VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
[Re-accredited with 'A' Grade by NAAC]
Virudhunagar – 626 001.

Course Name : Bachelor of Computer Applications
Discipline   : Computer Applications
(Who those joined in the year June 2022 and after)
Course Objective:

To prepare the students to manage the software components in a computer independently and to be a programmer. To motivate the students to take up higher studies in Computer Applications and other streams.

1) **Eligibility for admission :**

Candidates should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu or any other Examinations accepted by the syndicate as equivalent thereto with Mathematics is one of the subjects.

2) **Duration of the Course :**

The students shall undergo the prescribed course of study for a period of three academic years. (Six Semesters)

Course Scheme:

Semester	Part	Subject	Hrs	Cr	Int+Ext= Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject code	Revised/ New/ No Change/ Interchanged. (If revised % of change)
I	Part 1	Tamil	6	3	25+75=100		✔					✔					**U22PT11**	
	Part 2	English	6	3	25+75=100				✔	✓		✓					**U22PE11**	
	Core 1	Web Design with HTML and CSS	4	3	25+75=100				✔							✓	**U22CAC11**	NEW
	Core 2	Lab: Web Design with HTML and CSS	4	2	40+60=100			✔								✓	**U22CACP11**	NEW
	Core 3	Digital Principles and Computer Organization	4	3	25+75=100				✔							✓	**U22CAC12**	Interchanged 20% Revised
	Allied 1	Discrete Mathematics	4	4	25+75=100			✔						✓			**U22MAAA11**	22% Revised
	SBE -1	Lab: Office Automation	2	2	40+60=100				✔					✓			**U22CASP11**	NEW
	Part IV SLC	Value Education	-	3					✔								**U22VE11**	
II	Part 1	Tamil	6	3	25+75=100		✔					✔					**U22PT21**	
	Part 2	English	6	3	25+75=100				✔	✓		✓					**U22PE21**	
	Core 4	Programming in C	6	5	25+75=100				✔							✓	**U22CAC21**	Interchanged 25% Revised
	Core 5	Lab: C Programming	6	3	40+60=100			✔								✓	**U22CACP21**	Interchanged
	Allied 2	Operations Research	4	4	25+75=100											✓	**U22MAAA21**	6% Revised
	SBE - 2	Lab: Multimedia	2	2	40+60=100				✔					✓			**U22CASP21**	Interchanged 20% Revised
	Part IV SLC	Environmental Studies	-	2					✔								**U22ES21**	

Year	Part	Subject	Credit	Int=Total	Code
I & II	Part V	NSS/ NCC/ Physical Education – Sports/YRC/RRC	3	100=100	U2NS4/ U2NC4/ U2PS4/ U1YR4/ **U22RR4**

SEMESTER - I

Course Title : Web Design with HTML and CSS	Total Hours :60 Hours
Course Code : U22CAC11	Total Credits : 3

Course Outcomes

COs	CO Statement
CO1	Provide fundamental knowledge and expose to the concepts of website.
CO2	Describe the various tags used for web page development.
CO3	Understand the basic layout used in web pages.
CO4	Familiarize the various types of CSS styles used to styling the website.
CO5	Understand the process involving to developing a website.

Unit I   **12 Hours**
Structure – Understanding structure; Learning about markup; Tags and elements.
Text – Headings and paragraphs; Bold, italic, emphasis; Structural and semantic markup.
Lists – Numbered lists; Bullet lists; Definition lists.
Images – How to add images to pages; Choosing the right format; Optimizing images for the web.

Unit II   **12 Hours**
Tables – How to create tables; What information suits tables; How to represent complex data in tables.
Links – Creating links between pages; Linking to other sites; Email Links.
Forms – How to collect information from visitors; Different kinds of form controls; New HTML5 form controls.

Unit III   **12 Hours**
Introducing CSS – What CSS does; How CSS works; Rules, properties, and values.
Text – Size and typeface of text; Bold, italics, capitals, underlines; Spacing between lines, words, and letters.
Color – How to specify colors; color terminology and contrast; Background color.

Unit IV   **12 Hours**
Extra Markup – Specifying different versions of HTML; Identifying and grouping elements; Comments, meta information and iframes.
Boxes – Controlling size of boxes; Box model for borders, margin and padding; Displaying and hiding boxes.
Flash, Video & Audio – How to add video and audio to your site; HTML5 <video> and <audio> elements.

Unit V   **12 Hours**
Lists, Tables and Forms – Specifying bullet point styles; Adding borders and backgrounds to tables; Changing the appearance of form elements.

Layout – Controlling the position of elements; Creating site layouts; Designing for different sized screens.

Process & Design – How to approach building a site; Understanding your audience and their needs; How to present information visitors want to see.

Text Book

1. Jon Duckett, "HTML & CSS design and build websites", John Wiley & Sons Inc,

Unit I	1, 2, 3, 5
Unit II	6, 4, 7
Unit III	10, 12, 11
Unit IV	8, 13, 9
Unit V	14, 15, 18

Reference Books

1. Elizabeth Castro, Bruce Hyslop, "HTML5 and CSS3", Peachpit Press.
2. Patrick Carey, "New Perspectives on HTML5 and CSS3", Cengage Learning, Seventh Edition.

e- Resources

1.https://www.htmlandcssbook.com/code-samples/

2. https://www.htmlandcssbook.com/extras/

3.https://www.htmlandcssbook.com/extras/table-styles/

4. https://html.com/

5. https://www.w3schools.com/css/

6. https://www.w3schools.com/html/

Course Title: Lab: Web Design with HTML and CSS	**Total Hours :60 Hours**
Course Code : U22CACP11	**Total Credits : 2**

Course Outcomes

COs	CO Statement
CO1	Understand the important HTML tags for designing static pages and seperate design from content using Cascading Style sheet.
CO2	Design and develop web pages using CSS styles, internal and/or external style sheets.
CO3	Develop interactive web pages using Tables and Forms.
CO4	Implement different types of Layouts in developing a web page.
CO5	Able to create a website using HTML & CSS.

1. Create a simple webpage using basic tags.
2. Create a simple webpage using paragraphs and headings tags.
3. Create a simple webpage using lists tags.
4. Create a simple webpage using images.
5. Create a simple webpage using tables.
6. Create a simple webpage using forms
7. Create a simple webpage using hyperlinks.
8. Create a simple webpage using CSS.
9. Create a simple webpage using text and colors in CSS.
10. Create a simple webpage using boxes.
11. Create a simple webpage using video and audio.

12. Create a simple webpage using lists, tables, forms in CSS.
13. Create a simple webpage using different layouts to positioning the elements.
14. Create a simple website on your own using any HTML tags with CSS.

Course Title: Digital Principles and Computer Organization	Total Hours : 60
Course Code : U22CAC12	Total Credits : 3

Course Outcomes

COs	CO Statement
CO1	To obtain basic idea about logic gates.
CO2	To obtain knowledge arithmetic and combinational circuits.
CO3	To have a thorough understanding of the basic structure and operation of a digital computer.
CO4	To study the different ways of communicating with I/O devices and standard I/O interfaces.
CO5	To study the hierarchical memory system including cache memories and virtual memory.

Unit I   **12 Hours**
Digital Logic - The Basic gates-NOT, OR, AND; Universal Logic gates - NOR, NAND. **Combinational Logic Circuits -** Boolean Laws and Theorems; Sum-of-Products method; Truth table to Karnaugh Map; Pairs, Quads and Octets; Karnaugh Simplifications; Don't care Conditions; Product-of-sums Method; Product-of-sums simplification.

Unit II   **12 Hours**
Number Systems and Codes - Binary Number system; Binary-to-decimal Conversion; Decimal-to-Binary Conversion; Octal Numbers; Hexadecimal Numbers; The ASCII Code; The Excess-3 code.
Arithmetic Circuits - Binary Addition; Binary Subtraction; 2'S complement representation; Arithmetic Building Blocks.

Unit III   **12 Hours**
Flip-Flops - RS FLIP-FLOPs; Gated FLIP-FLOPs; Edge-triggered JK FLIP-FLOPs; JK Master-Slave FLIP-FLOPs.
Registers - Types of registers; Serial In-serial Out; Serial In-parallel Out.

Unit IV   **12 Hours**
Basic structure of Computers - Computer types; Functional units; Basic operational concepts; Bus Structures; Software; Historical Perspective.
Machine Instructions and Programs - Memory Locations and Addresses; Memory operations; Instructions and Instructions Sequencing; Addressing modes; Assembly Language; Basic Input/Output Operations.
Input/Output organization - Accessing I/O devices; Interrupts; Direct Memory Access; Buses; Interface Circuits.

Unit V   **12 Hours**
The Memory System - Some Basic Concepts; Semiconductor RAM Memories; Read-Only Memories; Cache Memories; Virtual Memories; Secondary Storage.
Basic Processing Unit – Some Fundamental concepts; Hardwired Control; Microprogrammed Control.

Pipelining – Basic Concepts; Data Hazards; Instructional Hazards.

Text Books

1. Donald P Leach, Albert Paul Malvino, GoutamSaha, "Digital Principles and Applications", McGraw Hill Education Pvt. Ltd, 7th Edition, 2013.

Unit I	Chapter 2 (2.1, 2.2)
	Chapter 3 (3.1 to 3.8)
Unit II	Chapter 5(5.1 to 5.7)
	Chapter 6(6.1, 6.2, 6.5, 6.7)
Unit III	Chapter 8(8.1, 8.2, 8.5, 8.8)
	Chapter 9(9.1 – 9.3)

2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", McGraw-Hill Higher Education, Fifth Edition, 2012.

Unit IV	Chapter 1(1.1 - 1.5, 1.8)
	Chapter 2(2.2 - 2.7)
	Chapter 4(4.1, 4.2, 4.4, 4.5, 4.6)
Unit V	Chapter 5(5.1 - 5.3, 5.5, 5.7, 5.9)
	Chapter 7(7.1, 7.4, 7.5)
	Chapter 8(8.1 – 8.3)

Reference Books

1. M.Morris Mano, "Digital Logic and Computer Design", Pearson Prentice Hall, Thirteenth Impression, 2011.
2. S.Salivaganan, S.Arivalagan, "Digital Circuits and Design", Vikas Publishing House Pvt. Ltd., Third Edition, 2007.
3. M.Morris Mano, "Computer System Architecture", Pearson Prentice Hall, Third Edition, 2006.

e– Resources:

1. https://www.youtube.com/watch?v=3zvINQUdUns&t=124s
2. https://www.tutorialspoint.com/digital_circuits/digital_circuits_logic_gates.htm
3. https://docs.google.com/file/d/0B8-drkZsESDnN2NmYTQxYjQtYTMwZi00N2IzLTkxNjgtZjI1NTZiN2FjNDli/edit?resourcekey=0-Yk8bAsCt9I5epBNFTG8KMQ
4. https://www.javatpoint.com/computer-organization-and-architecture-tutorial
5. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
6. https://nptel.ac.in/courses/106/106/106106092/

Course Title: Discrete Mathematics	Total Hours: 60 Hours
Course Code: U22MAAA11	Total Credits:4

Course Outcomes

COs	CO Statement
CO1	Understand sets and perform operations and algebra on sets
CO2	Determine the Properties of Relations, Equivalence Relation, Properties of Relations Matrix and Graph Representation of Relations
CO3	Analyse logical propositions via truth tables.
CO4	Perform the Matrix Operations and Rank of a Matrix
CO5	Able to define the basic concepts of Graphs, Directed graphs and Weighted

	Graphs

Unit I   **12 Hours**

Set Theory - Introduction – Sets – Notation and Description of sets – Subsets - Venn – Euler Diagrams – Operations on sets – Properties of set operations – Verification of basic laws and algebra by Venn diagram.

Unit II   **12 Hours**

Relations - Relations – Representation of a relation - Operations on relations – equivalence relation – Closures and Warshalls Algorithm.

Unit III   **12 Hours**

Logic - Introduction – IF statements – Connectives – Truth table of a formula – Tautology – Tautological implications and Equivalence of formulae.

Unit IV   **12 Hours**

Matrix Algebra **-** Introduction – Matrix Operations – Inverse of a Square Matrix – Elementary Operations and Rank of a Matrix (For all the theorems, consider statement only - Solved examples only)

Unit V   **12 Hours**

Graph Theory - Basic concepts – Matrix representations of graphs –shortest path problem. (For all the theorems, consider statement only)

Text Book

1. M Venkataraman, N. Sridharan and N. Chandrasekaran, "Discrete Mathematics", The National Publishing Company, May 2009.

Unit 1	Chapter 1 (1.1 - 1.8)
Unit II	Chapter 2(2.2 - 2.6)
Unit III	Chapter 9 (9.1 - 9.3, 9.6 - 9.8)
Unit IV	Chapter 6 (6.1 - 6.4)
Unit V	Chapter 11 11.1 (P.No: 11.1 – 11.9) 11.2 (P.No: 11.34 – 11.42 & 11.47 – 11.51) 11.4 (P.No: 11.69 – 11.71) 11.5 (P.No: 11.79 – 11.80

Reference Book

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications"

e – Resources

1. https://notendur.hi.is/mbh6/html/_downloads/Discrete%20Mathematics%20and%20Its%20Applications%20-%20Kenneth%20Rosen%20(2012).pdf
2. https://home.iitk.ac.in/~arlal/book/mth202.pdf
3. https://nptel.ac.in/courses/106/106/106106183/
4. https://youtu.be/wRMC-ttjhwM
5. https://youtu.be/2spTnAiQg4M

Course Title : LAB: Office Automation	Total Hours :30 Hours
Course Code : U22CASP11	Total Credits : 2

Course Outcomes

COs	CO Statement
CO1	Able to create folders and file operations such as copy, paste, delete and rename.
CO2	Create and edit documents in Word, Excel, PowerPoint.
CO3	Develop slideshow presentations using PowerPoint.
CO4	Implement different types of Layouts in designing the documents.
CO5	Able to use formula and charts using Excel worksheets.

MS-Word
- Working with Text and Formatting, spell check and grammar.
- Table manipulation.
- Flow chart designing and Create Smart Art.
- Mail merge.
- Real-time document preparation (Covering letter, greeting cards, invitation)

MS-Excel
- Performing calculations using Formula.
- Using Functions.
- Using Graphs and Charts.
- Sorting and Filtering.

MS-PowerPoint
- Designing slides for real time applications
- Using image, audio and video effects
- Using Animation and transition
- Using template

MS-Access
- Table manipulation
- Creating, altering and drop tables
- Inserting values
- Selecting and calculating values from the table
- Real-time application development (employee database, student database etc.,)

SEMESTER – II

Course Title : Programming in C	Total Hours : 90 Hours
Course Code : U22CAC21	Total Credits : 5

Course Outcomes

COs	CO Statement
CO1	Describe the basic structure of C Program.
CO2	Understand the fundamentals of C Programming.
CO3	Develop an in-depth understanding of functional and logical concepts of C Programming.
CO4	Implement basic operations on arrays, functions, pointers, structures, unions and files.
CO5	Provide an exposure to problem-solving through C Programming.

Unit I	18 Hours

Overview of C - History of C; Importance of C; Basic Structure of C Programs; Programming Style; Executing A 'C' Program.

Constants, Variables and Data types - Introduction; Character set; C Tokens; Keywords and Identifiers; Constants; Variables; Data types; Declaration of Variables, Declaration of Storage class; Assigning values to variables; Defining Symbolic Constants; Declaring a Variable as Constant; Declaring a variable as Volatile.

Operators and Expressions – Introduction; Arithmetic Operators; Relational Operators; Logical Operators; Assignment Operators; Increment and Decrement Operators; Conditional Operator; Bitwise Operators; Special Operators; Arithmetic Expression; Evaluation of Expressions; Precedence of Arithmetic Operators; Some Computational Problems; Type Conversions in Expressions; Operator Precedence and Associativity.

Unit II	18 Hours

Managing Input and Output Operations – Introduction; Reading a Character; Writing a Character; Formatted Input; Formatted Output.

Decision Making and Branching – Introduction - Decision Making with if statement; Simple if Statement; The if ... Else Statement; Nesting of if...Else statement; The Else if Ladder; The Switch Statement; The ?: Operator; The goto statement.

Decision Making and Looping – Introduction; The While Statement; The do Statement; The for Statement; Jumps in Loops.

Unit III	18 Hours

Array – Introduction; One-Dimensional arrays; Declaration of One-Dimensional Arrays; Initialization of One-Dimensional Arrays; Two-Dimensional Arrays; Initializing Two-Dimensional Arrays; Multi-Dimensional Arrays; Dynamic Arrays; More about Arrays.

Character Arrays and Strings – Introduction; Declaring and Initializing String Variables; Reading Strings from Terminal; Writing Strings to Screen; Arithmetic Operators on Characters; Putting Strings Together; Comparison of Two Strings; String-Handling Functions; Table of Strings; Other Features of Strings.

Unit IV	18 Hours

User defined functions – Introduction; Need for User-Defined Functions; A Multi-Function Program; Elements of User Defined Functions; Definition of Functions; Return Values and Their Types; Function Calls; Function Declaration; Category of Functions; No Arguments and no Return Values; Arguments but no Return Values; Arguments with Return Values; No Arguments but Returns a Value; Nesting of Functions; Recursion.

Structures and Unions – Introduction; Defining a Structure; Declaring Structure Variables; Accessing Structure Members; Structure Initialization; Copying and Comparing Structure Variables; Operations on Individual Members; Arrays of Structures; Arrays within Structures**;** Structures and Functions; Unions; Size of Structures.

Unit V	18 Hours

Pointers – Introduction; Understanding Pointers; Accessing the Address of a Variable; Declaring Pointer Variables; Initialization of Pointer Variables; Accessing a Variable Through its Pointer; Chain of Pointers; Pointer Expressions; Pointer Increment and Scale Factors; Pointers and Arrays; Pointers and Character Strings; Array of Pointers; Functions that Return Multiple Values; Pointers as Function Arguments.

File Management in C – Introduction; Defining and Opening a File; Closing a File; Input/output Operations on Files; Error Handling During I/O Operations; Random Access to Files; Command Line Arguments.

Text Book

1. E.Balagurusamy, "Programming in ANSI C", McGraw Hill Education India Pvt. Ltd., Eighth Edition,2019.

Unit I	Chapter 2 (17-19), (28-31) Chapters 3, 4
Unit II	Chapters 5, 6, 7
Unit III	Chapters 8, 9
Unit IV	Chapter 10 (291-315), Chapter 11 (347- 366)
Unit V	Chapter 12 (381-403), Chapter 13

Reference Books

1. Yaswant Kanetkar, "Let usC", BPB Publications, 10[th]Edition, 2010.
2. Gottfried, "Programmingwith C (Schaum"soutlineseries)", TataMcGraw Hill, 2006

e- Resources

1. https://www.programiz.com/c-programming
2. https://www.freecodecamp.org/news/what-is-the-c-programming-language-beginner-tutorial/
3. https://nptel.ac.in/courses/106/104/106104128/
4. https://www.digimat.in/nptel/courses/video/106104128/L01.html
5. https://youtu.be/KJgsSFOSQv0

Course Title : LAB: C Programming	**Total Hours : 90 Hours**
Course Code : U22CACP21	**Total Credits : 3**

Course Outcomes

COs	CO Statement
CO1	Develop programming skills using the fundamentals and basics of C Language.
CO2	Develop programs using the basic elements like control statements, Arrays and Strings
CO3	Enable effective usage of arrays, structures, functions and pointers.
CO4	Implement files and command line arguments.
CO5	Able to solve real-world problems through C Programming.

1. Program to use if else statement.
2. Program to use if else if statement.
3. Program to illustrate the use of Else-If Ladder.
4. Program to illustrate the use of Switch Case.
5. Program to use while statement.
6. Program to use do while statement.
7. Program to use for statement.
8. Program to use single dimensional array.

9. Program to use two dimensional arrays.
10. Program to implement User Defined Functions.
11. Program to implement User Defined Functions that returns multiple values.
12. Program to use Recursive function.
13. Program to perform string manipulations using built-in string functions.
14. Program to perform string operations without using built-in functions.
15. Program to demonstrate pointers.
16. Program to demonstrate structures.
17. Program to implement command line arguments.
18. Program to demonstrate Files.

Course Title: Operations Research	Total Hours: 60 Hours
Couse Code: U22MAAA21	Total Credits: 4

Course Outcomes

COs	CO Statement
CO1	Understand scopes and Modelling of OR
CO2	Determine the standard and canonical form of LPP
CO3	To enrich the knowledge of solving Assignment Problem
CO4	Perform the Transportation problem and find the cost
CO5	To solve the matrix in Game Theory

Unit I   **12 Hours**
Origin and development of OR –Nature and Features of OR- Modelling in OR – Scope of OR in decision making – Linear programming problems – Mathematical formulation of L.P.P – Graphical solution of L.P.P. (Solved Examples only)

Unit II   **12 Hours**
Canonical form-Standard form - Simplex methods (Solved Examples only)

Unit III   **12 Hours**
Mathematical formulation of assignment problem – Hungarian method for solving the assignment problem – Travelling salesmen problem. (Solved Examples only)

Unit IV   **12 Hours**
Mathematical formulation of Transportation problem – Methods for finding initial feasible solution (North – West Corner Rule, least cost method and Vogel's approximation method) – Optimal solution (Modi Method) – Unbalanced T.P. (Solved Examples only) (For all the theorems consider the statements without proofs)

Unit V   **12 Hours**
Two persons zero sum game – game with and without saddle point – Solution of 2 x 2 game – dominance – graphical method. (Solved Examples only) (For all the theorems consider the statements without proofs)

Text Books
1. Dr.S.Arumugam and Mr.A.Thangapandi Isaac, "Topics in Operations Research Linear Programming", New Gamma publishing house,2015.
2. KantiSwarup, P.K. Gupta and Manmohan, "Operations Research", Sultan Chand and Sons, 13th Edition, 2008.

Unit – 1	(Text Book 2) Chapter 1 Section 1.2, 1.4, 1.5, 1.6 (Text Book 1) Chapter 3 (P.No 3.0-3.7 and 3.64-3.77)
Unit – II	(Text Book 1) Chapter 3 (P.No 3.339-3.412,3.86-3.101) (problem 1 – 4),3.107-3.110 (Problem 7,8)
Unit – III	(Text Book 1) Chapter 5 (P.No 5.1-5.33)
Unit – IV	(Text Book 1) Chapter 4 (P.No 4.1-4.66)
Unit – V	(Text Book 2) Chapter 17 Section 17.1 – 17.7

Reference Book
1. Operations Research – S.D. Sharma. KedarNathRamNath and Co, Pearson Publications, 2005.

e – Resources
1. https://www.bbau.ac.in/dept/UIET/EMER-601%20Operation%20Research%20Queuing%20theory.pdf
2. https://ncert.nic.in/ncerts/l/lemh206.pdf
3. https://egyankosh.ac.in/bitstream/123456789/20790/1/Unit-5.pdf
4. http://www.nitjsr.ac.in/course_assignment/CA02CA3103%20RMTTransportation%20Problem.pdf
5. https://www.maa.org/sites/default/files/pdf/ebooks/GTE_sample.pdf

Course Title : LAB: Multimedia	Total Hours: 30 Hours
Course Code : U22CASP21	Total Credits: 2

Course Outcomes

COs	CO Statement
CO1	To increase the ability to edit and add special features to the images.
CO2	To increase the ability to create flash movie.
CO3	To design various applications such as cards, invitations, certificates etc.
CO4	To use various tools and Filters effectively.

Photoshop:
1. Merge more than one image into a single file.
2. Design a visiting card.
3. Implement Flaming Hot Fire Text.
4. Implement Rain effect.
5. Using Photoshop to change the color of an image.
6. Implement Ripple effect.
7. Create a water drop effect
8. Implement Blinking effect.
9. Create Out of Bound effect.
10. Place an image into a text.

Flash:
11. Create a text animation.
12. Create a picture animation.
13. Create an animation to indicate a ball bouncing on steps.

14. Implement Masking Concept.
15. Shape Tweening.
16. Animate a Globe.
17. Create an animation using Guide Layer.
18. Procedure to implement moving ball using mouse drag (Action Script).

Open Shot Video Editor:
19. Program to illustrate the use of multiple tracks.
20. Program to illustrate the use of Razor tools.
21. Program to add effects to the videos.
22. Program to add Transitions to the videos.
23. Program to create a video by using images.
24. Program to add text and logo watermark.

Course Name: Bachelor of Science

Discipline   : BCA

Rules and regulations, Course Scheme and Scheme of Examinations

(For those who join in June 2018 and after)

Semester	Part	Subject	Hour	Credit	Int +Ext = Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of revision
III	Part I	Tamil / Hindi	6	3	25+75=100		✔					✔					U3PT3/ U1PH3	Revised/60
	Part II	English	6	3	25+75=100				✔	✓		✓					U3PE3	Revised/90
	Core 5	Java Programming	4	4	25+75=100				✔							✓	U2CAC31	No Change
	Core 6	Data Structure	4	4	25+75=100				✔					✓			U2CAC32	Revised / 25%
	Allied 3	Computer Based Financial Accounting	4	4	25+75=100	✔								✓			U1CCA3A/ U1CEA3A	No Change
	Core7 – Lab	LAB: Java Programming	4	2	40+60=100				✔	✔						✓	U2CAC3P1	No Change
	SBS 3-Lab	LAB: Data Structure	2	2	40+60=100				✔	✔				✓			U4CAS3P	Revised / 8%
IV	Part I	Tamil / Hindi	6	3	25+75=100		✔					✔					U2PT4/ U1PH4	Revised/60
	Part II	English	6	3	25+75=100				✔	✓		✓					U3PE4	Revised/65
	Core 8	Relational Database Management System	4	4	25+75=100				✔							✓	U3CAC41/ U2CAC51	Interchange
	Core 9	Advanced Java Programming	4	4	25+75=100				✔							✓	U3CAC42	Revised / 40%
	Allied 4	Principles of Costing	4	4	25+75=100			✔						✓			U2CCA4A/ U2CEA4A	No Change
	SBS 4–Lab	LAB: RDBMS	2	2	40+60=100				✔	✔						✓	U4CAS4P	Interchange & Revised / 40%
	Core 10 – Lab	LAB: Advanced Java Programming	4	2	40+60=100				✔	✔						✓	U4CAC4P1	Revised / 60%

Self-Learning Course

Semester	Subject	Credit	Ext =Tot	Subject Code
IV	Human Rights	5	100 = 100	U1CSL41

Year	Part	Subject	Credit	Int=Total	Code
I & II	Part V	NSS/ NCC/ Physical Education – Sports/YRC/RRC	1	100=100	U2NS4 / U2NC4/ U2PS4 / U1YR4/ U1RR4

Core - Java Programming

Contact Hours per Week : 4 Hrs   **Subject Code : U2CAC31**
Contact Hours per Semester : 48 Hrs   **Credits : 3**
Objectives:
  ➢ To understand fundamentals of java programming such as variables, Conditional and iterative execution, methods, etc.
  ➢ To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
  ➢ To understand error-handling techniques using exception handling.
  ➢ To understand Applet and Graphics Programming.
  ➢ To understand I/O functionality to read from and write to text files.

Unit I   **10 Hrs**
Java Evolution: Java History - Java Features - How Java Differs From C and C++ -Java and Internet - Web Browsers - Java Environment. **Overview of Java language:** Introduction - Simple Java program - More of Java - Java Program Structure - Java Tokens - Implementing a Java program - Java Virtual Machine - Command Line Arguments. **Constants, Variables, and Data Types:** Introduction - Constants - Variables - Data Types - Declaration of Variables - Giving Values to Variables - Scope of Variables - Symbolic Constants - Type Casting - Getting Values of Variables.

Unit II   **10 Hrs**
Operators & Expressions: Introduction - Arithmetic Operators - Relational Operators-Logical Operators - Assignment Operators - Increment and Decrement Operators-Conditional Operator - Bitwise Operators - Special Operators - Evaluation of Expression-Precedence of Arithmetic Operators - Type Conversion in Expression – Operator Precedence and Associatively - Mathematical Functions. **Decision making and Branching**: Introduction - Decision Making With If Statement – Simple If Statement-The If...Else Statement – Nesting of If…Else Statement - The Else If Ladder - The Switch Statement - The ?: Operator. **Decision Making and Looping:** Introduction - The While Statement – The Do Statement - The For Statement - Jump in Loops - Labelled Loops

Unit III   **10 Hrs**
Classes, Objects and Methods: Introduction - Defining a Class - Fields Declaration - Methods Declaration - Creating Objects - Accessing Class Members - Constructors - Method Overloading - Static Members - Nesting of Methods - Inheritance: Extending a Class - Overriding Methods - Final Variables and Methods - Final Classes – Finalizer Methods - Abstract Methods and Classes - Visibility Control. **Arrays, Strings and Vectors**: Introduction - One Dimensional Array - Creating an Array - Two Dimensional Arrays -

Strings **Interfaces: Multiple Inheritance:** Introduction- Defining Interfaces - Extending Interfaces - Implementing Interfaces - Accessing Interface Variables

Unit IV   **9 Hrs**
Packages: Introduction - Java API Packages - Using System Packages - Naming Conventions - Creating Packages - Accessing Package - Using a Package - Adding a Class to Package - Hiding Classes - Static Import. **Multi Threaded programming:** Introduction - Creating Threads - Extending the Thread Class - Stopping and Blocking Thread - Life Cycle of a Thread - Using Thread Methods - Thread Exceptions - Thread Priority - Synchronization – Implementing The Runnable Interface - Inter Thread Communication. **Managing Errors and Exceptions:** Introduction - Types of Errors - Exceptions - Syntax of Exception Handling Code -Multiple Catch Statements - Using Finally Statements - Throwing Own Exceptions.

Unit V   **9 Hrs**
Applet: Introduction - How Applet Differ From Applications - Building Applet Code -Applet Life Cycle - Applet Tag - Adding Applet to HTML File - Running an Applet - More About Applet Tag - Passing Parameters to Applet. **Graphics Programming**: Introduction - The Graphics Class - Lines and Rectangles - Circles and Ellipses - Drawing Arcs - Drawing Polygons. **Managing Input/Output Files in Java:** Introduction - Concept of   Streams - Stream Classes - Byte Stream Classes - Character Stream Classes - Using Streams -Using The File Class- Creation of Files -Reading/Writing Characters-Reading/Writing Bytes-Random Access Files

Text Book:
"Programming with Java A Primer", E.Balagurusamy, Fourth Edition 2010, Tata McGraw Hill Ltd.
Unit I : Chapter 2 (2.1, 2.2, 2.3, 2.4,2.6,2.9)
            Chapter 3 (3.1,3.2,3.3,3.5,3.6,3.9,3.10,3.11)
            Chapter 4 (4.1 to 4.10)
Unit II : Chapter 5 (5.1 to 5.9),(5.11 to 5.15)
            Chapter 6 (6.1 to 6.8)
            Chapter 7 (7.1 to 7.6)
Unit III : Chapter 8 (8.1 to 8.16, 8.18)
            Chapter 9(9.1 to 9.5)
            Chapter 10(10.1 to 10.5)
Unit IV : Chapter 11 (11.1 to 11.10)
            Chapter 12(12.1 to 12.11)
            Chapter 13(13.1 to 13.7)
Unit V : Chapter 14(14.1,14.2,14.4,14.5,14.8 to 14.12)
            Chapter 15(15.1 to 15.6)
            Chapter 16(16.1 to 16.5, 16.6, 16.8, 16.10, 16.11, 16.12, 16.15)

Reference Book:
The Complete Reference Java2 by Herbert Schildt, Fifth Edition, 2008, Tata McGraw Hill Ltd,
----

Core 6 - Data Structure

Contact Hours per Week: 4   **Credits : 4**

Contact Hours per Semester: 48   **Subject Code : U2CAC32**

Course Outcome:

CO1:	To understand the basics of Data Structures.
CO2:	To gain knowledge about Linked lists and Stacks.
CO3:	To learn the working of queues and trees.
CO4:	To gain knowledge about graphs.
CO5:	To understand the sorting and searching techniques.

Unit I   **9 Hrs**

Introduction and overview: Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures.

Arrays: Definition – Terminology – One Dimensional Array – Multidimensional arrays: Two Dimensional Arrays.

Unit II   **10 Hrs**

Linked Lists: Definition – Single Linked List – Circular Linked List – Double Linked Lists – Circular Double Linked List.

Stacks: Introduction – Definition – Representation of stack – Operations of Stack.

Unit III   **10 Hrs**

Queues: Introduction – Definition – Representation of Queues – Various Queue structures.

Trees: Basic Terminologies – Definition and Concepts – Representation of Binary Tree – Operations on a Binary tree – Types of Binary Trees: Binary Search Tree, Heap Tree – B Trees.

Unit IV   **9 Hrs**

Graphs: Introduction – Graph Terminologies – Representation of Graphs – Operations of Graphs.

Unit V   **10 Hrs**

Sorting: Basic Terminologies – Sorting Techniques – Straight Insertion Sort – Heap Sort – Bubble Sort - Quick Sort – Merge Sort.

Searching: Basic Terminologies – Linear search with Array – Binary Search.

Text Book:

Debasis Samanta. ***Classic Data Structures.*** PHI Learning Private Ltd;Second Edition.29th Printing 2012.

Unit I	:	Chapter 1(1.1, 1.2, 1.3, 1.4), 2(2.1,2.2,2.3,2.4.1)
Unit II	:	Chapter 3(3.1,3.2,3.3,3.4,3.5), 4(4.1,4.2,4.3,4.4)
Unit III	:	Chapter 5(5.1,5.2,5.3,5.4), 7(7.1,7.2,7.3,7.4,7.5.2,7.5.3,7.7)
Unit IV	:	Chapter 8(8.1,8.2,8.3,8.4),
Unit V	:	Chapter 10(10.1, 10.2, 10.3.1, 10.4.3, 10.5.1, 10.5.4, 10.7.3), 11(11.1,11.2.1, 11.2.4)

Reference Books :

1. Chithra, P.T.Rajan, *Data Structure.* Vijay Nichole Pvt Ltd; 2006.

2. Horowitz, Sahni, Anderson-Freed.*Fundamentals of Data Structres in C*.University Press Private Limited; Second Edition 2008.

Allied - Computers Based Financial Accounting

Contact Hours per Week: 4 Hrs   **Subject Code: U1CCA3A / U1CEA3A**

Contact Hours per Semester: 48 Hrs   **Credits: 4**

Objective:
- ➢ Able to understand financial accounting
- ➢ To gain knowledge in final accounts
- ➢ To be familiar with Tally

Unit I   **10 Hrs**

Financial Accounting: Meaning, Nature and scope, Limitations – Accounting Principles: Basic Concepts and Conventions-Objectives of accounting-Accounting rules.

Unit II   **10 Hrs**

Books and records: Recording of business transactions –Types of accounts – Journal –Ledger – Journal Vs ledger. Subsidiary books – Trial balance.

Unit III   **10 Hrs**

Final Accounts: Introduction – Trading account – Profit and loss account – Balance sheet. (Simple problems)

Unit IV   **9 Hrs**

Introduction to Tally: Features of Tally 9 – Company info: Create, Select, Alter and Close or Shut Company – Ledger Creation: Creating, Displaying, Altering and Deleting. F11 – Features and F12- Configuration

Unit V   **9 Hrs**

Voucher Creation: Receipt, Payment, Contra, Journal, Sales, Purchase, Memo, Display, Alter, Delete, Insert. Statement of Reports: Trail balance, Profit and Loss account, Balance sheet.

Text Book:

1. Financial Accounts - R.S.N.Pillai and Bagavathi, S.Chand, 2007

       Unit I   : Page Number – 1 to 22

       Unit II : Page Number – 30 to 65

       Unit III : Page Number – 154 to 170

2. Tally (version 9) - C. Nellai Kannan, 2007

       Unit IV: Page Number – 5 to 61

       Unit V : Page Number – 62 to 102

Reference Books:

1. Comdex Tally 9 – Dr. Namrata Agrawal Dream Tech Publications.
2. Tally (Accounting Software) S.Palanivel, Margham Publications, 2010.

Note: The Question paper shall cover 60% theory and 40% problems

----

Core LAB: Java Programming

Contact Hours per Week: 5 Hrs   **Subject Code : U2CAC3P1**
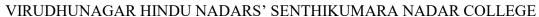
Contact Hours per Semester: 60 Hrs   **Credits : 2**

Objectives:

 Able to write, compiling & execute basic java program
- ➢ Able to create java programs that leverage the object-oriented features of java programming language.
- ➢ Able to create the interface program.
- ➢ Able to create and use threads, handle exceptions and write applets.

1) Write a java program to demonstrate looping statements.
2) Write a java program to demonstrate command line argument.
3) Write a java program for using one dimensional array.
4) Write a java program for using two dimensional arrays.
5) Write a java program to demonstrate method overloading.
6) Write a java program to demonstrate method overriding.
7) Write a java program to demonstrate string manipulation.
8) Write a java program to demonstrate single inheritance.
9) Write a java program to demonstrate multilevel inheritance.
10) Write a java program to demonstrate interface.
11) Write a java program to demonstrate packages.
12) Write a java program to demonstrate multithreading.
13) Write a java program to demonstrate built-in exception.
14) Write a java program to demonstrate user defined exception.
15) Write a java program to perform applet animation.
16) Write a java program to demonstrate graphics class.
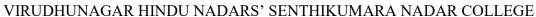17) Write a java program to demonstrate streams.

SBS-3 LAB: Data Structure

Contact Hours per Week: 2   **Credits : 2**
Contact Hours per Semester: 24   **Subject Code : U4CAS3P**
Course Outcome:

CO1:	To understand the basics of Data Structures.
CO2:	To understand the Sorting techniques.
CO3:	To gain knowledge about Stacks and Queues.
CO4:	To learn the working of Trees and Linked List.

1. Program to implement Exchange Sort using Arrays.
2. Program to implement Insertion Sort using Arrays.
3. Program to implement Structures.
4. Program to implement Stack Operations.
5. Program to implement Queue Operations.
6. Program to convert infix expression to postfix expression using Stack.
7. Program to implement Binary Tree Traversal. (Inorder, Preorder, Postorder)
8. Program to implement Binary Search Tree.
9. Program to implement Single Linked List.
10. Program to implement Circular linked List.

Core 8 - Relational Database Management System

Contact Hours per Week: 4   **Credits :4**

Contact Hours per Semester: 48   **Subject Code : U3CAC41/U2CAC51**

Course Outcome:

CO1:	Understand the basic concepts and the applications of database systems.
CO2:	Ability to define a problem at the view level and ability to understand the physical structure of the database to handle data.
CO3:	Utilize the knowledge of basics of SQL and construct queries using SQL.
CO4:	Ability to normalize the database and understand the internal data structure.
CO5:	Apply Relational Database theory and be able to write Relational Algebra expressions for queries.
CO6:	Use design principles for logical design of database using E-R method

Unit I   **8 Hrs**

Introduction to Database Management System (DBMS): Introduction – Need of a Database - Characteristics of data in a database – Database Management System – Purpose of DBMS - Types of DBMS.

Introduction to Relational Database Management System (RDBMS): Introduction - RDBMS Terminology - The Relational Data Structure - Relational Data Integrity - Relational Data Manipulation – Codd's Rules.

Unit II   **10 Hrs**

Database Architecture and Data modeling: Introduction - Conceptual, Physical and Logical database models - Database Design - Design Constraints - Functional Dependencies.

Entity Relationship Modeling: Introduction - E-R Model - Components of an ER Model – ER modeling Symbols.

Data Normalization: Introduction - First Normal Form (1NF) - Second Normal Form (2NF) - Third Normal Form (3NF) - Boyce- Codd Normal Form (BCNF) - Fourth Normal Form (4NF) - Fifth Normal Form (5NF) - Domain Key Normal Form (DKNF) - Denormalization.

Unit III   **10 Hrs**

Relational Algebra & Relational Calculus: Relational Algebra - Relational Algebraic Operations -Relational Calculus – Tuple relational calculus – Domain relational calculus**.**

Introduction to Structured Query Language (SQL): Introduction - SQL - Characteristics and Functions of SQL - Types and Uses of SQL Commands - Fundamental Commands and Advantages of SQL – Tables - SQL DML and DDL Statements - SQL Operators - SQL Like, Between, In, is Null, Wildcards Operators - SQL Alias - SQL Joins - SQL Union Operator - SQL Select into Statement - Select into With a Where Clause - Create Database Statements – Create Table Statements - SQL Constraints - Data Control Language(DCL) - Drop Table Statement - Truncate Table Statement - Alter Table Statement - Auto Increment Field - SQL Views - SQL Date and Null Functions - SQL Data types - SQL Functions – Indexes - Sequences with SQL - Oracle Built in Functions - SQL Sub Query.

Unit IV   **10 Hrs**

PL/SQL: Introduction of PL/SQL - Difference between PL/SQL and SQL - Advantages of PL/SQL - PL/SQL Block -Conditional, Iterative Statements, Operators, Control Structure, Functionality ,coding, Functions, Procedures, Anonymous Block in PL/SQL – Packages - Variables in PL/SQL - Conditional Statements - Array, Error, Exception Handling in PL/SQL

- For Loops – Cursors - PL/SQL Subprograms - Stored Procedures, Parameters, Discovering Errors ,Printing Variables ,Simple Programs in PL/SQL - Control Flow, The Character Set in PL/SQL - Data types in PL/SQL.

Triggers: Introduction: Trigger - Structure, Syntax of Triggers - Creating Triggers - How Triggers are used - Triggers Vs Declarative Integrity Constraints - Parts of Trigger - Triggering Event or Statement - Trigger Restriction - Trigger Action -Types of Trigger - Before Vs After Trigger – Combinations - Trigger Execution - The Execution Model of Triggers and Integrity Constraint Checking - Data Access for Triggers - Programming Triggers.

Unit V   **10 Hrs**
Database Security: Introduction - Database Environment - Data Security Risks - Complex User Management Requirements - Dimensions of Database Security - Data Security Requirements - Data Base Users - Protecting the Data within the Database – Granting and Revoking the privileges and Roles – Data Encryption – Database Integrity – System Availability Factors – Best Security Practices – Network Security – Authentication Users to the Database – Security Auditing.

Backup and Recovery: Introduction - Database Backups – Need of Plan Backup - Hardware Protection and Redundancy -Transaction Logs - Importance of Backups - Database Recovery - Data Storage - Cause of Failures - Recovery concepts and Terminology - Recovery Facilities - Recovery Techniques – Detached Transaction Actions – Recovery in Multi-Database Systems – Database Recovery from Catastrophic Failures.

Text Books:

1) Alexis Leon and Mathews Leon, Leon Vikas. ***Database Management Systems***. Chennai: 2002.
   Unit I: Chapter 5, 7.
   Unit II: Chapter 8,9,11.
   Unit III: Chapters 12.
   Unit V: Chapters 27, 30.
2) Rakesh Saini, M.M.S.Rauthan, Abhay Saxena, Bindu Sharma.***Database Management System***. First Edition,Vayu Education of India publishing; 2010.
   Unit III: Chapter 4 - 4.1 to 4.45 and 4.47 to 4.49
   Unit IV: Chapter 6, 7.1 to 7.5, 7.10, 7.12 to 7.23.

Reference Books:
1. Peter Rob, Carlos Coronel .***Database System concepts***. First Edition, Publishing Cengage Learning; 2008.
2. Nilesh Shah. ***Database Systems using Oracle***. Second Edition, Published by PHI Learning; 2010.

Core 9 - Advanced Java Programming

Contact Hours per Week: 4   **Credits :4**
Contact Hours per Semester: 48   **Subject Code : U3CAC42**

Course Outcome:

CO1:	Students will develop sophisticated GUI using AWT Components.
CO2:	Students will develop interactive user interfaces using the Java Swing class and appropriate layout managers.
CO3:	Students can understand difference between Swing and AWT programming.
CO4:	Students to develop server side programs in the form of servlets.
CO5:	Students to develop Interactive/Dynamic Web Pages using JSP.

Unit I   **9 Hrs**
Using AWT Controls, Layout Managers and Menus: Control Fundamentals - Labels - Using Buttons - Applying Check Boxes - Checkbox Group - Choice Controls - Using Lists - Managing Scroll Bars - Using a Text Field - Using a Text Area.

Unit II   **9 Hrs**
Using AWT Controls, Layout Managers and Menus: Understanding Layout Managers - Menu Bars and Menus - Dialog Boxes - File Dialog - Handling Events by Extending AWT Components - Exploring the Controls, Menus and Layout Managers.

Unit III   **9 Hrs**
A Tour of Swing: JApplet - Icons and Labels - Text fields - Buttons:JButton Class - Check Boxes - Radio Buttons - Combo boxes - Tabbed Panes - Scroll Panes - Trees - Tables - Exploring Swing.

Unit IV: **10 Hrs**
Servlets: Advantages of Servlets - Architecture - Environment setup - Life Cycle - First Program - Form Data - Client HTTP Request - Server HTTP Response - HTTP Status Code - Cookies Handling - Session Tracking.

Unit V   **11 Hrs**
Java Server Pages: An Overview - Advantages of JSP – Architecture - JSP Processing - JSP Lifecycle - JSP Comments
JSP-Syntax: Expression – The Scriptlet - JSP Declarations - JSP Directives - JSP Implicit Objects - Control Flow Statements
Client Server JSP - Form Processing - Cookies Handling - Session Tracking - Page Redirecting.

Text Books:
    1. Herbert Schildt,***The Complete Reference JAVA 2***, New Delhi:McGraw Hill
      Publishing Company Limited; 54th Reprint 2013.
          Unit I   : Chapter 22(Page No:736 to 763)
          Unit II   : Chapter 22(Page No:763 to 798)
          Unit III : Chapter 26
    2. B.Prasanalakshmi,***Advanced Java Programming***, New Delhi:CBS Publishers & Distributors Pvt Ltd;First Edition 2015.
          Unit IV : Chapter 8(3 to 3.8,3.11,3.12)

Unit V : Chapter 8(4.1 to 4.7(4.7.1 to 4.7.4),
4.8 to 4.10(4.10.4 to 4.10.6,4.10.9)

Reference Books:
1.Steven Holzner et al, *Java 2 Black Book*, Paraglyph press;Reprint 2012.
2.Jim Keogh, *The Complete Reference J2EE*, New Delhi : McGraw Hill Publishing Company Limited; 25th Reprint 2009.

Allied - Principles of Costing

Contact Hours per week : 4 Hrs   **Subject Code:** U2CCA4A / U2CEA4A
Contact Hours per Semester : 48 Hrs   **Credits :4**
Objectives:
  ➢ Able to know basics of cost accounting
  ➢ To acquire knowledge in marginal costing

Unit I   **10 Hrs**
Cost – Costing - Cost Accounting – Meaning, Objectives – Advantages – Limitations – Classification of cost - Elements of cost - Difference between Financial accounting Vs. Cost accounting.

Unit II   **10 Hrs**
Cost sheet – Preparation of Cost Sheet – Prime Cost – Works Cost – Cost of Production – Cost of Sales.

Unit III   **10 Hrs**
Material cost – EOQ - Determination of various stock Levels – Methods of pricing material Issues. (FIFO, LIFO, Simple average and Weighted average)

Unit IV   **9 Hrs**
Labour Cost – Meaning – Methods of Remuneration – Time Rate System – Piece Rate System – Differential Piece rate system (Taylor and Merrick) - Incentive and Bonus Plan – Halsey Plan – Halsey Weir Plan – Rowan Plan.

Unit V   **9 Hrs**

Marginal Costing – Meaning – Features – Advantages – Disadvantages – Break Even analysis – P/V ratio – Margin of safety.(Simple problems only)

Text Book:
Cost Accounting – R.S.N. Pillai V.Bagavathi, S.Chand & Company LTD (Reprinted on 2013)
        Unit I : Page No: 1 to 28
        Unit II : Chapters: 29 to 53
        Unit III : Page No: 80 to 135
        Unit IV : Chapters: 163 to 202
        Unit V : Page No : 570 to 646
Reference Book:
Cost Accounting – L.P.Ramalingam, Dharani Publications.
Note: The Question paper shall cover 60% problems and 40% theory
----

SBS 4 LAB: RDBMS

Contact Hours per Week: 2   **Credits: 2**

Contact Hours per Semester: 24   **Subject Code: U4CAS4P**

SQL

1) Data Definition Language (DDL) Commands.
2) Data Manipulation Language (DML) Commands.
3) Transaction Control Language Statements (TCS)

PL/SQL

4) Implement PL/SQL program using different statements.
5) Implement PL/SQL program using Exception Handling
6) Implement PL/SQL program using Cursor.
7) Implement PL/SQL program using Triggers.

Core 10 LAB: Advanced Java Programming

Contact Hours per week : 4 Hrs   **Subject Code: U4CAC4P1**

Contact Hours per Semester : 48 Hrs   **Credits :2**

1. Write an applet program to perform arithmetic operations
2. Write an applet program to check the given number is odd or even.
3. Write an applet program to draw different shapes using choice control.
4. Write an applet program to change background color using scrollbar control.
5. Write an applet program to use menu control.
6. Write an applet program to use File Dialog.
7. Write a program to zoom a picture in swing.
8. Write a program to change background color using JTabbedPane in swing.
9. Write a program to create application form in swing.
10. Write a program to demonstrate typical Editable table to store Employee Details in swing.
11. Write a program to displaying multiplication table in servlet for a number entered in html page
12. Write a program to displaying the contents of the login form along with date and time in servlet for a number entered in html page
13. Write a program to add two numbers in servlet for a number entered in html page
14. Write a JSP program for showing increased font size
15. Write a JSP program for printing Fibonacci series.
16. Write a JSP program to display current date and time
17. Write a JSP program to count total number of hits on a particular page.
18. Write a JSP program to simulate digital clock.
19. Write a JSP program to demonstrate cookies.

Program Name: BACHELOR OF COMPUTER APPLICATIONS
Discipline   : COMPUTER APPLICATIONS
 (For those who Join in 2018 and after)

Semester	Part	Subject	Hour	Credit	Int+Ext= Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised/ New/ No Change/ Interchanged If Revised % of Change
V	Core11	Operating System	4	4	25+75=100				✔	✔				✔			U3CAC51	40% Change Migrated from previous semester
	Core12	Data Communications and Networks	4	4	25+75=100				✔	✔				✔			U1CAC52	No Change Migrated from previous semester
	Core13	Mobile Application Development	4	4	25+75=100				✔	✔						✔	U1CAC53	New
	Elective 1	Web Technology / Data Mining / TCP/IP	5	5	25+75=100				✔	✔						✔	U3CAE51	40% Change
						✔	✔			✔				✔			U3CAE52	35% Change
										✔				✔			U3CAE53	25% Change
	SBE-5	Employability Skills	2	2	25+75=100			✔		✔				✔			U1PS51	No Change
	NME-1	Basics of Computer	2	2	25+75=100				✔	✔				✔			U3CAN51	New
	Core 14 –Lab	LAB : Mobile Application Development	5	3	40+60=100			✔	✔	✔						✔	U3CAC5P1	New
	Core 15 –Lab	LAB : Web Technology	4	2	40+60=100			✔	✔	✔						✔	U3CAC5P2	30% Change

Sem	Course	Title			Marks												Course Code	Change
VI	Core16	Software Engineering	4	3	25+75=100				✔	✔			✔				U2CAC61	No Change
	Core 17	Cryptography	4	3	25+75=100				✔	✔			✔				U3CAC62	10% Change
	Elective 2	Embedded Systems / Computer Algorithms / Cloud Computing	5	5	25+75=100	✔	✔		✔	✔			✔	✔	✔		U2CAE61/ U2CAE62/ U2CAE63	No Change Migrated from previous semester
	SBE-6	Internet of Things	2	2	25+75=100				✔	✔			✔				U3CAS61	New
	NME-2	Introduction to Multimedia	2	2	25+75=100				✔	✔						✔	U3CAN61	20% Change
	Project and Viva Voce	Project and Viva Voce	5	5	50+50=100				✔	✔			✔				U1CA6PR	No Change
	Core 18 –Lab	LAB : Dot Net Programming	5	3	40+60=100			✔	✔	✔						✔	U3CAC6P1	30% Change
	Core 19 – Lab	LAB : Multimedia	3	2	40+60=100				✔	✔			✔				U3CAC6P2	10% Change

Self-Learning Courses:

Subject	Credit	Ext =Tot	Subject Code
UNIX and Shell Programming	5	100 = 100	U1CASL51
System Software	5	100 = 100	U1CASL52

Core 11: Operating System

Contact Hours per Week : 4 Hours   **Subject Code: U3CAC51**
Contact Hours per Semester: 48 Hours   **Credits: 4**

Course outcome:
Students, after successful completion of the course ,will be able to
    CO1: Learn the different types of operating systems and I/O Structure.
    CO2: Learn the process scheduling in the system, how processes communicate with each
          other.
    CO3: Learn the synchronization between the processes, when deadlock will happen, how
          to prevent and recover from deadlock.
    CO4: Learn memory management schemes and virtual memory concepts in the system.
    CO5: Learn different ways of directory implementation and allocation methods in
          operating system.

Unit I   **10 Hours**
Introduction: What Operating Systems Do - Computer-System Organization – Computer-System Architecture – Operating-System Structure – Operating-System Operations – Process Management – Memory Management – Storage Management – Computing Environments.

Unit II   **10 Hours**
System Structures: Operating-System Services – User Operating-System Interface – System Calls – Types of System Calls – System Programs.
Process Concept: Process Concept - Process Scheduling - Inter Process Communication.
Process Scheduling: Scheduling Criteria – Scheduling Algorithms.

Unit III   **10 Hours**
Synchronization: The Critical Section Problem – Peterson's Solution – Monitors.
Deadlocks: System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

Unit IV   **9 Hours**
Memory-Management Strategies: Background – Contiguous Memory allocation – Paging – Structure of the Page Table – Segmentation.
Virtual-Memory Management: Background – Demand Paging - Page Replacement.

Unit V   **9 Hours**
Implementing File Systems: Directory Implementation - Allocation Methods - Free Space

Management - Recovery.

Secondary-Storage Structure: Disk Structure – Disk Attachment – Disk Scheduling – Disk Management – RAID Structure.

Text Book:

Abraham Silberschatz, Peter B.Galvin, Greg Gagne, *Operating System Concepts,* Wiley India Pvt Ltd., 8th Edition, 2015.

Unit I : Chapter 1.1 – 1.8, 1.12
Unit II : Chapter 2.1 – 2.5,
Chapter 3.1, 3.2, 3.4,
Chapter 5.2, 5.3
Unit III : Chapter 6.2, 6.3, 6.7
Chapter 7.1 – 7.7
Unit IV : Chapter 8.1, 8.3 – 8.6
Chapter 9.1, 9.2, 9.4
Unit V : Chapter 11.3 – 11.5, 11.7
Chapter 12.2 – 12.5, 12.7

Reference Books:

1. Milan Milenkovic, *Operating System Concepts and Design*, Tata McGraw- Hill Private Limited, New York., 2007.
2. Achyut Godbole, *Operating Systems*, Tata McGrawHill Education Private Limited, New Delhi, 2009.

. --

Core12 - Data Communications and Networks

Contact Hours per Week : 4 Hours **Subject Code: U1CAC52**
Contact Hours per Semester: 48 Hours **Credits : 4**

Course Outcome:

Students, after successful completion of the course ,will be able to

CO 1: Describe how computer networks are organized with the concept of layered approach.
CO 2: To contrast the protocol architectures such as OSI and TCP/IP.
CO 3: To explain how a collision occurs and how to solve it.
CO 4: Identify the different types of network devices and their functions within a network
CO 5: Describe how routing protocols work.
CO 6: Define information security and to identify the challenges for information security

Unit I **10Hours**

Introduction: A Brief History – Applications – Computer Networks – Categories of Networks –Standards and Standards Organizations.
Network Architectures and OSI Model: Networks Architecture-Open Systems and OSI Model – TCP/IP Architecture.
Communication Media and Data Transmission: Fourier Analysis – Analog and Digital Data Transmission – Modulation and Demodulation – Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing – Multiplexing

Unit II   10 Hours

Error Detection and Correction: Types of Errors – Error Detection – Error Correction.
Data Link Control and Protocol Concepts: Flow Control – Error Control –Asynchronous Protocols – Synchronous Protocols – High-Level Data Link Control (HDLC).
Local Area Networks: Types of Networks and Topology –LAN Transmission Equipment-.Ethernet: IEEE Standard 802.3 Token Bus: IEEE Standard 802.4 Token Ring:IEEE Standard 802.5 – Fiber Distributed Data Interface (FDDI) – Distributed Queue Dual Bus (DQDB): IEEE Standard 802.6 –Ethernet Technologies

Unit III   10 Hours

Wide Area Networks: WAN Transmission Methods – WAN Carrier Types – WAN Transmission Equipment-WAN Protocols
Integrated Services and Routing Protocols: Integrating Services – ISDN Services –ISDN Topology – ISDN Protocols – Broadband ISDN – Asynchronous Transfer Mode (ATM) – Principal Characteristics of ATM – Frame Relay..

Unit IV   9 Hours

Internetworking: Principles of Internet Working – Routing Principles – Internetwork Protocols (IP) – Shortcomings of IPv4 – IP Next Generation.
TCP Reliable Transport Service: Transport Protocols – The Service TCP Provides to Applications – End –to-End Service and Datagrams – Transmission Control Protocol – User Datagram Protocol.

Unit V   9 Hours

Network Applications: Client-Server Model – Domain Name System (DNS) – Telnet – File Transfer and Remote File access – Electronic Mail – World Wide Web (WWW).
Network Management: Simple Network Management Protocol (SNMP).
Network Security: Fundamental Concepts – Identification and Authentication–Access Control–A Model for Network Security-Malicious Software.

Text Book:
     Brijendra Singh. *Data Communications and Computer Networks.* PHI; Fourth Edition, 2014.

Unit I	: Chapter – 1(1.1 to 1.4, 1.8), 2(2.1 to 2.3), 3(3.2 to 3.9, 3.11).
Unit II	: Chapter – 4,6, 7 (7.1 to 7.7,7.10)
Unit III	: Chapter – 8 (8.1 to 8.5), 9(9.1 to 9.8)
Unit IV	: Chapter – 12(12.1,12.3,12.5 to12.7),13(13.2 to 13.6)
Unit V	: Chapter – 14,15 (15.5), 16(16.1 to 16.5)

Reference Books:
    1.   Andrew S Tanenbaum.*Computer Networks*. Prentice Hall of India; 4th Edition.2006.

    2. Prakash C. Gupta.*Data Communications and Computer Networks*. Prentice Hall of India;2005.

    3. Behrouz A. Forouzan. *Data Communication and Networking*. TMH; 2005.

Core 13: Mobile Application Development

Contact Hours per Week   : 4 Hours   **Subject Code: U1CAC53**
Contact Hours per Semester: 48 Hours   **Credits: 4**

Course outcome:
Students, after successful completion of the course, will be able to

   CO1: Understand the Architecture, Devices and Applications of Android.
   CO2: Understand the Android Activity Life Cycle and User Interface.
   CO3: Develop Interactive android Applications using Concepts such as Intents and
          Fragments.
   CO4: Develop android applications to manage user data using Databases, File Storage
           and Preferences.
   CO5: Able to Export an Application to Android Play store and reach globally.

Unit I   **10 Hours**
Getting started with Android programming: What is Android? – Obtaining the Required Tools – Creating your First Android Application – Anatomy an Android Application.
Designing your user interface with views: Using basic views – Using Picker views – Using List views to display long lists.

Unit II   **10 Hours**
Activities, Fragments and intents: Understanding Activities – Linking Activities using intents – Fragments – Calling Built-in Applications using intents. – Displaying notifications.

Unit III   **10 Hours**
Getting to know the Android user interface: Understanding the Components of a screen – utilizing the action bar – creating the user interface programmatically – listening for UI notifications.
Data Persistence: Saving and Loading user preferences – Persisting Data to Files.

Unit IV   **9 Hours**
Displaying Pictures and Menus with Views: Using Image Views to Display Pictures – Using Menus with Views – Some Additional Views.
Messaging: SMS Messaging – Sending E-mail.

Unit V   **9 Hours**
Location Based Services: Displaying Maps – Getting Location Data – Monitoring a Location – Project: Building a Location Tracker.
Publishing Android Applications: Preparing for publications – Deploying APK Files.

Text Book:
       Wei-Meng-Lee, ***Beginning Android 4 Application Development***, Wiley India Edition, 2017

       Unit I   : Chapter 1, 4 (Page No: 159-201)
       Unit II   : Chapter 2
       Unit III   : Chapter 3 (Page No: 105-122), 6 (Page No: 251-271)
       Unit IV   : Chapter 5, 8

Unit V : Chapter 9,12

Reference Book:

Pradeep Kothari, *Android Application Development*, Dreamtech Press, 2017.

Elective 1: Web Technology

Contact Hours per Week : 5 Hours **Subject Code: U3CAE51**
Contact Hours per Semester: 60 Hours **Credits: 5**

Course outcome:
Students, after successful completion of the course ,will be able to

CO1: List the major elements of the PHP & MySQL work and explain why PHP is good for web development

CO2: Learn how to take a static website and turn it into a dynamic website run from a database using PHP and MySQL.

CO3: Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.

CO4: Learn how databases work and how to design one, as well as how to use phpMyAdmin to work with MySQL.

CO5: Learn different ways of connecting to MySQL through PHP, and how to create tables,enter data, select data, change data, and delete data. Connect to SQL Server and other data sources.

Unit I **12 Hours**
Introduction to PHP: Basic Syntax – Sending Data to the Web Browser – Writing Comments – What are Variables? – Introducing Strings – Concatenating Strings – Introducing Numbers – Introducing Constants – Single vs. Double Quotation Marks.
Programming with PHP: Creating an HTML Form – Handling an HTML Form – Conditionals and Operators – Validating Form Data.

Unit II **12 Hours**
Programming with PHP: Introducing Arrays – For and While Loops.
Creating Dynamic Web Sites: Including Multiple Files – Handling HTML Forms, Revisited – Making Sticky Forms – Creating Your Own Functions.

Unit III **12 Hours**
Introduction to MySQL: Naming Database Elements – Choosing Your Column Types – Choosing Other Column Properties – Accessing MySQL.
Introduction to SQL: Creating Databases and Tables – Inserting Records – Selecting Data – Using Conditionals – Using LIKE and NOT LIKE – Sorting Query Results – Limiting Query Results – Updating Data – Deleting Data – Using Functions.
Unit IV **12 Hours**
Using PHP with MySQL: Modifying the Template – Connecting to MySQL – Executing Simple Queries – Retrieving Query Results – Ensuring Secure SQL – Counting Returned Records – Updating Records with PHP.

Cookies and Sessions: Making a Login Page – Making the Login Functions – Using Cookies – Using Sessions – Improving Session Security.

Unit V **12 Hours**
Web Application Development: Sending E-Mail – Date and Time Functions – Handling File Uploads – PHP and JavaScript – Understanding HTTP Headers.

Text Book:
     Larry Ullman, *PHP 6 AND MySQL 5*, Pearson Education, 2008.

Unit I	:	Chapter 1, 2 (Page No: 33-51)
Unit II	:	Chapter 2 (Page No: 52-72), 3
Unit III	:	Chapter 4, 5
Unit IV	:	Chapter 8, 11
Unit V	:	Chapter 10

Reference Book:
     Timothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann Le Scouranec, Jeremy Stolz, Michael K.Glass, *Beginning PHP6, Apache, MySQL Web Development*, Wiley Publishing, 2016.

Elective 1: Data Mining

Contact Hours per Week: **5 Hours**   **Subject Code: U3CAE52**
Contact Hours per Semester: **60 Hours**   **Credits: 5**

Course Outcome:
Students, after successful completion of the course ,will be able to

    CO1: To be familiar concepts of Data Mining and Warehousing and its operations.
    CO2: To get exposed with Association rules in Data Mining.
    CO3: To get exposed with Clustering techniques and Decision Trees in Data Mining.
    CO4: To get familiar with Genetic Algorithm and Neural Network.
    CO5: To get exposed with Web, Temporal and Spatial Mining.

Unit I **12 Hours**
Data Warehousing: Introduction – Data Warehouse Architecture – Dimensional Modeling – Categorization of Hierarchies – Aggregate Function – OLAP Operations – OLAP Server – ROLAP –MOLAP

Unit II **12 Hours**
Data Mining: Introduction – Data Mining – Definitions – KDD vs Data Mining – DBMS vs DM – Other Related Areas – DM Techniques – Other Mining Problems – Issues and Challenges in DM – DM Application Areas.
Association Rules: Introduction – Association Rule – Methods to Discover Association Rules – Apriori Algorithm – Partition Algorithm – Pincer Search Algorithm – Border Algorithm.

Unit III	12 Hours

Clustering Techniques: Introduction – Clustering Paradigms – Partitioning Algorithms – k-Medoid Algorithms – CLARA –CLARANS – Hierarchical Clustering – DBSCAN – BIRCH – CURE – STIRR.
Decision Trees: Introduction – Decision Tree – Tree Construction Principle – Best Split – Splitting Indices – Splitting Criteria – Decision Tree Construction Algorithm – CART – ID3.

Unit IV	12 Hours

Genetic Algorithm: Introduction – Basic steps of GA – Selection – Cross Over – Mutation.
Other Techniques: Introduction – Neural Network – Learning in NN – Unsupervised Learning – SVM

Unit V	12 Hours

Web Mining: Introduction – Web Mining – Web Content Mining – Web Structure Mining – Web Usage Mining – Text Mining – Hierarchy of Categories – Text Clustering.
Temporal and Spatial Mining: Introduction – Temporal Data Mining – Temporal Association Rules – Spatial Mining – Spatial Mining Tasks.

Text Book:
> Arun K Pujari. *Data Mining Techniques*, Third Edition, University Press, 2015.

Unit I : Chapter 2 (2.1 to 2.5, 2.8, 2.10 to 2.12)
Unit II : Chapter 3 (3.1 to 3.10), Chapter 4 (4.1 to 4.6, 4.13)
Unit III: Chapter 5 (5.1 to 5.10, 5.12), Chapter 6 (6.1 to 6.9)
Unit IV: Chapter 8 (8.1 to 8.5), Chapter 9 (9.1 to 9.4, 9.6)
Unit V :   Chapter 10 (10.1 to 10.6, 10. 9, 10.10), Chapter 11 (11.1to 11.3, 11.12, 11.13)

Reference Books:
1. Margaret H. Dunham. *Data Mining Introductory and Advanced Topics*, 8th Impression, Pearson Publications, 2011.
2. Rajan Chattamvelli, *Data Mining Algorithms.* Narosa Publishing House, 2011

Elective 1: TCP/IP

Contact Hours per Week: 5 Hours   **Subject Code: U3CAE53**
Contact Hours per Semester: 60 Hours   **Credits: 5**

Course Outcome:
Students, after successful completion of the course ,will be able to
> CO1: To understand networking and its basics.
> CO2: To understand about addressing and the media used for data transfer.
> CO3: To gain knowledge about Internet Protocol.
> CO4: To gain knowledge about User Datagram Protocol.
> CO5: To gain knowledge about Transmission Control Protocol.

Unit I	13 Hours

Introduction: A Brief History - Protocols and Standards – Standards Organizations – Internet Standards - Internet Administration.
 The OSI Model and the TCP/IP Protocol Suite: Protocol Layers - The OSI Model – TCP/IP Protocol Suite – Addressing.
Underlying Technologies: Connecting Devices.

Unit II   **13 Hours**

Introduction to Network Layer: Introduction - Switching – Packet Switching at Network Layer – Network Layer Services – Other Network Layer Issues.
IPv4 Addresses: Introduction - Classful Addressing – Classless Addressing – Special Addresses – NAT.

Unit III   **11 Hours**

Internet Protocol Version 4(IPv4): Introduction - Datagrams – Fragmentation – Options – Checksum – IP over ATM – Security – IP Package.

Unit IV   **11 Hours**

User Datagram Protocol (UDP): Introduction – User Datagram – UDP Services – UDP Applications – UDP Package.

Unit V   **12 Hours**

Transmission Control Protocol (TCP):- TCP Services – TCP Features - Segment – A TCP Connection – State Transition Diagram – Windows in TCP – Flow Control – Error Control – Congestion Control – TCP Timers – Options – TCP Package.
Text Book:
Behrouz A. Forouzan, *TCP/IP Protocol Suite,* Tata McGraw Hill Education (India) Private Limited, 2010.

Unit I	: Chapter 1, 2, 3.5
Unit II	: Chapter 4, 5
Unit III	: Chapter 7
Unit IV	: Chapter 14
Unit V	: Chapter 15

Reference Books:
1. Larry L.Peterson & Peter S.Daive, *Computer Networks*, Second Edition, Harcourt Asia Pvt. Ltd., 2000.
2. William Stallings, *Data and Computer Communication*, Sixth Edition, Pearson Education, 2000.

SBE- EMPLOYABILITY SKILLS

Contact Hours per week: 2   **Subject Code: U1PS51**

Contact Hours per Semester: 30   **Credits: 2**

Objectives:

       To enrich the Employability Skills by imparting Reasoning skills, Aptitude skills and General Knowledge.

Unit I : Quantitative Aptitude – Averages, Percentage, Profit & Loss, Ratio & Proportion, Time & Work, Time & Distance, Clock.   **(6-hour)**

Unit II : Quantitative Aptitude –Problems on Ages, Boat & Stream, Simple Interest, Compound Interest, Area, Partnerships. **(6-hours)**

Unit III: Reasoning **(6-hours)**

Verbal Reasoning - Analogy, Classification, Series, Coding & Decoding, Blood Relations, Direction Sense Test.

Unit IV: Reasoning **(6-hours)**

Verbal Reasoning - Number Test, Ranking & Time sequence Test, Alphabet Test, Logical Venn Diagrams.

Unit V: **(6-hours)**

General Knowledge: Abbreviations, Acronyms, Famous Personalities, Important Days, Capital Cities, Currencies, Books and Authors, Inventions.

Reference Books:

1. Verbal & Non Verbal Reasoning   -   R.S.Aggarwal
2. Quantitative Aptitude   -   R.S.Aggarwal
3. Subjective & Objective Quantitative Aptitude   -   R.S.Aggarwal
4. Malayala Manorama Year Book, 2014

NME - 1: Basics of Computer

Contact Hours per Week: 2 Hours   **Subject Code: U3CAN51**
Contact Hours per Semester: 24 Hours   **Credits: 2**

Course Outcome:
Students, after successful completion of the course ,will be able to,

CO1: To understand the basic components of computer.
CO2: To know about the programming languages and operating systems.
CO3: To be aware of the generations of computer.
CO4: To identify the components of computer network.
CO5**:** To grasp about multimedia and future of computer.

Unit I **4 Hours**
Computer Basics: A simple model of a computer – Characteristics of computers.
Input / Output Units: Traditional computer Input/Output units – Other input technologies – Computer output devices.
Computer Memory: Memory cell – Memory organization – Magnetic hard disk.
Unit II **8 Hours**
Programming Languages: Programming language – Assembly language – Higher level programming languages – Compiling a high level language program – Some high level languages.

Operating Systems: Why do we Need an operating system – Batch operating system – Multiprogramming operating system – Time sharing operating system- On-line and Real-Time systems - Other facilities provided by operating systems – Personal computer operating system.

Unit III   **5 Hours**
Computer Generations and Classification: First Generation of Computers – Second generation – Third generation – Fourth generation – Fifth generation – Classification of computers. **Computer Networks:** Need for computer communication networks – Communications protocols – Local area networks – Interconnecting networks - Internet and the world wide web – Internet security.

Unit IV   **4 Hours**
Voice and Data Communications: Characteristics of communication channels – Allocation of communication channel - Physical communication media – Cellular communications system.

Unit V   **3 Hours**
Advanced input/output interfaces: Graphical user interface – Vector graphics – Raster graphics – Accelerated graphics with GPU- Stereo display units – Other visual displays – Input devices for interaction – Speech and audio interface – Tactile interfaces.

Text Book:
V. Rajaraman, Neeharika Adabala, *Fundamentals of Computers*. PHI Learning Pvt. Ltd., New Delhi, 6th Edition, 2015

Unit I	: Chapter 1(1.2, 1.3), 3, 4(4.1, 4.2, 4.6)
Unit II	: Chapter 9, 10 (10.1 to 10.7)
Unit III	: Chapter 12 (12.1 to 12.5, 12.7), 13 (13.1 – 13.3, 13.5, 13.6, 13.7)
Unit IV	: Chapter 14 (14.1 – 14.3, 14.8)
Unit V	: Chapter 15

Reference Books:
1. Anita Goel, *Computer Fundamentals*.   Pearson India Publication, *2010.*
2. P.K. Singh, *Computer Fundamentals*. VK Global Publications, 2015.

Core 14 - Mobile Application Development Lab
Contact Hours per Week: 5 Hours   **Subject Code: U3CAC5P1**
Contact Hours per Semester: 60 Hours   **Credits: 3**

Course outcome:
    CO1: Develop android applications using Eclipse IDE.
    CO2: Learn and Develop android real-time applications.
    CO3: Export and Publish android applications.

List of Programmes :
    1. Develop a sample android application using eclipse.
    2. Develop an android application for registration form using Basic Views.
    3. Develop an android application using Activities.

4. Develop an android application using Intents.
5. Develop an android application using Built-in Intents.
6. Develop an android application using Fragments.
7. Develop an android application using Action bar.
8. Develop an android application using Picker Views.
9. Develop an android application using List Views.
10. Develop an android application for Gallery using Image Views.
11. Develop an android application using Menus.
12. Develop an android application to save and retrieve user data using Preferences.
13. Develop an android application using 'Messaging' and 'E-Mail'.
14. Develop an android application using Maps.

Core 15 - Web Technology Lab

Contact Hours per Week: 4 Hours   **Subject Code: U3CAC5P2**
Contact Hours per Semester: 48 Hours   **Credits: 2**

Course outcome:
CO1: PHP code to produce outcomes and solve problems.
CO2: Display and insert data using PHP and MySQL.
CO3: Test, debug, and deploy web pages containing PHP and MySQL.

List of Programmes :
1. Creating simple webpage using PHP
2. Use of conditional statements in PHP
3. Use of looping statements in PHP
4. Creating different types of arrays in PHP.
5. Usage of array functions in PHP.
6. Creating user defined functions in PHP
7. Creation of files in PHP.
8. File manipulation using PHP
9. Creation of sessions in PHP with MySQL.
10. Creation of cookies in MySQL.
11. Creating simple applications using PHP
12. Creating simple table with constraints in MySQL.
13. Insertion, Updation and Deletion of rows in MYSQL tables
14. Searching of data by different criteria in MySQL.
15. Sorting of data in MySQL.
16. Demonstration of joining tables in MySQL.
17. Usage of subqueries in MySQL.
18. Usage of aggregate functions in MySQL.
19. Working with string, numeric and date functions in PHP.
20. Database connectivity in PHP with MySQL

Core 16 – Software Engineering

Contact Hours per Week: 4 Hours   **Subject Code: U2CAC61**
Contact Hours per Semester: 48 Hours   **Credits: 3**

Course outcome:
Students, after successful completion of the course ,will be able to

  CO 1: Understand the phases in Software Development Process and Organizational
     Structure
  CO 2: Understand the size and cost estimation of the software.
  CO 3: Understand the Software Requirement specification and its needs.
  CO 4: Understand the Software design and its guidelines.
  CO 5: Understand the Verification, Validation Techniques and Maintainability of a
     Software

Unit I   **10 hrs**
Introduction to Software Engineering: Definitions- Size Factors-Quality and Productivity factors.
Planning a Software Project: Defining the Problem-Developing Solution Strategy-Planning the Development Process-Planning an Organizational Structure.

Unit II   **8 hrs**
Software Cost estimation: Software Cost Factors-Cost Estimations Techniques-Staffing Level Estimation-Estimating and Maintenance cost.

Unit III   **10 hrs**
Software Requirements Definition: Software Requirement Specification-Formal Specification Techniques-Languages and Processors for Requirements Specification.

Unit IV   **10 hrs**
Software Design: Fundamental Design Concepts-Modules and Modularization Criteria-Design Notations - Design Techniques-Test Plans-Milestones, Walkthroughs and Inspections - Design Guidelines.

Unit V   **10 hrs**
Verification and Validation Techniques: Quality Assurance-Walkthroughs and Inspections - Static Analysis-Symbolic Execution-Unit testing and Debugging-System Testing.
Software Maintenance: Enhancing Maintainability during Development-Managerial Aspects of Software Maintenance –Configuration Management-Source-Code Metrics-Other Maintenance Tools and Techniques.

Text Book:
Richard Fairley, *Software Engineering Concepts*, McGraw-Hill Education, 45th Reprint 2016.

          Unit I   : Chapters – 1 (1.1 to 1.3), 2 (2.1 to 2.4)
          Unit II   : Chapter – 3
          Unit III   : Chapter – 4
          Unit IV   : Chapters – 5 (5.1 to 5.4, 5.7 - 5.9)
          Unit V   : Chapters – 8 (8.1 to 8.6), 9

Reference Books:
1. Roger S. Pressman, *Software Engineering,* McGraw-Hill International Edition, 7th Edition, 2010.
2. Rajib Mall, *Fundamentals of Software Engineering,* Prentice Hall of India Pvt. Ltd., New Delhi-2003.

Core 17 : Cryptography

Contact Hours per Week: 4 Hours   **Subject Code: U3CAC62**
Contact Hours per Semester: 48 Hours   **Credits: 3**

Course Outcome:
Students, after successful completion of the course ,will be able to
CO1: To understand the fundamentals of Cryptography
CO2: To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
CO3: To understand the various key distribution and management schemes.
CO4: To understand how to deploy encryption techniques to secure data in transit across data networks
CO5: To design security applications in the field of Information technology

Unit I   **9 Hours**
Introduction to the concepts of Security: Introduction – The Need for Security – Security Approaches – Principles of Security – Types of Attacks.
Cryptography Techniques: Introduction – Plain Text and Cipher Text – Substitution Techniques – Transposition Techniques – Encryption and Decryption – Symmetric and Asymmetric Key Cryptography – Possible Types of Attacks.

Unit II   **10 Hours**
Computer-based Symmetric Key Cryptographic Algorithms: Introduction – Algorithm Types and Modes – An Overview of Symmetric Key Cryptography – Data Encryption Standard(DES) – International Data Encryption Algorithm (IDEA) – Advanced Encryption Standard(AES).

Unit III   **11 Hours**
Computer-based Asymmetric Key Cryptographic Algorithms: Introduction – Brief History of Asymmetric Key Cryptography – An Overview of Asymmetric Key Cryptography – The RSA Algorithm – Symmetric and Asymmetric Key Cryptography.

Unit IV   **9 Hours**
Public Key Infrastructure: Introduction – Digital Certificates.
Internet Security Protocols: Introduction – Secure Socket Layer (SSL) – Secure Electronic Transaction (SET) – SSL versus SET – Email Security.

Unit V   **9 Hours**
User Authentication Mechanisms: Introduction – Authentication Basics – Passwords – Certificate Based Authentication – Biometric Authentication.
Network Security, Firewalls and Virtual Private Networks (VPN): Firewalls.

Text Book:

Atul Kahate, *Cryptography and Network Security*, McGraw Hill Education Pvt. Ltd, Eighth Reprint 2017, Third Edition.

Unit I :	Chapter 1 & 2 [2.1-2.6, 2.9]
Unit II :	Chapter 3 [3.1 – 3.5, 3.9]
Unit III:	Chapter 4 [4.1 – 4.4, 4.6]
Unit IV:	Chapter 5 [5.1, 5.2] & 6 [6.1, 6.3, 6.6, 6.7, 6.9]
Unit V :	Chapter 7 [7.1-7.3, 7.5,7.6] & 9 [9.3]

Reference Book:

William Stallings, *Cryptography and Network Security*, PHI, 2008

Elective 2 – Embedded Systems

Contact Hours per Week: 5 Hours   **Subject Code: U2CAE61**
Contact hour per semester: 60 Hours   **Credits: 5**

Course Outcome:

Students, after successful completion of the course ,will be able to

CO1**:** Learn and obtain the basic concept of embedded systems

CO2: Learn to apply and analyze the applications in various processors, Input/output interfacing and Bus Communication

CO3: Learn interrupt service mechanisms and device driver concepts

CO4: Learn the process of memory management and basic design of real time operating system

CO5: Learn to write the programs for microcontroller and obtain basic knowledge of embedded Software Development tools

Unit I   **12 Hours**

Introduction to Embedded Systems: Embedded Systems – Processor Embedded into a System – Embedded Hardware units and Devices in a System – Embedded Software in a System – Examples of Embedded System – Embedded System on-chip (Soc) and Use of VLSI Circuit design Technology – Complex systems design and processors – Design process in Embedded System – Formalization of System design – Design process and Design Examples – Classification of Embedded Systems.

Unit II   **12 Hours**

8051 and Advanced Processor Architectures, Memory Organizations and Real-world Interfacing: 8051 Architecture – Real world Interfacing – Processor and Memory organizations – Memory-Types, Memory-Maps and Addresses. Design and Communication Buses for Devices Network: IO Types and Examples – Serial Communication Devices – Parallel Device Ports – Timer and Counting Devices – Serial Bus Communication Protocols.

Unit III   **12 Hours**

Device Drivers and Interrupts Service Mechanism: Programmed-I/O Busy-wait Approach without Interrupt Service Mechanism – ISR Concept – Interrupt Sources – Interrupt Servicing Mechanism – Multiple Interrupts – Context and the Periods for Context Switching, Interrupt

Latency and Deadline – Classification of Processors Interrupt Service Mechanism from Context-saving Angle – Direct Memory Access – Device Driver Programming.

Unit IV   **12 Hours**

Real-Time Operating Systems: OS Services – Process Management – Timer Functions – Event Functions – Memory Management – Device, File and IO Subsystems Management – Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls – Real-time Operating Systems – Basic Design using RTOS – RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics – OS Security Issues.

Unit V   **12 Hours**

Programming Concepts: Software Programming in Assembly Language (ALP) and in High-Level Language „C‟ – C Program Elements: Header and Source Files and Preprocessor Directives – Program Elements: Macros and Functions – Program Elements: Data Types – Data Structures, Modifiers, Statements, Loops and Pointers. Embedded Software Development Process and Tools: Introduction to Embedded Software Development Process and tools – Host and Target machines – Linking and Locating Software – Getting Embedded Software into the Target System – Issues in Hardware-Software Design and Co-Design.

Text Book:

RAJ KAMAL, *Embedded Systems Architecture, Programming and Design*, 2nd Edition Tata McGraw Hill Education Private Limited, New Delhi, 2013.

        Unit I :   Chapter 1 [1.1 to 1.11]
        Unit II :   Chapter 2 [2.1, 2.2, 2.4, 2.7] & 3[3.1 to 3.3, 3.6, 3.10]
        Unit III: Chapter 4
        Unit IV: Chapter 8
        Unit V :   Chapter 5 [5.1-5.4] & 13

Reference Book:

David E.Simson, *An Embedded Software Primer*, Pearson Education, Eighth Impression, 2009.

Elective 2 – Computer Algorithms

Contact Hours per Week: 5 Hours   **Subject Code: U2CAE62**
Contact hour per semester: 60Hours   **Credits: 5**

Course Outcome

Students, after successful completion of the course ,will be able to

CO 1: Learn the concept of designing an algorithm to solve real world problems

CO 2: Learn greedy method, advanced tree and graph applications to select a proper pattern matching algorithm for given problem

CO 3: Learn and familiarize with basic paradigms and data structures to solve algorithmic problems.

CO 4: Learn different classes of problems with reference to their computation difficulties

CO 5: Learn major algorithms, design paradigms and methods of analysis in algorithm design

Unit I   **12 Hours**

Introduction: An Algorithm – **Performance Analysis:** Space Complexity –Time Complexity – Asymptotic Notation.

Divide and Conquer: General Method – Binary Search – Finding the Maximum and Minimum – Merge Sort – **Quick Sort:** Performance Measurement – **Selection:** A Worst-Case Optimal Algorithm.

Unit II 12 Hours

The Greedy Method: General Method - Container Loading – Knapsack Problem – Tree Vertex Splitting – Job Sequencing with Deadlines – Minimum-Cost Spanning Trees – Optimal Storage on Tapes –Optimal Merge Patterns – Single source Shortest Paths.

Unit III 12 Hours

Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source shortest Paths – String Editing – 0/1 Knapsack – Reliability Design – The Traveling Salesperson Problem – Flow Shop Scheduling.

Unit IV 12 Hours

Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS

Unit V 12 Hours

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles –Knapsack Problem.

Text Book:
Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms*, 2nd Edition, Universities Press Pvt. Ltd., 2008.
      Unit I : Chapter 1 (1.1, 1.3.1, 1.3.2, 1.3.4), 3 (3.1, 3.3 to 3.5, 3.6.1, 3.7.1)
      Unit II : Chapter 4
      Unit III: Chapter 5 (5.1 to 5.4, 5.6 to 5.10)
      Unit IV: Chapter 6
      Unit V : Chapter 7

Reference Books:

1. Anany Levitin, *Introduction to the Design & Analysis of Algorithms*,2nd Edition, Pearson Education, New Delhi, 2008.
2. Berman and Paul, *Algorithms*, Cenage Learning India Edition, New Delhi, 2008.

Elective 2 – Cloud Computing

Contact Hours per Week: 5   **Subject Code: U2CAE63**
Contact Hours per Semester: 60   **Credits: 5**

Course Outcome:
Students, after successful completion of the course , will be able to
    CO1: To understanding cloud computing terminology.
    CO2: To implement virtualization in cloud.
    CO3: To gain knowledge about how to migrate our applications to the cloud.
    CO4: To know the applications and standards of cloud
    CO5: To know the future of cloud computing through mobile and microservices

Unit I   **12 Hours**
Cloud Computing – An Overview: Introduction – History of Cloud Computing – Characteristics of Cloud – Cloud Computing Model. Issues and challenges of Cloud Computing – Advantages, Disadvantages of Cloud computing – Security, Privacy and Trust – Virtualization – Threats to Cloud Computing – Next Generation of Cloud Computing.
Cloud Computing Architecture: Introduction – Cloud Architecture - Cloud Computing models – Comparison of Service models – Deployment Models – Identity as a Service.

Unit II   **12 Hours**
Virtualization in Cloud: Introduction – Virtualization – Implementation of Virtualization - Virtualization support at the OS level – Middleware Support for Virtualization - Advantages of Virtualization - Application Virtualization - Virtualization Implementations Techniques – Hardware Virtualization - Types of Virtualization – Load balancing in Cloud Computing - Logical Cloud Computing Model – Virtualization for Data Centre.
 Security Management: Security Issues in Cloud Computing – Classification of Security Issues – Types of Attackers – Security risks in Cloud Computing – Security Threats against cloud Computing.

Unit III   **12 Hours**
Virtualization System Specific Attacks: Attacks in Cloud Computing Environment – Attacks on Hypervisor – Security Challenges – Virtualization Security Solutions.
Web Services: Introduction – Amazon Web Services – Microsoft Azure.
Migrating Applications to the Cloud Computing: Introduction - Motivations for Migration – Issues in Migrating the Applications to the Cloud – Challenges in Migrating the Applications to the Cloud – Solutions for the Challenges in Migration of Applications to Cloud – Types of Migration – Planning for Migrating the Application to Cloud – Migration Roadmap – Cloud Bursting.

Unit IV   **12 Hours**
Cloud Computing Applications: Introduction – Business Applications – Finance and Banking Application – Cloud Computing in Education.
Standards in Cloud Computing: Introduction - Standardization Activities – Challenges – Fields of Standardization – Role of Standards in Cloud Computing Environments- Standardization Organizations in Cloud Computing.

Unit V   **12 Hours**
Mobile Cloud Computing: Introduction – Need of Mobile Cloud Computing – Mobile Computing Architecture – Technologies of MCC – MCC Applications – Issues in MCC – Challenges in Building Applications – Platforms.
Microservices: Introduction – Need of Microservices – Microservice Architecture – Benefits of Microservices – Drawbacks of Microservices – Communication Mechanisms – Decentralized Data Management – Essential Checklists for Migration from Monolithic to Microservices.

Text Book:
        V.K.Pachghare, *Cloud Computing*, PHI Learning Private Limited, 2016

                Unit I   : Chapter 1, 2.

Unit II	: Chapter 3, 5 (5.3 to 5.7)
Unit III	: Chapter 6(6.2 to 6.5), 7 (7.1 to 7.3), 10
Unit IV	: Chapter 11, 12.
Unit V	: Chapter 13, 14 (14.1 – 14.8) .

Reference Books:
1. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, *Cloud Computing a Practical Approach*, Tata McGraw-Hill Education Private Limited, New Delhi, 2010 Edition, Fifth Reprint 2011.
2. Barrie Sosinsky, *Cloud Computing Bible*, Wiley India Private Limited, Reprint 2011

SBE-6 - Internet of Things

Contact Hours per Week: 2 Hours   **Subject Code: U3CAS61**
Contact Hours per Semester: 24 Hours   **Credits: 2**

Course Outcome:
Students, after successful completion of the course ,will be able to

CO1: To understand the basics of IoT and Machine to Machine Communication
CO2: To gain knowledge about the protocols used for Communication.
CO3: To gain knowledge about processing of data acquired from IoT.
CO4: To understand the working principles of Sensors.
CO5: To understand the basics of Embedded Devices.

Unit I   **5 Hours**
Internet of Things: **An Overview**:- Internet of Things – IoT Conceptual Framework – IoT Architectural View – Technology behind IoT – Sources of IoT – M2M Communication – Examples of IoT.

Unit II   **5 Hours**
Internet Connectivity Principles:- Introduction – Internet Connectivity – Internet-Based Communication – IP Addressing in the IoT – Media Access Control – Application Layer Protocols: HTTP, HTTPS, FTP, Telnet and Others.

Unit III   **5 Hours**
Data Acquiring, Organising, Processing and Analytics:- Introduction – Data Acquiring and Storage – Organising the Data – Transactions, Business Processes, Integration and Enterprise Systems – Analytics – Knowledge Acquiring, Managing and Storing Processes.

Unit IV   **5 Hours**
Sensors, Participatory Sensing, RFID and Wireless Sensor Networks:- Introduction – Sensor Technology – Participatory Sensing, Industrial IoT and Automative IoT, Actuator, Sensor Data Communication Protocols – Radio Frequency Identification Technology – Wireless Sensor Networks Technology.

Unit V **4 Hours**

Prototyping the Embedded Devices for IoT and M2M:- Introduction – Embedded Computing basics – Embedded Platforms for Prototyping – Things always connected to the Internet/Cloud.

Text Book:

Raj Kamal, *Internet of Things Architecture and Design Principles*, McGraw Hill Education (India) Private Limited, 2017.

Unit I:	Chapter 1
Unit II	Chapter 4
Unit III	Chapter 5
Unit IV:	Chapter 7
Unit V:	Chapter 8

Reference Book:

Arshdeep Bahga and Vijay Madisetti, *Internet of Things A Hands-on Approach*, University Press (India) Private Limited, 2018

NME 2 – Introduction to Multimedia

Contact Hours per Week: 2 hrs **Subject Code: U3CAN61**
Contact Hours per Semester: 24 hrs **Credits: 2**

Course Outcome:
Students, after successful completion of the course ,will be able to

CO1: To know the resources and products of multimedia
CO2: To understand the multimedia architecture
CO3: To use the text, graphics in multimedia
CO4: To understand the digital audio format
CO5: To know the multimedia video format

Unit I **5 Hours**
Introduction: Objectives – Brief History of Multimedia – What is Multimedia? - The Multimedia Market – Resources for multimedia developers.
Products and Evaluation: Objectives – Types of Products.

Unit II **5 Hours**
Hardware, operating systems and software: Multimedia Computer architecture.
Text: Objectives-Element of Text - Using Text in Multimedia Applications-Hypertext.

Unit III **5 Hours**
Graphics: Graphics Files and Application Formats- Obtaining Images for Multimedia use -Using Graphics in Multimedia Applications.

Unit IV **5 Hours**
Digital Audio: Digital Audio systems- MIDI-Audio File Formats-Using Audio in Multimedia Applications.

Unit V   **4 Hours**
Digital Video and Animation: Characteristics of Digital video- Video capture and Playback systems-Computer Animation-Using Digital video in Multimedia Applications.

Text Book

David Hillman, *Multimedia Technology and Applications,* GALGOTIA publication, Reprint 2015

Unit I: Chapter 1 (Pg. No. 1-10, 14-19), 2 (Pg. No. 21-33)
Unit II: Chapter 3 (Pg. No. 53-63), 4 (Pg. No. 67-71, 76-80)
Unit III: Chapter 5 (Pg. No. 93-104)
Unit IV: Chapter 6 (Pg. No. 112-121)
Unit V: Chapter 7 (Pg. No. 129- 133, 139-146)

Reference Book :

Principles of Multimedia, Ranjan Parekh,TMH, 2006

Project and Viva - Voce
Contact Hours per Week: 5 Hrs   **Subject Code: U1CA6PR**
Contact Hours per Semester: 60 Hrs   **Credits: 5**

Course Outcome:
Students, after successful completion of the course ,will be able to

   CO1 : Designed to help students develop practical ability and knowledge about
            practical tools techniques in order to solve real life problems related to the
            industry, academic institutions and computer science research.
   CO2 : Involves practical work for understanding and solving problems in the field of
            computing.
   CO3 : Students will select individually Commercial or Technical Project based on
            Application D evelopment Technologies.
   CO4 : With the known technologies they can develop the software.

Core 18 Lab – Dot Net Programming Lab

Contact Hours per Week: 5 Hours   **Subject Code: U3CAC6P1**
Contact Hours per Semester: 60 Hours   **Credits: 3**

 Course Outcome
Students, after successful completion of the course ,will be able to

   CO1: Basic Programming in Dot NET Environment.
   CO2: To develop Windows based applications in Dot NET using VB and C#.
   CO3: Proficient to develop Web applications using ASP.NET

List of Programmes :

VB.NET
Console Applications:
      1. Write a program in VB.Net to perform Matrix Manipulations.
      2. Write a program in VB.Net to perform Array List Operations.
Windows Applications:
      3. Write a program in VB.Net to perform File Operations using Streams.
      4. Write a program in VB.Net to design a Scientific Calculator.
      5. Create Inventory Management System using Database.
C# :
Console Applications:
      6. Write a program in C#.Net to demonstrate Error Handling.
      7. Write a C#.Net program to implement Multi Level Inheritance.
Windows Applications:
      8. Write a C#.Net program to design book store management.

ASP.NET
      9. Write an ASP.Net program to find the Factorial of a given number by using Function
      10 .Write an ASP.Net program to generate a Fibonacci series by using Subroutine
      11. Write a program containing the following controls:
              • A ListBox
              • A Button
              • An Image
              • A Label
      The listbox is used to list items available in a store. When the user clicks on an item in the listbox, its image is displayed in the image control. When the user clicks the button, the cost of the selected item is displayed in the control.
      12. Create Course Registration Application using Validation Controls.
      13. Create college student registration as web page in online using Visual Basic.
      14. Create a web page for employee details of an organization using C#.

Core 19 - Multimedia Lab

Contact Hours per Week: 3   **Subject Code: U3CAC6P2**
Contact Hours per Semester: 36   **Credits: 2**

Course Outcome
Students, after successful completion of the course ,will be able to

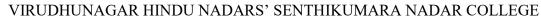CO1 : To increase the ability to edit and add special features to the images.
CO2 : To increase the ability to create flash movie.
CO3 : To design various applications such as cards, invitations, certificates etc.

List of Programmes :

1. Merge more than one image into a single file.
2. Design a visiting card.
3. Implement Flaming Hot Fire Text.
4. Implement Rain effect.
5. Using Photoshop to change the color of an image.
6. Implement Ripple effect.
7. Create a water drop effect
8. Implement Blinking effect.
9. Create Out of Bound effect.
10. Place an image into a text.
11. Create a text animation.
12. Create a picture animation.
13. Create an animation to indicate a ball bouncing on steps.
14. Create an animation to represent the growing moon.
15. Implement Masking Concept.
16. Shape Tweening.
17. Create a Fog effect.
18. Animate a Globe.
19. Create an animation using Guide Layer.
20. Procedure to implement moving ball using mouse drag (Action Script).

Course Name: BACHELOR OF COMPUTER APPLICATIONS

Self-Learning Courses:

Subject	Credit	Ext =Tot	Subject Code
UNIX and Shell Programming	5	100 = 100	U1CASL51
System Software	5	100 = 100	U1CASL52

Self-Learning Courses
BCA - UNIX and Shell Programming

Credit: 5   **Subject Code: U1CASL51**
Total Marks: 100
Objectives:
- ➢ To know about to get through understanding of the kernel.
- ➢ To understand the file organization and management.
- ➢ To know the various system calls.
- ➢ To have knowledge of process architecture, process control and scheduling and memory management.

Unit I
Getting Started: The Operating System-The UNIX Operating System-Knowing Your Machine-Knowing Your Keyboard-The System Administrator- Logging In and Out-Trying Out Some Commands-Two important Observations-When Things Go Wrong-Working with Files and Directories-How it All Clicked-Linux and GNU-Inside UNIX.
Understanding the UNIX Command: General Features of a Command-The PATH: Locating Commands-Internal and External Commands-Command Structure-Flexibility of Command Usage-man: On-Line Help-The man Documentation- info:The Texinfo Documentation-whatis and apropos: Which Command Will Do the job.

Unit II
General-Purpose Utilities: passwd: Change your Password-who and w: Know the Users-tty: Know Your Terminal –lock: Lock Your Terminal-stty: Set Terminal Characteristics-script:Record Your Session-clear and tput: Clear Your Screen-uname:Know Your Machine's Name-date:Display the System Date-cal:The Calendar-calendar:A Useful Reminder Mechanism-bc:The Calculator.
The vi/vim Editor: Vi Preliminaries-Quitting vi-Inserting and Replacing Text-Saving Text-Exit to the UNIX Shell- String Search –Searching with Regular Expressions-Search and Replace-Handling Multiple Files-Marking Text –Filtering Text-Named Buffers-Recovering Multiple Deletions-Abbreviating Text-Customizing the Keyboard-Customizing the Environment.

Unit III
The File System:The File-What's in a (File) Name-The Parent-Child Relationship-The UNIX File System-pwd: Knowing Your Current Directory-Absolute Pathnames-cd: Changing Directories-Relative Pathnames-mkdir: Making Directories-rmdir: Removing Directories- cp: Copying Files- rm: Deleting Files-mv: Renaming Files-cat: Displaying and Creating Files-

file:Know the File Types-lp and cancel:Printing a File-df: Finding Out the Free Disk Space-du:Finding Out Your Own Consumption-compress,gzip and zip:Compress Your Files.

File Attributes: ls-ls –l-Listing Directory Atrributes-File Permission-chmod:Changing File Permissions-Directory Permissions-umask:Default File Permissions-File Ownership-chown and chrp:Changing File Ownership-File Modificationans Acess Times-touch: Changing the Time Stamps-File systems and Inodes-ln-Symbolic Links-find.

Unit IV
The Shell: The Shell as Command Processor-Pattern Matching-The Wild Cards-Escaping-Quoting-Escaping and Quoting in echo-Redirection-/dev/null and/dev/tty:Two Special Files-Pipes-tee:Splitting a Stream-Command Substitution-Shell Variables- Shell Scripts-The Shell's Treatment of the Command Line-The other Shells-More Wild Cards in the Korn Shell and bash.
Simple Filters:more: Paging Output-wc: Line,Word and Character Counting-od: Displaying Data in Octal-pr: Paginating Files-cmp: Comparing Two Files-diff: Converting One File to Another-comm: What is common?- head: Displaying the Beginning of a File- tail: Displaying the End of a File-cut: Slitting a File Vertically-paste: Pasting Files-sort: Ordering a File-tr: Translating Characters-uniq: Locate Repeated and Non repeated Lines-nl: Line Numbering.

Unit V
Filters using Regular Expressions-grep and sed: The sample Database-grep-grep options-Regular Expressions-Round One-egrep and fgrep-Regular Expressions-Round Two-sed-Line Addressing Context Addressing- Editing Text-Substitution-Regular Expressions-Round-Three.
Programming with awk: awk Preliminaries-Splitting a Line into Fileds-printf-The Comparison Operators-Number Processing-variables-Reading the Program from a File-The BEGIN and END Sections-Positional Parameters-getline:Making awk Interactive-Built-In Variables-Arrays-Functions-Control Flow-The if Statement-Looping:for and while.
Text Book:
Your UNIX the Ultimate Guide, Sumitabha Das, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2009.

Unit I - Chapter 1, 2
Unit II - Chapter 3, 4(4.1 to 4.5,4.14 to 4.24)
Unit III - Chapter 6,7
Unit IV - Chapter 8,9(9.1 to 9.15)
Unit V - Chapter 15,16

Reference Book:
UNIX Shell Programming, Yashavant P Kanetkar, BPB Publications, 1996.

SYSTEM SOFTWARE

Credit: 5   **Subject Code: U1CASL52**

Total Marks: 100

Objectives:
- ➤ It covers the design and implementation of various types of system utilities software.
- ➤ It illustrates how the utility software interacts with operating system.

Unit I

Background: Introduction-System software and Machine Architecture – The simplified Instructional Computer – Traditional Machines – RISC Machines.

Unit II

Assemblers: Basic Assembler Functions – Machine-Dependent Assembler Features – Machine-Independent Assembler Features – Assembler Design Options.

Unit III

Loaders and Linkers: Basic Loader Functions – Machine-Dependent Loader Features - Machine-Independent Loader Features – Loader Design Options.

Unit IV

Macro Processors: Basic Macro Processor Functions - Machine-Independent Macro Processor Features – Macro Processor Design Options.

Unit V

Compilers: Basic Compiler Functions - Machine-Dependent Compiler Features – Machine-Independent Compiler Features – Compiler Design Options.

Text Book:

System Software, Leland L. Beck, D. Manjula, 3rd Editions, Pearson Education, 2008.

Unit I	:	Chapter 1
Unit II	:	Chapter 2 (2.1 to 2.4)
Unit III	:	Chapter 3 (3.1 to 3.4)
Unit IV	:	Chapter 4 (4.1 to 4.3)
Unit V	:	Chapter 5 (5.1 to 5.4)

Reference Book:

System Software, J. Nithyashri, 2nd edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.

Discipline   : **Computer Applications**

CHOICE BASED CREDIT SYSTEM

VALUE ADDED COURSES (UG Only)

Course Name	Internal Mark = Total Mark	Subject Code
R Programming	100 = 100	V1CA1
Virtual and Augmented Reality	100 =100	V1CA2
Client Side Web Development	100 =100	V1CA3
Hardware Trouble Shooting and Networking	100 =100	V1CA4P
Lab: Office Automation	**100=100**	**V1CA5**
Lab: Creative Game Development using Greenfoot	**100=100**	**V1CA6**

R Programming

Subject Code : V1CA1

Contact Hours per Semester   : 30 Hrs

Course Outcomes:

CO1	To get familiarity about Working Environment of R.
CO2	To collect detailed information using R tutorials package
CO3	Develop modules using loop functions and debugging tools in R.
CO4	Effective use of libraries in R to export and import external data.
CO5	Develop modules using Lists, Dataframes and Graphics in R.

Unit I   **6 Hrs**

A Short Introduction to R: Introduction – Installing R – Getting Started – Some Information on R Commands – Special Values – Objects – Functions – Simple Manipulations – Numbers and Vectors – Matrices and Arrays – Factors – Lists – Data Frames.

Unit II   **6 Hrs**

Programming Using R: Introduction – Function Creation – Scripts – Logical Operators – Conditional Statements – Loops in R –Switch Statement.

Unit III   **6 Hrs**

Lists and Data Frames: Introduction – Creating a List – Common List Operations – Recursive List – Creating a Data Frame – Common Data Frame Operations – Using lapply() and sapply() Functions.

Unit IV   **6 Hrs**

Import and Export: Introduction – Saving and Loading R data – Import and Export to CSV Files – Importing Data from SAS – Import and Export Via ODBC.

Unit V   **6 Hrs**

Graphics: Introduction – Basic Plots – Labeling and Documenting Plots – Adjusting the Axes – Specifying Colors – Specifying Fonts – Specifying Sizes – Plotting Symbols.

Text Book:
R for Beginners in 24 Hours, Sandip Rakshit , McGraw Hill Education, 2017.

Unit I : Chapter 1: 1.1 – 1.12
Unit II : Chapter 2: 2.1 – 2.7
Unit III : Chapter 3: 3.1 – 3.7
Unit IV : Chapter 6: 6.1 – 6.5
Unit V : Chapter 12: 12.1 – 12.8

Virtual and Augmented Reality

Subject Code : V1CA2

Contact Hours per Semester   : 30 Hrs
Course Outcomes:

CO1	To understand the basics of augmented and virtual reality.
CO2	To learn about content development
CO3	To learn about the basics of virtual reality displays
CO4	To learn how to develop a virtual reality project
CO5	To plan the strategy in developing the virtual reality project.

Unit I **6 Hrs**
Computer Generated Worlds: What is Augmented Reality? – Head-Up Displays – Helmet-Mounted Sights and Displays – Smart Glasses and Augmenting Displays – What is Virtual Reality?

Unit II **6 Hrs**
Understanding Virtual Space: Defining Visual Space and Content – Defining positions and Orientation in Three Dimensions – Navigation.

UNIT III **6 Hrs**
Components Technologies of Head-Mounted Displays: Display Fundamentals – Related Terminology and concepts.

Unit IV **6 Hrs**
Evaluating your project – Accessing your projects Technology needs – What is the elevator pitch for my project? - What are my goals and objectives? - What problem does my project uniquely solve? - Who is the target market? - What should the end-user experience be? - Choosing Virtual Reality - Choosing Augmented Reality.

Unit V **6Hrs**
Planning Your Virtual Reality Project: Defining Your Virtual Reality Project - Exploring Design Principles in Virtual Reality - Defining Your Social Experience.

Text Books:
1. Practical Augmented Reality by Steve Aukstakalnis, Addison Wesley, 2017
        Unit I: Chapter 1
        Unit II: Chapter 2
        Unit III: Chapter 4
2. Virtual and Augmented Reality for Dummies by Paul Mealy, John Wiley & Sons Inc, 2018
        Unit IV: Chapter 6
        Unit V: Chapter 7

Reference Books:
1. Virtual Reality Headsets – A Theoretical and Pragmatic Approach by Philippe Fuchs, Judith Guez, Olivier Hugues, Jean-François Jégo, Andras Kemeny & Daniel Mestre, CRC Press, 2017
2. Understanding Virtual Reality Interface, Application and Design by William R. Sherman, Alan B.Craig, Morgan Kaufmann Publishers, 2003

Client Side Web Development

Subject Code : V1CA3

Contact Hours per Semester   : 30 Hrs
Course Outcomes:

CO1	To get familiar with basics of the Internet Programming.
CO2	Implement interactive web page(s) using HTML.
CO3	Design web page(s) using HTML with Cascading Style Sheets.
CO4	Realise the importance of Javascript for web development.
CO5	Design interactive web page(s) using Dreamweaver.

Unit I   **6 Hrs**
HTML: The Language of the web: what is HTML? – Structuring your HTML pages –Adding Pictures – Adding Links – Creating Tables – More Advanced Tables – What is Web Form? – Choosing Form Elements – Using The Input Tags – Using Other Form Elements – Creating Lists – The Art of Good HTML – Your Next Steps With HTML –HTML Reference Tables – Tables, List, Links, Images.

Unit II   **6 Hrs**
Designing Effective Navigation: What is Navigation? – Laying Out Your Navigation – Grouping the Option – Tabbed Navigation – Dropdown Menus – Using Icons – The Role Of the Homepage – You are Here – Encouraging Exploration – Adding a Search Engine – Effective Error Messages – 14 Tips for Effective Links.

Unit III   **6 Hrs**
CSS:Giving Your Pages Some Style: Why Use CSS? – How CSS Transforms HTML –How CSS Describes Design – Adding CSS to Your Site – How to Change Colors –Styling Your Text – Padding, Border and Margin – Dividing the Page Up – Styling With Class – Advanced CSS Selectors – Creating a Simple Layout – Styling the Content – Advanced Positioning – List Bullets and Numbers – Creating a Navbar With CSS – Printer-friendly Pages – Next Steps With CSS and references.

Unit IV   **6 Hrs**

Javascript for Interactive Pages: What is Javascript? – How to Add Javascript – Creating Functions – Responding to User Actions – Showing and Hiding Content – How it Works – Adding a Toggle Routine – Simple Form Validation – Checking Text Boxes – More Advanced Form Tests – Customizing by Date – Opening New Windows – Adding Random Content – Adding Photo Slideshow – Saving Time with jQuery – 3 Quick jQuery Examples.

Unit V   **6 Hrs**

Tools for Website Design: Using Microsoft Word – HTML and Visual Editors – Introducing DreamWeaver – A Dreamweaver Tour.

Measuring Success: Measuring Visitor Interaction – Installing Google Analytics –
What the Numbers Mean – Other Important Metrics – Surveying Customers – Creating a Survey – Enabling Evolution.

Text Book:

Web Design in easy steps – Fifth edition, Sean Mcmanus , Tata McGraw Hill Eduction , 2011.

Unit I	: Page No: 85 to 106
Unit II	: Page No: 63 to 83
Unit III	: Page No: 107 to 131
Unit IV	: Page No: 137 to 156
Unit V	: Page No: 167 to 172, 223 to 231

Hardware Trouble Shooting and Networking
Subject Code : V1CA4P

Contact Hours per Semester : 30 Hrs

Course Outcomes:

CO1	To know about the basic hardware components
CO2	Assemble/setup and upgrade personal computer systems.
CO3	Diagnose and troubleshoot microcomputer systems hardware and software, and other peripheral equipment

1. Front panel indicators & switches and Front side & rear side Connectors.
2. To know about CPU Layout: SMPS, Motherboard, HDD, RAM, DVD.
3. Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.
4. Assembling and Disassembling of Laptop to identify the components.
5. Assembling a system
6. Install Hard Disk and configure to the PC's
7. Assemble a system with add on cards and check the working condition of the system and install OS.
8. Installation windows OS and Linux OS
9. Importance of networking, configuring networking, TCP/IP, Routing, VLAN, VPN
10. Installation and Configure windows server OS
11. Windows server network installation, file system security privileges
12. Windows firewall, hardware firewall, rules framing for file accessing and internet accessing
13. Installation of Hard Disk and configure hard disk as RAID.

Lab: Office Automation (For UG Only)

Subject Code: V1CA5

Contact Hours per Semester: **30 Hours**
Course Outcome:
Students, after successful completion of the course ,will be able to,

CO1: To use MS Word to create various types of documents.
CO2: Able to create and format spreadsheets, including the use of mathematical formula.
CO3: To create a presentation containing both text and graphics.
CO4 : To manipulate data with MS-access.

List of Programmes :
1. Working with Explore [Files / Folders : Create , Copy , Paste , Delete, Rename]
2. Create and edit a document
3. Table Manipulation
4. Mail Merge
5. Creation of worksheet and Editing.
6. Data sorting-Ascending and Descending
7. Mark list preparation for a student
8. Manipulating Excel Functions.
9. Drawing Graphs.
10. Create & Edit Database Table
11. Manipulating query commands from the Database Table
12. Report Generation
13. Slide Layout generation
14. Slide animation
15. Slide Transition Effects

Lab: Creative Game Development using Greenfoot (For UG Only)

Credits:
Contact Hours per Semester: 30 hours   **Subject Code:** V1CA6

COURSE OUTCOMES:
Students, after successful completion of the course ,will be able to

CO1: To understand the basics in java.
CO2: To know how java environment make interactive game development environment
CO3: To work on real time environment

List of Programmes :
1. Implementation of basic scenario creation
2. Implementation of superclass and subclasses
3. Implement actions to actors

4. Implementation of keyboard movement to actor
5. Implementation of inheritance
6. Implementation of mouse movement to actor
7. Orientation changing of object
8. API implementation within the game
9. Timer, Counter implementation in games
10. Keyboard controls implementation
11. Sounds implementation of games
12. Write programming statements to switch between two images.
13. Adding GIF images to the games
14. Adding next levels to the game