to execute all programs in each part to complete the Lab course.
- 10 marks of internal assessment (IA) will be awarded based on practical test.

Year	III	Course Code: SEPBCASPEP 5.8			Credits	02
Semester	V	Course Title: C# using .NET Framework - Lab				
Course Pre-requisites, if any		NA				
Formative Assessment Marks: 10		Summative Assessment Marks: 40		Duration of ESA: 03hrs.		

Practice Programs:

- Create an application to simulate the working of Font Dialog box using list boxes, label and button controls.
- Program to insert the data in the database having fields such as Roll No, Name, Age and ContactNo using Execute-Non Query.
- Program to input Roll No and display the corresponding student details using database.
- Program to implement Stream Reader and Stream Writer classes.

Part A

1. C# program to show the machine details like machine name. Operating System, Version, Physical Memory and calculate the time since the Last Boot Up. (Hint: Use System. Environment Class)
2. C# Sharp program to calculate roots of Quadratic Equation
3. Program in C# Sharp to count a total number of alphabets, digits and special characters in a string
4. Program in C# Sharp to create a function to calculate the sum of the individual digits of a given number.
5. Draw a square with sides 100 pixels in length. Then inscribe a circle of radius 50 inside the square. Position the square and the inscribed circle in the middle of the screen
6. Program to implement multilevel inheritance.
7. Program to demonstrate System exception.

Part B

1. Object oriented program to demonstrate bank transaction. Include methods for amount deposit, amount withdrawal and display.
2. Program that inputs the coordinates of three mouse clicks from the user and then draws a triangle in the output window using those three points.
3. Demonstrate operator overloading two complex numbers.
4. Program to demonstrate Application exception.
5. Demonstrate Dialog box (Modal and Modeless).
6. Program to demonstrate Directory Info and File Info.
7. Program in C# Sharp to create Menu and menu items.

Instructions:

- Certified Journal is mandatory for every student to appear for the examination.
- Student has to execute all programs in each part to complete the Lab course.
- 10 marks of internal assessment (IA) will be awarded based on practical test.

Year	III	Course Code: SEPBCASPEP 5.9			Credits	02
Semester	V	Course Title: Full Stack Development - Lab				
Course Pre-requisites, if any		NA				
Formative Assessment Marks: 10		Summative Assessment Marks: 40		Duration of ESA: 03hrs.		

Practice Programs:

- Write a program to display current date and time in different formats
- Write a program to create a simple calculator using basic php logic and forms
- Write a PHP script to write content to a file and then read it back
- Write a PHP script to send email using PHP (SMTP, PHPMailer)

Part A

1. PHP program to demonstrate variables, constants, and different data types.
2. Program that takes user input and determines if the number is prime using functions.
3. Program to read and write data to a text file using PHP.
4. PHP script that validates an email ID using regex and performs string operations.
5. Build a simple login form that captures user input using both GET and POST methods.
6. PHP application that implements login functionality using sessions and cookies.
7. Program that demonstrates the use of try-catch blocks and custom exceptions in PHP.
8. PHP script to connect with MySQL and perform Create, Read, Update, and Delete (CRUD) operations.

Part B

1. PHP application that uses Joins, Subqueries, and Prepared Statements for secure database queries.
2. Program to export MySQL data into a CSV file and import data from a JSON file.
3. PHP program using Classes, Objects, Inheritance, and Encapsulation.
4. Develop a user login & registration system with password hashing using bcrypt/Argon2.
5. PHP script to upload images securely with validation and file size restrictions.
6. Build a REST API that allows users to fetch, add, update, and delete records from a MySQL database.
7. PHP program that sends emails using PHPMailer with SMTP authentication.

Instructions:

- Certified Journal is mandatory for every student to appear for the examination.
- Student has to execute all programs in each part to complete the Lab course.
- 10 marks of internal assessment (IA) will be awarded based on practical test.

Year	III	Course Code: SEPBCASECT 5.10		Credits	02
Semester	V	Course Title: Gaming And Animation (Theory)		Hours	30
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 02 hrs.		
Course Outcomes	At the end of the course, students will be able to: • Understand the basics of Animation and Animation properties in HTML and CSS • Create and apply various effects to animation slides • Understand basics of gaming • Design games, using HTML and JavaScript				
Unit No.	Course Content			Hours	
UNIT I	Introduction: What is an Animation?, HTML5 – SVG ,Viewing SVG Files , SVG Circle , Rectangle, SVG Line SVG Ellipse ,SVG Polygon ,SVG Polyline ,SVG Gradients SVG StarThe Start and End States , Interpolation , Animations in HTML, All About CSS Animations, Creating a Simple Animation ,CSS Animation Property , Reusing Keyframes , Declaring Multiple Animations, Wrap-up, All About CSS Transitions, Adding a Transition ,Looking at Transitions in Detail , The Longhand Properties , Longhand Properties vs. Shorthand Properties, Working with Multiple Transitions, The transition End Even			10	
UNIT II	Sliding Background Effect on Link Hover , Overview of How This Works , How this Effect Really Works, Creating a Sweet Content Slider , Overview of How It Works , The Code,The<BLINK>Tag Shall Live On , Re-creating the Blink Effect , Overview of How It Works, Simple Text Fade and Scale Animation , The ExampleMove Element to Click Position , The Example , The Full Code , How This All WorksHover Effects Using Animations , What This Looks Like , Hovering, CSS Animations, and Handoffs			10	
UNIT III	Animations Created in Code, Why Animate Using JavaScript, Breaking Down a JavaScript Animation , Looking at a Real Example , Going a Little More CrazyMeetrequest AnimationFrame, Meet request Animation Frame ,Using It Another Example ,Your Frame Rate ,Stopping your request Animation Frame LoopVendor Prefixes in JavaScript , Meet the Vendor Prefixes in JavaScript , Dealing with Vendor Prefixes, Animating What You Draw, How This Is All Going to Work , Actually Drawing and Animating on a Canvas , Animating Your Circle. Game IntroGame, CanvasGame, ComponentsGame, ControllersGame, ObstaclesGame, ScoreGame, ImagesGame, SoundGame, GravityGame, BouncingGame, RotationGame, Movement			10	
Recommended Learning Resources					
Reference Books: 1. Animation in HTML, CSS, and JavaScript ByKirupaChinnathambi 2. https://www.tutorialspoint.com/html5/index.htm 3. Gaming Section last unit :https://www.w3schools.com/graphics/game_intro.asp 4. https://cloudinary.com/blog/creating_html5_animations					

Year	III	Course Code: SEPBCADSCT 6.1		Credits	03
Semester	VI	Course Title: Data Warehousing and Mining (Theory)		Hours	48
Course Pre-requisites, if any		Basics of HTML, CSS, Java Script			
Formative Assessment Marks: 20		Summative Assessment Marks: 80		Duration of ESA: 03hrs.	
Course Outcomes	After the successful completion of the course, the student will be able to: • Introduction to general issues of Data Warehouse and Data Mining. • Understanding of the different architectures and mining techniques • The role and functions of Data Warehouse and Data Mining • Explain the stages and process different data mining techniques. • Learn mining and warehouse techniques through the use of different tools				
Unit No.	Course Content				Hours
UNIT I	Data Warehouse: Introduction to Data Ware House, Differences between operational data base systems and data Ware House, Data Ware House characteristics, Data Ware House Architecture and its components, Extraction Transformation-Loading, Data Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Fact Less-Facts, OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.				10
UNIT II	Data Mining: Motivation for Data Mining, Data Mining Functionalities, Knowledge Discovery Process, Data Mining Techniques, Issues and applications; Data Objects and attribute types, Statistical description of data, Data Preprocessing: Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.				08
UNIT III	Data Cube Technology: Efficient method for data cube computation, Cube materialization (Introduction to Full cube, Iceberg cube, Closed cube, Shell cube), General strategies for cube computation, Attribute oriented induction for data characterization. Mining Frequent Patterns: Frequent patterns, Market basket analysis, Frequent itemsets, closed itemsets, association rules, Types of association rule (Single dimensional, multidimensional, multilevel, quantitative), Finding frequent itemset (Apriori algorithm, FP growth), Generating association rules from frequent itemset, Limitation and improving Apriori, From Association Mining to Correlation Analysis.				10
UNIT IV	Classification And Prediction : Definition (Classification, Prediction), Learning and testing of classification, Classification by decision tree induction, ID3 as attribute selection algorithm, Bayesian classification, Laplace smoothing, Classification by backpropagation, Rule based classifier (Decision tree to rules, rule coverage and accuracy, efficient of rule simplification), Support vector machine, Evaluating accuracy (precision, recall, f-measure), Issues in classification.				10

UNIT V	Clustering Analysis: Overview, K-Means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation, Density-Based Clustering, Graph-Based Clustering, Scalable Clustering Algorithms. Mining Spatial, Multimedia, Text And Web Data : Spatial data mining, Spatial data cube, Mining spatial association, Multimedia data mining, Similarity search in multimedia data, Mining association in multimedia data, An introduction to text mining, natural language processing and information extraction, Web mining (Web content mining, Web structure mining, Web usage mining)	10
Recommended Learning Resources		
Text Books:		
1. Jiawei Han, Micheline Kamber and Jian Pei“Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2011.		
Reference Books:		
1. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007. 2. Introduction to Data Mining, 2nd ed. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar. Pearson Publisher, 2019.		

Year	III	Course Code: SEPBCADSCT 6.2			Credits	03
Semester	VI	Course Title: Cloud Computing (Theory)			Hours	48
Course Pre-requisites, if any		NA				
Formative Assessment Marks: 20		Summative Assessment Marks: 80		Duration of ESA: 03hrs.		
Course Outcomes	After the successful completion of the course, the student will be able to: • Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing. • Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost. • Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing. • Analyze various cloud programming models and apply them to solve problems on the cloud.					
Unit No.	Course Content				Hours	
UNIT I	Introduction: Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Applications of Cloud Computing; Trends in Cloud Computing; Leading , Challenges Ahead, Historical Developments, Different Computing Paradigms: Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Platform Service Providers.				10	
UNIT II	Cloud Architecture: Cloud Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models: Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Virtualization- Definition, Features of Virtualization; Types of Virtualizations- Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Virtualization and Cloud Computing, Pros and Cons of Virtualization,				10	
UNIT III	Cloud Applications: Moving Applications to the Cloud –Microsoft Cloud Services Google Cloud Applications –Amazon Cloud Services –Cloud Applications				08	
UNIT IV	Cloud Computing At Work: Software as a service-overview, driving forces, company offerings, industries, software plus services- overview, mobile device integration, Providers, Microsoft Online.				10	
UNIT V	Cloud Applications: Scientific Applications- Healthcare (ECG Analysis in the Cloud) Biology (Protein Structure Prediction and Gene Expression Data Analysis for Cancer Diagnosis), Geoscience (Satellite Image Processing); Business and Consumer Applications: CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.				10	

Recommended Learning Resources

Text Books:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering Cloud Computing- Foundations and Applications Programming", Elsevier, 2013
2. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
3. Cloud Computing A practical Approach, Anthony T Velte, Toby J Velte, Ph.D. Robert Elsenpeter, McGraw Hill Education(India) Private Limited.
4. K Chandrashekar: "Essentials of Cloud Computing", CRC Press, 2015
5. A.Srinivasan and J.Suresh, "Cloud Computing –A Practical Approach for Learning and Implementation", Pearson India Publications

Reference Books:

1. Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, Elsevier 2013.

Year	III	Course Code: SEPBCADSCT 6.3		Credits	03
Semester	VI	Course Title: Mobile Application Development (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.		
Course Outcomes	After the successful completion of the course, the student will be able to: • Being able to build cross platform mobile application development. • Understand the basics of the Dart programming language. • Learn the fundamentals of Flutter widgets. • Learn how to design and build user interfaces with Flutter.				
Unit No.	Course Content			Hours	
UNIT I	Introduction to Mobile Applications : Development, Flutter Introduction: Features of Flutter Advantages of Flutter and Disadvantages of Flutter, Flutter SDK, Android Studio and Creating Simple Hello world Application with flutter, Hot Reload Feature, Basic Flutter Application Structure, Creating Simple Flutter App using Online Sandboxes like FlutLab.io			10	
UNIT II	Dart Programming Language Basics: Variable declaration and initialization, Constants and final values, Data Types: Numeric values, Strings, Boolean Types, Operators, Flow Control constructs: if and switch statements, looping statements. Lists and Maps. Object oriented Programming in Dart: Defining Classes, Instance Variables and Methods. Named parameters, Arrow functions Constructors, Subclasses.			10	
UNIT III	Introduction to Widgets: Widgets, Gestures, Concept of State, Layers Widget Build Visualization, Platform Specific Widgets, Layout Widgets: Types of Layout Widgets, MaterialApp, Scaffold, Center, Row, Column, Expanded, Align, Container, Padding and Text Widgets, Button, Image and Icon Widgets.			10	
UNIT IV	Introduction to Gestures and State management: Tap, Double Tap, Long Press, VerticalDrag, Horizontal Drag and Pan. Dialogs, Flutter State Management: Ephemeral State Management, Application State, Navigation and Routing. Stateful Widgets: Input, Checkbox, Radio, Date and Time pickers and ListView			10	
UNIT V	Introduction to Dart Packages and Database Concepts: Types of Packages and using Dart Package, Database Concepts: SQLite, SQLiteDbProvider object and its methods			08	

Recommended Learning Resources

Text Books:

1. Beginning Android Programming with Android Studio, 4th Edition
Jerome DiMarzio ISBN: 978-1-119-41933- April 2017-Wiley.464 pages
2. Practical Flutter: Improve your Mobile Development with Google's Latest Open-Source SDK
By Author Frank Zammett.

Reference Books:

1. https://www.tutorialspoint.com/flutter/flutter_tutorial.pdf
2. <https://flutlab.io/>
3. <https://zapp.run/>
4. <https://www.geeksforgeeks.org/android-tutorial.>

Year	III	Course Code: SEPBCASPET 6.4		Credits	03
Semester	VI	Course Title: Artificial Intelligence & Machine Learning (Theory)		Hours	48
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 20		Summative Assessment Marks: 80	Duration of ESA: 03hrs.		
Course Outcomes	After the successful completion of the course, the student will be able to: • Understand problems solved by AI, types of intelligent agents • Understand the nature of environment of agents • Application of informed and uninformed searching techniques • Evaluate techniques used for knowledge representation • Analyze supervised and unsupervised machine learning algorithms				
Unit No.	Course Content			Hours	
UNIT I	Introduction: What is Artificial Intelligence: The AI Problems, The Underlying assumption, What is an AI Technique?, History of AI, intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.			10	
UNIT II	Searching: Searching for solutions: uniformed search strategies – Breadth first search, depth first Search. Informed (Heuristic) Search Strategies, Heuristic Functions Heuristic search techniques: A* Search, AO* search Generate-and-test, Hill climbing, Best-first search, Problem reduction, Constraint satisfaction, Mean-ends analysis Game Playing-Adversarial search, Games, mini-max algorithm			10	
UNIT III	Knowledge representation and Logic Programming: Representations and mappings, Approaches to knowledge representation, First order logic, predicate logic, Inference in Predicate Logic, semantic nets- frames and inheritance.			08	
UNIT IV	Introduction to machine learning: Basics of machine learning - Human Learning - Define machine learning - -Applications of machine learning-List the Tools used for machine learning- Advantages and disadvantages of machine learning. Types of machine learning – Supervised Learning, unsupervised, reinforcement Supervised learning : Regression models: Simple Linear Regression, multiple linear Regression. K-Nearest-Neighbors (KNN), Logistic Regression, Support Vector Machines (SVM) Classification Model-Classification learning Steps - Classification Algorithms - Naive Bayes Classifier, Decision tree - Applications of supervised learning			12	
UNIT V	Unsupervised learning: Different types of clustering techniques – clustering Algorithms - K-Means Clustering, Hierarchical clustering algorithms - Agglomerative Clustering, Association Algorithm - Apriori algorithm - Applications of Unsupervised learning			08	

Recommended Learning Resources
Text Books:
1. Elaine Rich, Kevin Knight, Shivashanka B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition. 2013 2. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education 3. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.
Reference Books:
1. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education. 2. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

Year	III	Course Code: SEPBCASPEP 6.5			Credits	02
Semester	VI	Course Title: Artificial Intelligence & Machine Learning - Lab				
Course Pre-requisites, if any		NA				
Formative Assessment Marks: 10		Summative Assessment Marks: 40		Duration of ESA: 03hrs.		

Practice Programs:

- Creation and loading different datasets in Python.
- Program to compute Mean, Mode, Median, Variance and Standard deviation using datasets.
- Program to implement minimax algorithm for an application
- Program to analyze students' scores based on study hours using regression.

Part A

1. Program to implement Breadth-First Search(BFS) algorithm.
2. Program to illustrate Depth-First Search (DFS) algorithm.
3. Program to describe A* algorithm.
4. Program to enforce Hill climbing algorithm.
5. Program to perform Tic Tac Toe algorithm.
6. Program to Implement and evaluate a simple linear regression model.
7. Program to Implement a KNN classifier.

Part B

1. Program to execute NaiveBayes algorithm
2. Program to perform decision tree algorithm
3. Program to Implement and visualize K-means clustering.
4. Program to carry out SVM for classification.
5. Program to demonstrate K-means clustering.
6. Program to describe Agglomerative clustering.
7. program to fulfill Apriori algorithm

Note : Programs to be implemented using Python Programming Language

Instructions:

- Certified Journal is mandatory for every student to appear for the examination.
- Student has to execute all programs in each part to complete the Lab course.
- 10 marks of internal assessment (IA) will be awarded based on practical test.

Year	III	Course Code: SEPBCASPEP 6.6		Credits	10
Semester	VI	Course Title: Project work			
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 60		Summative Assessment Marks: 240	Duration of ESA: 03hrs.		
Objective: The objective of the BCA project work is to develop a quality software solution by following the software engineering principles and practices. During the development of the project the students shall implement all the stages of the software development life cycle (SDLC). This Lab will enable students to demonstrate their practical and theoretical skills gained during five semesters of study in BCA Programme					
Part A					
Instructions - The students are required to carry out the project in a group of two or three students under the guidance of course teacher. - Project work problem statement shall be identified by the students with the help of the course teachers and students shall submit the synopsis/project proposal of the same during the second week of the commencement of VI semester BCA course. - During project development, students are expected to define a project problem, do requirements analysis, systems design, software development, apply testing strategies and do documentation with an overall emphasis on the development of a robust, efficient and reliable software systems. - No change in the title of the project work shall be allowed after 3rd week of the commencement of VI semester BCA course. - The project development process has to be consistent and should follow standards identified by the guide monitoring the project work. - There is no restriction on use of hardware and software for carrying out the project work except that ready application packages are not allowed. - The students have to submit the individual dissertation of the project work carried out in one hard copy along with soft copy written on compact disc.					
Project Dissertation Details: - The standard procedure for documenting the project work shall be followed. However, while writing is in progress, students shall get each chapter evaluated by to their supervisor for necessary feedback, especially on technical content. Note that the quality of the dissertation is more important than its number of pages. - The dissertation text (defined as everything except title page, table of contents, references and appendices) should be around 50-70 A4 pages. The length (dissertation text together with appendices) of the dissertation should be less than 100pages.					
The students are advised to follow the following typing recommendations Contents of the dissertation: Preface: Title page, certificate, student declaration page, abstract, acknowledgement page, contents, list of figures, list of tables, and list of acronyms. Main chapters: Introduction: The motivation for the project should be argued here. Then a brief introduction to the project should be provided indicating its objectives and scope. Finally, a paragraph containing an outline of the remaining chapters (starting with Chapter 2) is recommended. Analysis: information on the existing system should be provided-The students can incorporate different types of diagrams to describe the processes and functionalities of the existing system. The candidate should review software of the proposed system. An analysis of the requirements should					

also be provided in this chapter. For example, the requirements of the system could be listed. A specification of the number of users, the frequency of use, and the jobs of the users could be provided. Functional requirements covering system functionality expected by the users should be addressed. Include a section to the end of the analysis chapter to describe the selected methodology.

- **Design:** In this chapter the student should consider different competing design strategies (alternative solutions) for his system. The different strategies may involve the way of development (developing from scratch, using open-source components, etc.), the development platform (stand-alone personal computer, client-server environment, etc.), choice of system software (Windows, Linux, etc.). The candidate should compare how the project requirements are satisfied through each alternative. The design of the proposed system should be another major section of this chapter. The candidate should describe the design of the system referring to different types of diagrams/models; for example, if no object oriented methodology has been selected then include use case diagrams, use case narratives, activity diagrams, and entity relationship diagrams, and if object oriented methodology has been selected then include use case diagrams and use case narratives, class diagrams, sequence diagrams. User interface design is the next major section of this chapter. The candidates should describe the design considerations for designing user interfaces of the system and justify the design decisions that were made. Layouts of relevant interfaces should be included in order to clarify the design decisions taken.
- **Implementation:** This chapter should describe the implementation of the system. For example, it should identify and explain all major code and module structures. Include a diagram to depict and describe the interaction between modules of the system. Also, the implementation environment (hardware and software), any existing code that was reused by the candidate, development tools used, and any platform dependence must be discussed. Appropriate technical documentation may be included as appendices to the dissertation if they are expected to be useful for the reader. Note that a list of selected code will appear in appendix and the code used in this chapter should be presented for the purpose of explaining the implementation aspects of selected important code. This code should be presented as a code segment.
- **Evaluation:** A comprehensive test plan that was used to verify and validate the system should be provided. Evidence should be provided of using a wide range of test data. Evidence should be produced to show that all aspects of the system have been tested and specification has been met. Description of the effects of various kinds of errors and the required system behavior upon occurrence of an error should be included. The candidate should report the test results in text in a table in this chapter and include detailed actual test results (in screen shots) in an appendix of the dissertation.
- **Conclusion:** This chapter will conclude the dissertation with a critical evaluation of the system and suggestions for any future work. The evaluation should include a critical discussion and assessment of results of project. This chapter should also identify any deficiencies in the final product and highlight how improvements could be made
- **References:** The details of the references are provided in References section of the dissertation. You should include any web links too.
- **Appendices:** - System Documentation-Provide program installation, compilation and execution details.; Design Documentation- Any design documentation that is not critical to be included in the main text (Chapter 3) but could still be of interest to a reader can be added to the appendices. These could be for example design diagrams (e.g., data flow, entity relationship, database schema and UML) that have not been included in the main text; User Documentation-User documentation may cover all aspects of the system, with appropriate screen shots and explanations; Management Reports- In addition to producing day to day transaction reports (e.g. a payroll system should produce an individual pay sheet, coin analysis to make cash payments, EPF report etc.) a system must produce summarized reports for the management (e.g. monthly, quarterly payments made by

organization, employees, overtime Hrs by employee, etc.). These reports will be included here; -
Code Listing; Glossary and Index

Note: Project guidelines shall be notified by the Department at the end of V semester BCA course. The documentation guideline to document the project work in the form of dissertation shall be notified to the students well in advance during VI semester BCA course.

Year	III	Course Code: SEPBCASECT 6.7		Credits	02
Semester	VI	Course Title: Digital Marketing (Theory)		Hours	30
Course Pre-requisites, if any		NA			
Formative Assessment Marks: 10		Summative Assessment Marks: 40	Duration of ESA: 02 hrs.		
Course Outcomes	At the end of the course, students will be able to: • Understand the fundamental concepts and principles of digital marketing. • Develop practical skills to implement various digital marketing strategies and techniques. • Analyze and evaluate the effectiveness of digital marketing campaigns. • Apply critical thinking and problem-solving skills to real-world digital marketing scenarios. • Create comprehensive digital marketing plans and strategies.				
Unit No.	Course Content			Hours	
UNIT I	Introduction to Digital Marketing: Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms .Digital Marketing Strategy and Planning: Developing a digital marketing strategy, Budgeting and resource allocation.			10	
UNIT II	Social Media Marketing: Campaign planning and execution, Social media platforms and their features, Creating and optimizing social media profiles Content creation and distribution: Content Creation, Content promotion and amplification. Email Marketing: Introduction to email marketing, Building an email list, Email automation and segmentation			10	
UNIT III	Mobile Marketing: Mobile marketing overview, Mobile app marketing, Location-based marketing Search Engine Optimization: Introduction to SEO, Abstraction of SEO, Types of SEO. Analytics and Reporting: Steps and Importance of analytics in digital marketing, Setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization			10	
Recommended Learning Resources					
Reference Books: 1. Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth. 2. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by Chad S. White 3. "Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi 4. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles 5. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik					

Scheme of Evaluation
Semester End Exam Question Paper Pattern

Duration of the examination: 3hour Max. Marks: 80

Section A

Answer any TEN Questions from the following, each carries 2 marks: [10X2=20]

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----
11. -----
12. -----

Section B

Answer any FOUR from the following questions each carries 5 marks. [4X5=20]

13. -----
14. -----
15. -----
16. -----
17. -----

Section C

Answer any FOUR from the following questions each carries 10 marks. [4X10=40]
(The Question may consists two sub-questions)

18. -----
19. -----
20. -----
21. -----
22. -----

CIA for Practical	
Assessment Type	Marks
Test1	10
Total	10 Marks

Semester End Examination Scheme of Evaluation for Lab Examination

Assessment Criteria	Marks
Writing of 2 Programs (Each from Part A & Part B)	15
Execution (Includes program code modification and execution result)	15
Journal	05
Viva Voice	05
Total 40 Marks	40 Marks

Instructions:

1. Certified Journal is mandatory for appearing in the Lab examination.
2. Students shall be given two programming assignments taking into consideration the duration of the time allotted to students for writing, typing and executing the programs.

CIA for Theory	
Assessment Type	Marks
Test 1 / Seminar / Activity	10
Test 2 / Seminar / Activity	10
Total	20 Marks

Note: Guidelines given by the university from time-to-time shall be followed for IA.

CIA for Project Work	
Assessment Type	Marks
First Internal Assessment	30
Second Internal Assessment	30
Total	60 Marks

First Internal Assessment

Max.Marks: 30

Time: 20 minutes

Students shall present the details of the project work carried out that includes the following

- Synopsis contents
- Problem identification and proposed solution
- SAD, SRS
- Database Design
- Functions

PowerPoint slides shall be used by the students to present the work carried out.

Second Internal Assessment

Max. Marks: 30

Time: 30minutes

Students shall present the details of the project work carried out that includes the following

- Coding details
- Forms and reports
- Demo of the application developed

Note: IA marks shall be assigned by the concerned guide monitoring the project work of the students.

Semester End Examination Scheme of Evaluation for Project Work.

Assessment Criteria	Marks
Dissertation/Project Report evaluation	100
Presentation/Demo of the application developed : (navigation of the application, features incorporated, data validation, UI, reports, etc.)	100
Viva Voice	40
Total	240 Marks

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