Course Name : **Bachelor of Science**
Discipline : **Information Technology.**

Rules and Regulations, Course scheme and Scheme of Examinations
(For those who join in June 2022 and after)

COURSE OBJECTIVE:

The course is broadly based, covering the areas of IT and Software development, providing a good foundation for a rapidly changing IT industry. In addition to the core area of study, the students are given sufficient exposure to all necessary skill enhancement tools and techniques in the field of IT. With the above intention the students are provided with sufficient laboratory sessions comprising of qualitative experiments in computer programming.

ELIGIBILITY FOR ADMISSION

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Govt. of Tamilnadu or any other Examinations accepted by the syndicate as equivalent there to with Mathematics/Computer Science as one of the Subjects.

Medium of Instruction : English

i) A candidate shall be eligible for the award of the degree on completion of the prescribed course of study and passing all the prescribed external examinations.
ii) Attendance, Progress and conduct certification from the head of the department shall be required for taking the external examinations.
iii) The passing minimum is 40% and a candidate will be declared to have passed.
    a) In I Class if he / she has obtained 60% and above in the III Part.
    b) In II Class if he / she has obtained 50% and above in the III Part.
    c) In III Class if he / she has obtained 40% and above in the III Part.

Ranking will be made for the candidates who have successfully completed the course without any arrears in each semester with the candidates scored the maximum total in III part be put in the I Rank and the minimum total in III Part be put in the last rank.

DURATION OF THE COURSE: Three Years.

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	Programming in C	6	5	25+75=100				✔	✓				✓			**U22NTC11**	Revised and Interchanged (10%)
	Core 2	Lab: Programming in C	5	3	40+60=100			✔		✓				✓			**U22NTCP11**	Interchanged
	Core 3	Lab: HTML and SASS	3	3	40+60=100			✔	✔	✓						✓	**U22NTCP12**	Revised (40%)
	Allied	Mathematical Foundations	4	4	25+75=100				✔	✓						✓	**U22MAAN11**	Revised (50%)
	Part IV SLC	Value Education	-	3	25+75=100							✓					**U22VE11**	
II	Part 1	Tamil	6	3	25+75=100		✔					✔					**U22PT21**	
	Part 2	English	6	3	25+75=100				✔	✓		✓					**U22PE21**	
	Core 4	Java Programming	5	5	25+75=100				✔	✓				✓			**U22NTC21**	Interchanged
	Core 5	Lab: Java Programming	6	3	40+60=100			✔		✓				✓			**U22NTCP21**	Interchanged
	Allied	Accounting Practices for Business	4	4	25+75=100				✔	✓						✓	**U22CEAN21**	Revised 50%
	Allied Lab	Lab: Business Accounting Software	3	3	40+60=100			✔		✓						✓	**U22NTAP21**	Revised 25%
	Part IV SLC	Environmental Studies	-	2	25+75=100								✓				**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**

Course I

Course Title : PROGRAMMING IN C	**Total Hours : 78 hrs**
Course Code : U22NTC11	**Total Credits : 5**

Course Outcomes

Upon completion of the course, students will be able to

COs	CO Statement
CO1	Learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs
CO2	Identify solution to a problem and apply control structures and user defined functions for solving the problem
CO3	Work with textual information, characters and strings
CO4	Write reusable modules
CO5	Understand the basic idea of pointers and managing files

Unit I **15 Hours**

Overview of C: History of C - Importance of C - Basic Structure of C Programs – Programming style. **Constants, variables and Data types :** Introduction - Character set – C Tokens – Keywords and identifiers – Constants – Variables - Data types - Declaration of variables, storage class – Assigning values to variables - Defining symbolic constants - Declaring a variable as constant, volatile - Overflow and underflow of data. **Operators and expressions:** Arithmetic, relational, logical, assignment operators - Increment and decrement operators - Conditional operator, Bitwise operators - Special operators - Arithmetic expressions - Evaluation of expressions - Precedence of arithmetic operators - Type conversions in expressions - Operator precedence and associativity - Mathematical functions. **Managing I/O operations:** Introduction - Reading and writing a character - Formatted input, output.

Unit II **16 Hours**

Decision making and branching: Introduction – Decision making with if statement- Simple if statement – The if...else statement - Nesting of if...else statements – 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 **16 Hours**

Array: Introduction **–** One-dimensional arrays - Declaration, 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 operations on characters - Putting strings together –

Comparison of two strings - String handling functions – Tables of strings – Other features of strings.

Unit IV **16 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 – Functions that return multiple values - Nesting of functions - Recursion - Passing arrays to functions – Passing strings to functions –The scope, visibility and life time of variables - Multifile programs. **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 within structures - Structures and functions - Unions - Size of structures - Bit fields.

Unit V **15 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 increments and scale factor - Pointers and arrays - Pointers and character strings - Array of pointers - Pointers as function arguments - Functions returning pointers - Pointers to functions - Pointers and structures. **File Management in C**: Introduction - Defining, opening, closing a file - I/O 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", Seventh Edition, McGraw Hill Education (India) Private Limited, Chennai, Fifth Reprint 2017.

Unit I	Chapters: 1 – 4 Pg. Nos. : 1 – 3, 12, 13, 22 – 44, 51 – 64, 66 – 71, 81 - 101
Unit II	Chapters: 5, 6 Pg. Nos. : 111 – 135, 149 - 173
Unit III	Chapters: 7, 8 Pg. Nos. : 189 – 214, 234 - 257
Unit IV	Chapters: 9, 10 Pg. Nos. : 267 – 309, 320 - 341
Unit V	Chapters: 11, 12 Pg. Nos. : 353 – 379, 391 - 411

Reference Book:

1. Yashavant Kanetkar**,** "Let us C :Authentic Guide To C Programming Language", 17Th Edition, BPB Publications.
2. Ashok N.Kamthane and Amit Ashok Kamathane, "Programming in C", Third Edition, Pearson Publication**.**
3. Byron Gottried, "Programming with C (Schaum's Outlines Series)", Third Edition, McGraw Hill Publishing Company**.**

e- Resources

1. https://www.geeksforgeeks.org/c-programming-language/

2. https://www.javatpoint.com/c-programming-language-tutorial
3. https://www.w3schools.in/c-tutorial/
4. https://nptel.ac.in/courses/106/104/106104128/
5. https://www.tutorialspoint.com/cprogramming/index.htm
6. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
7. file:///C:/Users/Administrator/Downloads/C%20in+21+days.pdf

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Course II

Course Title : LAB: PROGRAMMING IN C	**Total Hours : 65 Hrs**
Course Code : U22NTCP11	**Total Credits : 3**

Course Outcomes

Upon completion of the course, students will be able to

COs	CO Statement
CO1	Apply the specification of syntax rules for numerical constants and variables, data types
CO2	Read, understand and trace the execution of programs written in C language
CO3	Write programs that perform operations using derived data types
CO4	Apply and Write C programs to implement one dimensional and two dimensional arrays
CO5	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor

1. Write a C program to check whether the given number is odd or even.
2. Write a C program to find the largest of 3 numbers.
3. Write a C program for arithmetic calculation using switch statement.
4. Write a C program to reverse a given number using for loop.
5. Write a C program to display multiplication table using for loop.
6. Write a C program to check whether the given number is Prime or not using do while loop.
7. Write a C program to display N Fibonacci numbers using while loop.
8. Write a C program to check the given number is perfect or not using while loop.
9. Write a C program to count the number of positive, negative and zero in an array.
10. Write a C program to find the largest and smallest numbers in an array.
11. Write a C Program to find Mean, Variance and Standard Deviation for the given numbers in an array.
12. Write a C program to calculate the factorial value of a given number using recursion.
13. Write a C program to perform String operations.
14. Write a C program to check the given string palindrome or not without using library functions.
15. Write a C program to search an element in an array.
16. Write a C program to sort the array of numbers in ascending order.
17. Write a C program to perform Matrix Addition.
18. Write a C program to perform Matrix Multiplication.

19. Write a C Program to Store Information of 10 Students Using Structure
20. Write a C program to prepare an Electricity Bill Using Structure.
21. Write a C Program to perform Swapping using Pointer**.**
22. Write a C Program to sort an array using Pointer.

Course III

Course Title : LAB: HTML and SASS	**Total Hours : 39 hrs**
Course Code : U22NTCP12	**Total Credits : 3**

Course Outcomes

Upon completion of the course, students will be able to

COs	CO Statement
CO1	Analyze a web page and identify its elements and attributes.
CO2	Understand the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
CO3	Design and develop web pages using CSS styles, internal and/or external style sheets
CO4	Develop interactive web applications through coding using HTML Frames and CSS

1. Write a paragraph about our nation. Create a HTML page to display it. Use all paragraph attributes.
2. Write a paragraph about your friends. Create a HTML document with different font attributes to display it.
3. Design a HTML document describing your bio-data. Assign suitable background design, background color and text color.
4. Design a webpage for anyone of our national leaders with suitable headings and horizontal rule.
5. Write a HTML code to generate the following output:
   a. Diamond shape

   1 5
   2 3 6 7
   4 8

   b. Chemical Equations
      i. $Ba(BrO_3)_2 \cdot 2H_2O$
      ii. $BaFeSi_4O_{10}$
      iii. CO_3^{2-}
      iv. $C_{21}H_{36}N_7O_{16}P_3S$
      v. $ab^2x^4 + bx^3 + cx^2 + dx + ad^2 = 0$
      vi. $a_0x^{2n} + a_1x^{2n-1} + a_2x^{2n-2} + \ldots + a_2x^2 + a_1x + a_0 = 0$
6. Write a HTML code to print the library details using Lists.
   1. Novels
      - English
        i. To the Light House
        ii. Invisible Man
        iii. The Age of Innocence

- Tamil
  i. Ponniyin selvan
  ii. Parthiban kanavu
  iii. Kaval kottam

2. Education
   - Computer
     i. Programming in C
     ii. Mastering in Visual Basic
     iii. PASCAL
   - Mathematics
     i. Operation Research
     ii. Mathematical Foundations
     iii. Discrete Mathematics
3. Kids stories
   - The Ugly Duckling
   - The Ant and Grasshopper
   - Cinderella
   - Little Red riding Hood

7. Design a webpage that describes the forests in India. Use all link attributes.
8. Design a main page contains list of states in India. When we click one of the states it should open that state file and display the tourist places of that state. When we click one place it should open a file which contains information about that place with appropriate contents and images.
9. Design a timetable and display it in tabular format
10. Create the following table in HTML. Use different colors for name of the train, place, destination, train no, time, fare.

Name of the Train	Place	Destination	Train No	Time		Fare
				Arrival	Departure	
Pothigai Express	Sengottai	Chennai	1657	20:50	20:55	220
Nellai Express	Tirunelveli	Chennai	2234	21:20	21:30	230
Pandian Express	Madurai	Chennai	1233	19:45	20:00	200
Chennai Express	Madurai	Chennai	6657	12:10	12:20	185
Vaigai Express	Madurai	Chennai	2210	06:45	06:50	120

11. Design the following static web pages required for an online book store web site.

1) HOME PAGE:

The static home page must contain three frames.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link "MCA" the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

12. Create a web page which shows the map of India. The cities of Chennai, Delhi, Mumbai, Calcutta are in the coordinates (115,240), (100,100), (70, 70), (200,150). Define them with hot spots and when we click the city corresponding HTML document is opened which shows the history of the city.
13. Design few HTML documents which describe the top IT companies in India. The list of companies is shown in one frame. When we click one company the details must appear in another frame.
14. Design a college application form using all input types.
15. Write a HTML code for changing the style and color of the text using Sass.
16. Write a HTML code to change the style for Navigation using Sass Nested rule.
17. Write a HTML code to demonstrate the usage of external Sass.
18. Design a web page using Sass Color functions.
19. Write a HTML code to change the appearance of the form elements using Sass Inheritance.
20. Create a Sass to design the home page for College Website using Sass Mixins.

Course IV

Course Title : MATHEMATICAL FOUNDATIONS	**Total Hours : 52 hrs**
Course Code : U22MAAN11	**Total Credits : 4**

Course Outcomes

Upon completion of the course, students will be able to

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 **11 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 **10 Hours**

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

Unit III **10 Hours**

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

Unit IV **10 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 **11 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 (Sec 1.1 – 1.8)
Unit – II	Chapter 2(Sec 2.2 to 2.6)
Unit – III	Chapter 9 (Sec 9.1 to 9.3, 9.6 to 9.8)
Unit – IV	Chapter 6 (Sec 6.1 – 6.4)
Unit – V	Chapter 11 Sec 11.1 (P.No: 11.1 – 11.9) Sec 11.2 (P.No: 11.34 – 11.42 & 11.47 – 11.51) Sec 11.4 (P.No: 11.69 – 11.71) Sec 11.5 (P.No: 11.79 – 11.80

Reference Book:

1. Kenneth H.Rosen , "Discrete Mathematics and its Applications", 8th edition, TMH, 2018

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

SEMESTER – II - Course V

Course Title : JAVA PROGRAMMING	**Total Hours : 65 Hrs**
Course Code : U22NTC21	**Total Credits : 5**

Course Outcomes

Upon completion of the course, students will be able to

COs	CO Statement
CO1	Understand the basic concepts and fundamentals of platform independent object oriented language.
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO3	Apply the concepts of Multithreading and Exception handling to develop

	efficient and error free codes.
CO4	Use the syntax and semantics of java programming language and basic concepts of OOP
CO5	Understand streams and efficient user interface design techniques.

UNIT I **13 hrs**

Introduction : Features of Java Language – Types of Programs – Java Architecture – Literals – Data types – Variables – Structure of Java Program – Comments – Expression and Statements – Type Conversion – Arithmetic Operators – Bitwise Operators – Relational Operators – Logical Operator – Ternary Operator – Operator Precedence.

UNIT II **14 hrs**

Control Structure and Arrays: If…else Statement – Switch Statement – while Statement – do…while Statement – for Statement – Break in Loop – One Dimensional Array – Multi Dimensional Array.

UNIT III **14 hrs**

Class and Interface: Definition – new operator and objects – dot operator – Method Declaration and Calling – Constructors – Instance Variable – this in Constructor – Method Overloading – Passing Objects as Parameters – Sub Class – Method Overriding – Final Class – Method – Variable – Object destruction – Static Class – Method – Variable – Abstract Class – Package – Import Statement – Access modifier – Interfaces.

UNIT IV **12 hrs**

String, Wrapper & Exception classes: Number Class – Character Class – Boolean Class – String Class – String Buffer Class – Types Of Exception – Catching Exception – Rethrowing Exception – User Exception – Finally Block – Checked and Unchecked Exceptions.

UNIT V **12 hrs**

I/O and Multithreading: I/O Streams – File Class – Byte Stream – Disk File Handling – Memory Handling – Filtered Byte Stream – Random access File – Character Stream – Multithreading – Creations – Thread States – Multithreaded Programming – Thread Priorities – Waiting For Thread – Join Method – Controlling Threads.

TEXT BOOK

1. "**Programming in Java2**" by Dr.K.Somasundaram, JAICO Publishing House, First edition, 2013.

Unit I	Chapter 1.2 to 1.4 Chapter 2.1 to 2.3 Chapter 3.1 to 3.4 Chapter 4.1 to 4.6
Unit II	Chapter 5.1 to 5.7 Chapter 6.1, 6.2
Unit III	Chapter 7.1 to 7.9 Chapter 8.1 to 8.9 Chapter 9.1 to 9.4
Unit IV	Chapter 10.1 to 10.3 Chapter 12.1 to 12.4, 12.6, 12.7 Chapter 14.1, 14.2

Unit V	Chapter 13.1 to 13.6, 13.10, 13.11 Chapter 15.1 to 15.7

REFERENCE BOOKS

1. "**Programming with java**" by E.Balagurusamy, TMH, Fourth Edition, 2009.
2. "**Internet and Java Programming**" by R Krishnamoorthy, S Prabhu, New Age International (P) Ltd, Fifth Edition, 2014.
3. "**Java Complete Reference**" by Herbert Schildt, McGraw Hill Education; Ninth edition, 2017.

e-Resources

1. http://www.tutorialspoint.com/java/
2. https://www.geeksforgeeks.org/java/
3. https://www.w3schools.com/java/default.asp
4. https://docs.oracle.com/javase/tutorial/
5. https://www.javatpoint.com/java-tutorial
6. https://www.programiz.com/java-programming
7. https://www.cp.eng.chula.ac.th/books/wp-content/uploads/sites/5/2018/01/java101.pdf
8. http://staff.um.edu.mt/__data/assets/pdf_file/0010/57169/jn.pdf
9. https://www.tutorialspoint.com/java/java_tutorial.pdf

Course VI

Course Title : LAB : JAVA PROGRAMMING	**Total Hours : 78 Hrs**
Course Code : U22NTCP21	**Total Credits : 3**

Course Outcomes

Upon completion of the course, students will be able to

COs	CO Statement
CO1	Write Java application programs using OOP principles and proper program structuring
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
CO4	Create Multithreaded programs.

1. Write a Java Program to demonstrate Command line arguments.
2. Write a Java Program to demonstrate Type conversions.
3. Write a Java Program to implement operations on complex numbers.
4. Write a Java program to check two strings are equal or not.
5. Write a Java Program for prime number checking using classes.
6. Write a Java program to calculate the roots of Quadratic equations.
7. Write a Java Program to implement any sorting technique for sorting given n elements.
8. Write a Java Program using string methods.
9. Write a Java Program to implement Method Overloading.
10. Write a Java Program to implement possible Operations on matrix

11. Write a Java Program to implement Constructor Overloading.
12. Write a Java Program to create a package and importing a package.
13. Write a Java Program to implement Exception Handling.
14. Write a Java Program for Student database using Interfaces.
15. Write a Java Program for writing all the properties of a thread.

Course VII

Course Title : ACCOUNTING PRACTICES FOR BUSINESS	**Total Hours : 52 Hrs**
Course Code : U22CEAN21	**Total Credits : 4**

Course Outcomes

Upon completion of the course, students will be able to

COs	CO Statement
CO1	Understand the fundamentals of financial accounting
CO2	Compute the ledger balances, net profit, amount of deprecation.
CO3	Assess the financial position of the business
CO4	Analyse the EOQ, stock levels and material issues
CO5	Nuance of BEP, PV ratio and margin of safety

UNIT I **11 Hours**

Introduction to Accounting: Accounting – meaning – Objectives – Importance - Basic Accounting Terms; Classification of accounting – Financial, Cost and Management accounting; Types of Accounts – Real Accounts, Personal Accounts and Nominal Accounts; Accounting Equations.

UNIT II **11 Hours**

Book keeping : Journal – Meaning – Transaction analyses for journal entries; Ledgers – Meaning – Posting of Ledger accounts – Journal Vs. Ledger; Trial Balance – Meaning – Objectives - preparation of Trial Balance from the given balances and correct the trial balance.

UNIT III **10 Hours**

Final accounts: Final accounts of sole trading concerns – Adjustments (Simple Problems only)

UNIT IV **10 Hours**

Inventory Control: Meaning - EOQ - Determination of Stock level – minimum level, maximum level, re- order level, reorder quantity and danger level – Material Issue – FIFO, LIFO.

UNIT V **10 Hours**

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

Note: Distribution of Marks - Theory - 20% and Problems - 80%

TEXT BOOK

1. T.S Reddy & Murthy, **"Advance Accountancy"** Volume – 1, Margham Publications, Chennai, 2019 Reprint
2. T.S Reddy & Murthy, **"Cost and Management Accounting"** Margham Publications, Chennai, 2014 Reprint

Unit I	1.1 – 1.8, 1.12 – 1.14, 2.11 – 2.14 3.1 – 3.3

Unit II	3.3 – 3.11 3.22 – 3.33 3.40 – 3.55 4.1 – 4.5, 4.11 - 4.12
Unit III	12.1- 12.12 12.17 Problem 1,2,11,12,13
Unit IV	**Text Book 2:** 3.1, 3.25 ,3.26, 3.38, 3.54 – Sum No 8, 9, 10 3.61 – Sum No 14, 15, 16, 17, 18,19. 3.68 – Sum No 20,21,22,23
Unit V	**Text Book 2:** 10.1- 10.4, 10.8 – 10.10 10.37 Sum No 8,10,11,12,13,15,17,18,19

REFERENCE BOOKS

1. R.L.Gupta and M.Radaswamy, "**Advanced Accountancy**", Sultan Chand Publisher. Lolkatta,2013
2. M.A.Arulanandam & K.S. Raman, **"Adavance Accountancy"** Vol-1, Sixth Edition, 2015, Himalaya Publishing House, Mumbai.
3. S.N.Maheswari & Suneel K Maheshwari, **"Financial Accounting"**, Fifth Edition, 2012, Vikas Publishing House.
4. R.S.N Pillai and Bhaghavathi **"Cost Accouting"** S. Chand Publication, Delhi 2019 Reprint
5. R.S.N Pillai and Bhaghavathi **"Management Accouting"** S. Chand Publication, Delhi 2019 Reprint

e-Resources

1. https://nscpolteksby.ac.id/ebook/files/Ebook/Accounting/Accounting%20and%20Financial%20Management%20(2006)/4.%20Chapter%203%20-%20Final%20Accounts.pdf
2. https://www.egyankosh.ac.in/bitstream/123456789/15458/1/Unit-19.pdf
3. https://egyankosh.ac.in/bitstream/123456789/28672/1/Unit-9.pdf
4. http://www.vandemataramcollege.com/app/webroot/files/NOTES_sem246/Marginal-costing.pdf

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Course VIII

Course Title : **LAB**: **BUSINESS ACCOUNTING SOFTWARE**	Total Hours : 39 Hrs
Course Code : **U22NTAP21**	Total Credits : 3

Course Outcomes

Upon completion of the course, students will be able to

COs	CO Statement
CO1	Extend the knowledge on computerized accounting with tally
CO2	Build the ledgers, groups, stock groups, stock categories, stock items and other processing

CO3	Analyze the usage of vouchers and debit note and credit note.
CO4	Compute interest and profit or loss of a business
CO5	Prepare Financial reports, quotations and orders

1. Create X Ltd., company.
2. Alter the X Ltd., Company
3. Create accounts single and multiple groups.
4. Create sub-group Creation.
5. Create single and multiple ledgers (Sundry Debtors and Sundry creditors).
6. Pass the journal entry and display the trading a/c, Profit and Loss a/c and Balance sheet.
7. Create a new voucher using advance mode numbering
8. Maintain the multi location stock level.
9. Create company's budget for sales and purchase of XYZ Ltd.,
10. Create single and multiple stock groups
11. Create Company Inventories using purchase and sales
12. Create debit note and credit note.
13. Pass the voucher entry in receipts and payments in X Ltd., Companies
14. Prepare the cheque payments of printing methods.
15. Using multiple currency option for purchase, sales, receipts and payments

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Course Name : Bachelor of Science
Discipline: Information Technology
CHOICE BASED CREDIT SYSTEM
(For those who join in June 2018 and after)
Course Scheme:

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 6	Data Structures	4	4	25+75=100				✔	✓						✓	U2NTC31	No Change
	Core 7	Java Programming	4	4	25+75=100				✔	✓				✓			U2NTC32/ U2NTC41	Interchanged
	Core 8	LAB: Computer Animation	5	3	40+60=100				✔	✓						✓	U3NTC3P1	Revised / 30%
	Core-9 Lab	LAB: Programming in Java	5	3	40+60=100				✔	✓				✓			U3NTC3P2/ U2NTC4P	Interchanged
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 10	Python Programming	4	4	25+75=100	✔		✔	✔	✓				✓			U3NTC41	New / 100%
	Core 11	Operating Systems	5	4	25+75=100				✔	✓						✓	U1NTC42	No Change
	Allied 4	Resource Management Techniques	4	4	25+75=100				✔	✓						✓	U1MAA4N	No Change
	Core-12 Lab	LAB: Python Programming	5	3	40+60=100	✔		✔	✔	✓				✓			U3NTC4P	New / 100%

Self-Learning Course

Subject	Semester	Credit	Ext =Tot	Subject Code
Human Rights	IV	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 6 – DATA STRUCTURES

Contact Hours per week: 4 hrs **Sub. Code: U2NTC31**
Contact hours per semester: 52 hrs

Objective:

1. Assess how the choice of data structures and algorithm design methods impacts the performance of programs.
2. Choose the appropriate data structure and algorithm design method for a specified application.
3. Solve problems using data structures such as linked lists, stacks, queues, binary trees and graphs and writing programs for these solutions.

UNIT I **(11 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.

UNIT II **(11 hrs)**

Linked Lists : Definition – Single linked list – Circular linked list – Double linked list – Circular double linked list – Applications of Linked Lists.

UNIT III **(10 hrs)**

Stack : Definition – Representation of Stack – Operations on stack – Applications of stack: Evaluation of Arithmetic Expressions - Code generation for stack machines - Implementation of Recursion - Factorial Calculation - Quick sort - Tower of Hanoi Problem.

UNIT IV **(10 hrs)**

Queues : Definition – Representation of Queues – Various Queue Structures.

Trees: Basic Terminologies – Definition and concepts – Representation of Binary Tree - Operations on binary tree – Types of binary tree : Expression tree , Binary Search tree.

UNIT V **(10 hrs)**

Graphs : Introduction – Graph Terminologies – Representation of Graphs – Operations on Graphs – Applications of graph structures : Shortest Path problem.

Text Book:

"Classic Data Structures", D.Samanta, Prentice Hall of India Private Limited, 2008

UNIT I : Chapter 1,2.1 – 2.4
UNIT II : Chapter 3.1 – 3.6
UNIT III : Chapter 4.1 – 4.5.6
UNIT IV : Chapter 5.1 - 5.4, 7.1 - 7.5.2
UNIT V : Chapter 8.1 – 8.5.1

Reference Books:

1. "Data Structures", A.Chitra and P.T.Rajan, Vijay Nicole Imprints Private Limited, 2006
2. "Schaum's Outline of Data structures", Seymour lipschutz, McGraw Hill Ltd

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CORE 7 – JAVA PROGRAMMING

Contact Hours per Semester: 52hrs **Credits: 4**

Subject Code: U2NTC32/U2NTC41

Course Outcome

Upon completion of the course, students will be able to

CO1	Gain knowledge about object oriented programming, java technology and its features and get exposure on java literals, data types, variables and operators.
CO2	Implement programs using control flow statements, loop statements and arrays.
CO3	Describe the basic building block of object oriented programming in Java
CO4	Learn how to create objects for basic types and how to handle abnormal condition occurring in a program.
CO5	Implement input output data processing and learn how to execute more than one process at a time.

UNIT I **12 hrs**

Introduction : Features of Java Language – Types of Programs – Java Architecture – Literals – Data types – Variables – Structure of Java Program – Comments – Expression and Statements – Type Conversion – Arithmetic Operators – Bitwise Operators – Relational Operators – Logical Operator – Ternary Operator – Operator Precedence.

UNIT II **10 hrs**

Control Structure and Arrays: If…else Statement – Switch Statement – while Statement – do…while Statement – for Statement – Break in Loop – One Dimensional Array – Multi Dimensional Array.

UNIT III **10 hrs**

Class and Interface: Definition – new operator and objects – dot operator – Method Declaration and Calling – Constructors – Instance Variable – this in Constructor – Method Overloading – Passing Objects as Parameters – Sub Class – Method Overriding – Final Class – Method – Variable – Object destruction – Static Class – Method – Variable – Abstract Class – Package – Import Statement – Access modifier – Interfaces.

UNIT IV **10 hrs**

String, Wrapper & Exception classes: Number Class – Character Class – Boolean Class – String Class – String Buffer Class – Types Of Exception – Catching Exception – Rethrowing Exception – User Exception – Finally Block – Checked and Unchecked Exceptions.

UNIT V **10 hrs**

I/O and Multithreading: I/O Streams – File Class – Byte Stream – Disk File Handling – Memory Handling – Filtered Byte Stream – Random access File – Character Stream – Multithreading – Creations – Thread States – Multithreaded Programming – Thread Priorities – Waiting For Thread – Join Method – Controlling Threads.

TEXT BOOK

"Programming in Java2" by Dr.K.Somasundaram, JAICO Publishing House, First edition, 2013.

Unit I **:** Chapter 1.2 to 1.4
Chapter 2.1 to 2.3

Chapter 3.1 to 3.4
Chapter 4.1 to 4.6

Unit II **:** Chapter 5.1 to 5.7
Chapter 6.1, 6.2

Unit III **:** Chapter 7.1 to 7.9
Chapter 8.1 to 8.9
Chapter 9.1 to 9.4

Unit IV **:** Chapter 10.1 to 10.3
Chapter 12.1 to 12.4, 12.6, 12.7
Chapter 14.1, 14.2

Unit V **:** Chapter 13.1 to 13.6, 13.10, 13.11,
Chapter 15.1 to 15.7

REFERENCE BOOK

1. **"Programming with java"** by E.Balagurusamy, TMH, Fourth Edition, 2009.
2. **"Internet and Java Programming"** by R Krishnamoorthy, S Prabhu, New Age International (P) Ltd, Fifth Edition, 2014.
3. **"Java Complete Reference"** by Herbert Schildt, McGraw Hill Education; Ninth edition, 2017.

CORE 8 – LAB: COMPUTER ANIMATION

Contact Hours per Semester: 65hrs **Credits: 3**

Subject Code : U3NTC3P1

Course Outcome

Upon completion of the course, students will be able to

CO1	Design layouts for Paper Adverts, Brouchers, CD Covers, Package Designing in Photoshop
CO2	create new layers and perform other basic layer functions in Photoshop
CO3	Design, create, edit, and manipulate animation using several animation tools and techniques in Flash.
CO4	Utilize components to create interactivity in Flash
CO5	Acquire practical proficiency for work with 2D graphics in CorelDraw
CO6	Meet the demands of today's working designer to create ads or collateral for print in CorelDraw

Photoshop

1. Basic tools used in Photoshop.
2. Design an image by cutting the objects from 3 files and organize them in a single file and apply feather effects.
3. Design an image by applying mirror effect.
4. Design an image by extracting flower only from given photographic image
5. Design an image by applying Text and Transform Tool.
6. Design an image by using patch or healing brush tool to remove damaged parts of an image.
7. Design an image by applying Color Balance to change the color of an image.
8. Design an image by using Clone Stamp Tool, Smudge Tool.
9. Design an image by applying Blur Filter.
10. Design an image by applying Lighting effect Filter.
11. Design an image by applying Blending options to make a text effect.
12. Design an image by applying rainbow effect.
13. Design an image by applying text masking effect.
14. Design a college id card using any tools.

15. Design a banner for your college with images and text.

Flash

1. Basic tools used in Flash.
2. Develop a Flash application using motion tween.
3. Develop a Flash application using shape tween.
4. Develop a Flash application for ball bouncing using motion guide path.
5. Develop a Flash application for masking effect.
6. Develop a Flash application using layer based animation.
7. Develop a Flash application to represent the growing moon
8. Write action script to play and stop an animation.
9. Write action script to find the biggest of three numbers.
10. Write action script to find the factorial of a number.

CorelDraw

1. Design a greeting card by applying image, alignment and styles.
2. Design simple report cover by applying fonts, size and orientation.
3. Design a home by applying colors, outline and fill tools.
4. Design an art work by applying drawing tools.
5. Design a smiley by applying basic shape tools.
6. Design a photo album by applying bitmap color effects.
7. Design a logo by applying combine and break.
8. Design a visiting card by applying angle rotation and mirror tools.
9. Design an invitation by applying interactive envelope, blend and distortion tools.
10. Design a flex by applying shadow, interactive fill and transparency tools.

CORE 9 – LAB: Programming in Java

Contact Hours per Semester: 65hrs **Credits: 3**

Subject Code : U3NTC3P2/U2NTC4P

Course Outcome

CO1	Describe the Numbers, Type conversions and Strings in Java
CO2	Express different Decision Making statements and Functions
CO3	Interpret Object oriented programming in Java
CO4	Understand how to create a package and importing a package
CO5	Understand Multithreading and Exception handling Concepts in java
CO6	Explain how to design GUI Applications using applet
CO7	Design simple animation using applet and thread.

1. Write a Java Program to demonstrate Command line arguments.
2. Write a Java Program to demonstrate Type conversions.
3. Write a Java Program to implement operations on complex numbers.
4. Write a Java program to check two strings are equal or not.
5. Write a Java Program for prime number checking using classes.
6. Write a Java program to calculate the roots of Quadratic equations.
7. Write a Java Program to implement any sorting technique for sorting given n elements.
8. Write a Java Program using string methods.
9. Write a Java Program to implement Method Overloading.
10. Write a Java Program to implement possible Operations on matrix
11. Write a Java Program to implement Constructor Overloading.
12. Write a Java Program to create a package and importing a package.
13. Write a Java Program to implement Exception Handling.
14. Write a Java Program for Student database using Interfaces.

15. Write a Java Program to writing all the properties of a thread.
16. Write a Java Program to draw traffic signal using applet.
17. Write a Java Program for bouncing ball using applet and thread.

Semester IV
CORE 10 - PYTHON PROGRAMMING

Contact Hours per Semester: 52hrs **Credits: 4**
Subject code: U3NTC41

Course Outcome

Upon completion of the course, students will be able to

CO1	Learn the Basics of Python Environment and Data Types
CO2	Learn to process Inputs and Outputs
CO3	Design program using Arrays and Subroutines
CO4	Describe the usage of the built-in data structures like 'list', 'tuple' and 'dictionary'.
CO5	Understand the basics of OOPs and Database Connectivity

UNIT I **10 hrs**

Introduction to Python: Python – Features of Python – Execution of a Python program – Viewing the Byte Code – Flavors of Python – Python Virtual Machine – Frozen Binaries – Memory Management in Python – Garbage Collection in Python – Comparisons between C and Python – Comparisons between Java and Python.

Data Types in Python: Comments in Python – Docstrings – how Python Sees Variables – Data Types in Python – Built–in data types – bool data type – Sequences in Python – Sets – Literals in Python – Determining the Data type of a variable – What about Characters – User–defined Data types – Constants in Python – Identifiers and Reserved words – Naming Conventions in python.

UNIT II **10 hrs**

Input and Output: Output statements – Input statements – Command line arguments.

Control Statements: Control Statements – The if Statement – A Word on Indentation – The if … else Statement – The if … elif … else Statement – The while Loop – The for Loop – Infinite Loops – Nested Loops – The else Suite – The break Statement – The continue Statement – The pass Statement – The assert Statement – The return Statement.

UNIT III **10 hrs**

Arrays in Python: Array – Advantages of Arrays – Creating an Array – Importing the Array Module – Indexing and Slicing on Arrays – Processing the Arrays – Types of Arrays.

Functions: Difference between a function and a method – Defining a Function - Calling a function – Returning results from a function – Returning multiple values from a function – Functions are First Class Objects – Pass by Object Reference – Formal and Actual Arguments – Positional Arguments – Keyword Arguments – Default Arguments – Variable Length Arguments – Local and Global Variables – The Global Keyword – Passing a Group of Elements to a Function – Recursive Functions – Anonymous Functions or Lambdas – Function Decorators.

UNIT IV **11 hrs**

Lists and Tuples: List – Creating lists using range() function – Updating the elements of a list – Concatenation of two lists – Repetition of lists – Membership in lists –Aliasing and

cloning lists – Methods to process lists – Finding Biggest and Smallest Elements in a List – Sorting the List Elements – Number of Occurrences of an Element in the List – Finding Common Elements in Two Lists – Storing Different Types of Data in a List – Nested Lists – Nested Lists as Matrices – List Comprehensions – Tuples – Creating tuples – Accessing the tuple elements – Basic operations on tuples –Functions to process tuples – Nested tuples – Inserting, modifying and deleting elements in a tuple.

Dictionaries: Operations on dictionaries – Dictionary methods – Using for loop with dictionaries – Sorting the Elements of a Dictionary using Lambdas – Converting Lists into Dictionary – Converting Strings into Dictionary – Passing Dictionaries to Functions – Ordered Dictionaries.

UNIT V **11 hrs**

Classes and Objects: Creating a class – The self variable – Constructor – Types of variables – Namespaces – Types of methods – Passing members of One Class to another Class – Inner Classes.

Python's Database Connectivity: Working with MYSQL database – Using MYSQL from Python – Retrieving all rows from a table – Inserting, Deleting and Updating rows in a table – Creating database tables through Python.

TEXTBOOK

"Core Python Programming" by Dr.R.Nageswara Rao, Dreamtech Press publication, Second edition, 2017.

Unit I	**:**	Chapter 1, 3
Unit II	**:**	Chapter 5, 6
Unit III	**:**	Chapter 7 → **Pg.No:** 151 – 167 Chapter 9
Unit IV	**:**	Chapter 10, 11
Unit V	**:**	Chapter 13, 24 → **Pg.No:** 666 – 681

REFERENCE BOOK

1. **"Beginning Python from novice to Professional"** by Margnus Lie Hetland, Dream Tech Press, Second Edition, 2008.
2. **"Learning with Pythons"** by Allen Downey et al, Dream tech Press, First edition, 2015.
3. **"The Complete Reference Python"** by Matic C.Brown, M.C.Graw Hill Education, First edition, 2001.

CORE 11 – OPERATING SYSTEMS

Contact Hours per week: 5 hrs **Sub. Code: U1NTC42**
Contact hours per semester: 65 hrs
Objective:

The students should have acquired the following capabilities:

1. To acquire the knowledge on the role of an operating system.
2. Become aware of the issues in the management of resources like processor, memory and input-output.

UNIT I **(10 hrs)**

Introduction - What is an Operating System? – Mainframe Systems-Desktop Systems-Multiprocessor Systems-Distributed Systems-Real Time Systems-Computing Environment. Computer System Structures - Computer System Operation- I/O structure-Storage Structure-Storage Hierarchy–Hardware Protection-Network Structure. Operating System Structure -

System Components-Operating-System Services - System Calls - System Programs -System Structure- Virtual Machines-System Design and Implementation - Operating System Generation

UNIT II **(10 hrs)**

Process - Process Concept - Process Scheduling - Operations on Processes - Co operating processes- Interprocess Communication - Communication in Client Server Systems. Threads: Overview- Multithreading Models- Threading Issues. CPU Scheduling - Basic Concepts- Scheduling Criteria- Scheduling Algorithms -Multiple-Processor Scheduling- Real Time Scheduling- Algorithm Evaluation- Process Scheduling Models

UNIT III **(10 hrs)**

Process Synchronization - Background - The Critical-Section Problem- Synchronization Hardware - Semaphores - Classic Problems of Synchronization - Critical regions - Monitors -OS Synchronization- Atomic Transactions. Deadlocks - System Model- Deadlock Characterization-Methods for Handling Deadlocks- Deadlock Prevention- Deadlock Avoidance- Deadlock Detection-Recovery From Deadlock

UNIT IV **(12 hrs)**

Memory Management - Background -Swapping- Contiguous Memory Allocation- Paging- Segmentation- Segmentation with paging

Virtual Memory - Background - Demand Paging - Process Creation- Page Replacement - Allocation of Frames - Thrashing

UNIT V **(10 hrs)**

File-System Interface - File Concept - Access Methods - Directory Structure - File-System Mounting- File Sharing- Protection

File-System Implementation - File-System Structure - File-System Implementation - Directory Implementation - Allocation Methods - Free-Space Management - Efficiency and Performance - Recovery

Text book:

"Operating System Concepts" Sixth Edition, Silberschatz, Galvin, Gagne, Wiley India

UNIT I : Chapter 1, 2, 3
UNIT II : Chapter 4, 5, 6
UNIT III : Chapter 7, 8
UNIT IV : Chapter 9, 10
UNIT V : Chapter 11, 12

Reference book:

"Operating systems", Second Edition, William Stallings, PHI Learning

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ALLIED 4 - RESOURCE MANAGEMENT SYSTEMS

Contact Hours per week: 4hrs Credit: 4
Contact Hours per Semester: 52 hrs Subject Code: U1MAA4N

Objective:

To provide the student with the concept of Operations Research Techniques and problem solving in LPP, Simplex Method, Assignment Problem and Transportation Problem.

UNIT I **(10 hrs)**

Development of OR – Definition of OR – Modeling – Characteristics and Phases of OR – tools, techniques and Methods of OR – Scope of OR

UNIT II **(10 hrs)**

Linear programming Problem: Formulation – Slack and Surplus Variables – Standard form of LPP – Graphical Representation of LPP

UNIT III **(10 hrs)**

Simplex Method – Artificial Variable techniques: Big M method (Only Problems)

UNIT IV **(10 hrs)**

Mathematical Formulation of AP – Algorithm: Hungarian Method – Balanced and Unbalanced AP

UNIT V **(12 hrs)**

Mathematical Formulation of Transportation Problem – Initial basic feasible solution: North West Corner Method and Vogel's Approximation Method – Optimum Solution of TP using MODI Method

Text Book:

Operation Research, S.D.Sharma
UNIT I: Chapter 1 – 1.1, 1.2, 1.4, 1.8, 1.9, 1.10, 1.11
UNIT II: Chapter 3 – 3.2, 3.5, 3.6, 3.3
UNIT III: Chapter 5 – 5.3, 5.5.4
UNIT IV: Chapter 12 – 12.2, 12.4, 12.6
UNIT V: Chapter 11 – 11.2, 11.8, 11.10, 11.11, 11.12

Reference Book:

1. Kanthi Swarup at all, "Operations Research", Sultan Chand & Sons, New Delhi, 1996.
2. Handy S.Taha, Operations Research, TMH.

CORE 12 – LAB: PYTHON PROGRAMMING

Contact Hours per Semester: 65hrs **Credits: 3**

Subject Code : U3NTC4P

Course Outcome

Upon completion of the course, students will be able to

CO1	Demonstrate programs using simple Python statements and expressions.
CO2	Explain control flow and functions concept in Python for solving problems.
CO3	Develop Python programs by defining functions and calling them
CO4	Use Python data structures – lists, tuples & dictionaries for representing compound data.
CO5	Design programs using OOP concepts in Python
CO6	Interpret different database operations

1. Program that asks the user for a number and then prints out the sine, cosine, and tangent of that number using Command Line argument.
2. Perform arithmetic operations on Complex Numbers.
3. Get one number from user, and prints a countdown from that number to zero using While Loop.
4. Find the sum of all the odd and even numbers for the given range using for loop.
5. Program that generates a random number, x, between 1 and 50, a random number y between 2 and 5, and computes x^y.
6. String Manipulation
7. Program to prints out all the divisors of the given number using function.
8. Print the GCD of two numbers using Recursion.
9. Program to find all such numbers which are divisible by 7 but are not a multiple of 5 using List.

10. Demonstrate use of tuple and its related functions.
11. Program that prints out a list of the integers from 1 to 20 and their squares in a dictionary data structure.
12. Program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple.
13. Write a program that converts Roman numerals into ordinary numbers and vice-versa using Class.
14. Student database Management using MySQL
15. Library database Management using MySQL

Course Name : Bachelor of Science
Discipline : Information Technology
(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
V	Core 13	Relational Database Management Systems	4	4	25+75=100				✔	✓						✓	U3NTC51	I & Revised /40%
	Elective 1	Data Communications and Networks	5	5	25+75=100				✔	✓						✓	U3NTE51	Revised / 20%
	Elective 2	Web Programming	5	5	25+75=100				✔	✓				✓			U3NTE52	Revised / 60%
	Core 14 - Lab	LAB: Android Programming	5	3	40+60=100			✔	✔	✓				✓			U3NTC5P1	New
	Core 15 - Lab	LAB: Web Programming	5	3	40+60=100			✔	✔	✓				✓			U3NTC5P2	Revised / 40%
	SBE - 2	Android Programming	2	2	25+75=100	✔			✔	✓				✓			U3NTS51	New
	SBE - 3	Employability Skills	2	2	25+75=100					✓							U1PS51	No Change
	NME - 1	Introduction to Information Technology	2	2	25+75=100				✔	✓						✓	U3NTN51	Revised / 30%
VI	Core 16	Software Engineering	4	4	25+75=100				✔	✓						✓	U3NTC61 / U2NTE52	I & No Change / -
	Core 17	Dot Net Programming	5	4	25+75=100				✔	✓				✓			U3NTC62	I and R / 60%
	Core 18	Data Science	5	4	25+75=100				✔	✓						✓	U3NTC63	New
	Elective 3	Project and Viva - Voce	5	5	40+60=100				✔	✓				✓			U1NT6PR	No Change / -
	SBE - 4 – Lab	LAB: Dot Net Programming	5	3	40+60=100			✔	✔	✓				✓			U3NTS6P1	Revised / 40%
	SBE - 5	Open Source programming	2	2	25+75=100				✔	✓						✓	U3NTS61	New
	SBE - 6 – Lab	LAB: Open Source Programming	2	2	40+60=100			✔	✔	✓						✓	U3NTS6P2	New
	NME - 2	Introduction to Internet	2	2	25+75=100				✔	✓						✓	U2NTN61	New

SEMESTER V

CORE 13 – RELATIONAL DATABASE MANAGEMENT SYSTEMS

Contact Hours per Semester: 52hrs **Credits: 4**

Subject Code: U3NTC51

Course Outcome

Upon completion of the course, students will be able to

CO1	Learn the fundamental elements of DBMS and RDBMS.
CO2	Explain the basic concepts of Entity - Relationship model, Relational database design.
CO3	Improve the database design by normalization and relational algebra.
CO4	Understand the use of Structured Query Language (SQL) and PL/SQL.
CO5	Interpret the concept of Transaction and Query processing.

UNIT I (10hrs)

Introduction to Database Management Systems (DBMS): Introduction - Why a Database - Characteristics of Data in a Database - Database Management System - Why DBMS - Types of Database Management Systems.

Files, File Organization and File Structures: Introduction - Operations of Files - File Storage Organization - Sequential File Organization - Sequential File Processing - Case Study - Efficiency of Sequential File Organization

Introduction to Relational Database Management Systems(RDBMS): Introduction - RDBMS Terminology - The Relational Data Structure - Relational Data Integrity - Domain Constraints - Entity Integrity - Referential Integrity - Operational Constraints - Relational Data Manipulation – Codd's rules.

UNIT II (10hrs)

Database Architecture and Data Modeling: Introduction - Conceptual, Physical and Logical Database Models - Functional Dependencies.

Entity - Relationship (ER) Modeling: Introduction - E - R model - Components of an E - R model - ER diagram Conventions – Relationships – Entity list - ER diagrams (ERDs) - ER Modeling Symbols

Data Normalization: Introduction – Keys – Relationships - 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 (10hrs)

Relational Algebra and Relational Calculus: Relational Algebra - Relational Algebraic Operations - Relational Calculus - Tuple Relational Calculus - Expressions - Domain Relational Calculus.

Queries and Subqueries: SQL Data Types - Types of SQL Commands - SQL Operator - Subqueries.

Aggregate Functions: Introduction - General rules - COUNT() and COUNT(*) - SUM() - AVG() - MAX() and MIN().

Insert, Update and dDelete operations: Introduction - INSERT statement - Bulk inserts of data - UPDATE statement - DELETE statement.

UNIT IV (11hrs)

PL/SQL Concepts : 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.

UNIT V (11hrs)

Triggers: Introduction - What is Trigger? - Types of Triggers - Trigger Syntax - Combining Trigger Types - Setting Inserted Trigger Values - Disabling and Enabling Triggers - Replacing Triggers - Dropping Triggers - Advantages and Limitations of Triggers.

Transaction Management: Introduction – Transaction Properties – Database Structure – Transaction States - Concurrency Control - Serializabillity - Recoverability - Concurrency Control Schemes - Transaction Management in SQL - Transaction and Recovery - User - Defined Transactions - Commit - Rollback - Savepoint

Recovery System: Introduction - Database Backups - Hardware Protection and Redundancy - Transactions Logs - Importance of Backups - Database Recovery

TEXT BOOK

1. **"Database Management System"** by **Alexis Leon & Mathews Leon**, Leon Vikas Publishing Chennai,2002

   Unit I : Chapters 5, 3, 7
   Unit II : Chapters 8, 9, 11
   Unit III : Chapters 12, 17, 18, 19
   Unit V : Chapters 25, 29, 30

2) **"Database Management System"** by **Rakesh Saini, M.M.S.Rauthan, Abhay Saxena, Bindu Sharma,** First Edition, Vayu Education of India publishing, 2010.

   Unit IV : Chapters 6

REFERENCE BOOKS

1. **"Database Management Systems"** by **Raghu Ramakrishnan & Johannes Gehrke**, 2 nd Edition, McGraw Hill International Edition, 2000
2. **"Database System Concepts"** by **Silberschatz, Korth, Sudarshan**, 4th edition, McGraw Hill International Edition.

ELECTIVE I – DATA COMMUNICATIONS AND NETWORKS

Contact Hours per Semester: 65hrs **Credits: 5**
Subject Code: U3NTE51

Course Outcome

Upon completion of the course, students will be able to

CO1	Gain the Knowledge about the Data communication, Analog and Digital Signals
CO2	Acquire Practical ability of doing the encryption and decryption
CO3	Understand the process flow of the data exchange

CO4	Determine the Internetworking Devices
CO5	Manipulate the IP address and logical address

NIT I (13 hrs)

Introduction to Data Communications and Networking: Introduction – Fundamental Concepts – Data Communications – Protocols – Standards – Standards Organizations – Signal Propagation – Analog and Digital signals – Bandwidth of a Signal and Medium.

Information Encoding: Introduction – Representing Different Symbols – Minimizing Errors – Multimedia – Multimedia and Data Compression.

Analog and Digital Transmission Methods: Introduction – Analog Signal, Analog Transmission – Digital Signal, Digital Transmission – Digital Signal, Analog Transmission – Baud Rate and Bits Per Second – Analog Signal, Digital Transmission – Nyquist Theorem.

UNIT II (13 hrs)

Modes of Data Transmission and Multiplexing: Introduction – Parallel and Serial Communication – Asynchronous, Synchronous and Isochronous Communication – Simplex, Half - duplex and Full - duplex Communication – Multiplexing – Types of multiplexing – FDM versus TDM.

Transmission Errors: Detection and Correction: Introduction – Error Classification– Types of Errors – Error Detection.

Data Compression and Encryption: Introduction – Simple Coding Scheme – Scheme Based on the Context of the Symbols – Statistical Compression –Multimedia Storage Formats – Data Encryption – Risks Involved – Basic Concepts – Digital Signature.

UNIT III (13 hrs)

Transmission Media: Introduction – Guided media – Unguided media – Shanon Capacity.

Network Topologies, Switching and Routing Algorithms: Introduction – Mesh Topology – Star Topology – Tree Topology – Ring Topology – Bus Topology – Hybrid Topology – Switching Basics – Circuit switching – Packet switching – Message switching – Router and Routing – Factors affecting routing algorithms – Routing Algorithms – Approaches to Routing.

Networking protocols and OSI model: Introduction – Protocols in Computer Communications – The OSI model – OSI layer functions.

UNIT IV (13 hrs)

LAN, MAN and WAN: Introduction – Local Area Networks – Ethernet – Token Ring – Fiber Distributed Data Interface – Metropolitan Area Network – Distributed Queue Dual Bus – Switched Multimegabit Data Services – Wide Area Network – WAN Architecture – WAN Transmission media – WAN Addressing – Packet Forwarding – Next - hop Tables and Routing - Aloha.

Internetworking concepts, Devices, Internet Basics, History and Architecture: Introduction – Why Internetworking? – The Problems in Internetworking – Dealing with Incompatibility Issues – A Virtual Network – Internetworking Devices – Repeaters – Bridges – Routers – Gateways – A brief History of Internet – Internet Topology – Internal Architecture of an ISP.

UNIT V (13 hrs)

TCP/IP – Part I: An Introduction to TCP/IP, IP, ARP, RARP, ICMP: Introduction – TCP/IP Basic – Why IP Address? – Logical Address – TCP/IP Example – The

Concept of IP Address – Address Resolution Protocol (ARP) - Reverse Address Resolution Protocol (RARP) – Internet Control Message Protocol (ICMP)

TCP, UDP - Part II(TCP, UDP): Introduction – TCP basics – Features of TCP – Relationship between TCP and IP – Ports and Sockets – Connections: Passive Open and Active open – TCP Connections – What Makes TCP Reliable? – TCP Packet Format – Persistent TCP Connections – User Datagram Protocol (UDP) – Differences between UDP and TCP.

TEXT BOOK

"Data Communications and Networks" by **Achyut S Godbole**, Tata McGraw Hill, first edition, 2005.

Unit I **:** Chapters 1.0 - 1.8, 2, 3
Unit II **:** Chapters 4, 5, 6
Unit III **:** Chapters 7, 8, 9
Unit IV **:** Chapters 10, 15
Unit V **:** Chapters 17, 18

REFERENCE BOOKS:

1. **"Computer Networks"** by **Andrew S. Tanenbaum and David J.Wetherall**, 5th edition, Pearson Education Inc.,2011
2. **"Data Communication and Networking"** by **Behrouz A. Forouzan,** 4th edition, Tata McGraw Hill, 2009

ELECTIVE 2 – WEB PROGRAMMING

Contact Hours per Semester: 65hrs **Credits: 5**
Subject Code: U3NTE52

Course Outcome

Upon completion of the course, students will be able to

CO1	Design and implement dynamic websites with good aesthetic sense of designing and latest technical know - how's.
CO2	Analyze a web page and identify its elements and attributes.
CO3	Understand, analyze and apply the role of languages like HTML, CSS, JavaScript, PHP and protocols in the workings of the web and web applications.
CO4	Have a Good grounding of Web Application Terminologies, Internet Tools.
CO5	Learn different ways of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data.

UNIT I (13 hrs)

Understanding the JavaScript Basics: Viewing the World of JavaScript - Examining the Ways to Add JavaScript to a Page.

Building a JavaScript Program: Getting Started with JavaScript Programming - Testing Things with Conditionals - Performing Actions Multiple Times with Loops - Using Functions to Avoid Repeating Yourself - Objects in Brief - Working with HTML Documents - Working with Web Browsers.

UNIT II (13 hrs)

Understanding PHP Basics: How PHP Works - Examining the Structure of a PHP Script - Looking at PHP Syntax - Writing PHP Code - Displaying Content in a Web Page - Using PHP Variables - Using PHP Constants - Understanding Data Types - Using Arrays - Using Dates and Times - Understanding PHP Error Messages - Adding Comments to Your PHP Script.

Building PHP Scripts: Setting Up Conditions - Using Conditional Statements - Repeating Actions with Loops - Using Functions - Organizing Scripts.

UNIT III (13 hrs)

OOP: Introducing OOP - Developing an Object Oriented Script - Defining a Class - Using a Class in a Script - Using Abstract Methods in Abstract Classes and Interfaces - Preventing Changes to a Class or Method - Handling Errors and Exceptions - Copying Objects - Comparing Objects - Destroying Objects.

Tracking Visitors with Sessions: Understanding Sessions and Cookies - Using Sessions with Pass Data - Understanding Other Session Objects.

UNIT IV (13 hrs)

Introducing MySQL: Understaning DB Structure - Communicating with MySQL - Protecting with MySQL Databases.

Designing and building a DB: Designing a Database - designing a Sample Database - Writing Down Your Design - Building a - Changing the Database Structure.

Using the DB: Adding Information to a Database - Looking at the Data in a Database - Retrieving Information from a Database - Updating Information in a Database - Removing Information from a Database.

UNIT V (13 hrs)

Communicating with the Database from PHP Scripts : Knowing How MySQL and PHP Work Together - PHP Functions That Communicate with MySQL - Communicating with MySQL - Selecting a Database - Handling MySQL Errors - Using Other Helpful mysqli Functions - Converting mysqli Functions to mysql Functions.

Validating web forms with JavaScript and PHP: Understanding How to Validate Web Forms - Performing Basic JavaScript Validation - Performing PHP Validation.

TEXT BOOK

1. **"PHP, MySQL, Javascript & HTML5 ALL - IN - ONE FOR DUMMIES" by Steve Suehring and Janet Valade ,** A Wiley Brand, 2013
   - **Unit I** : Chapters 1, 2
   - **Unit II** : Chapters 1, 2
   - **Unit III** : Chapters 4, 6
   - **Unit IV** : Chapters 1, 3, 4
   - **Unit V** : Chapters 5, 3

REFERENCE BOOKS

1. **"Learning PHP, MySQL & JavaScript 5e"** by **Robin Nixon**, O'Reilly Media, Inc ., 2018
2. **"The complete reference PHP"** by **Steven Holzner,** Tata McGraw - Hill Edition, 2007

CORE 14 – LAB: ANDROID PROGRAMMING

Contact Hours per Semester: 65hrs **Credits: 3**

Subject Code: U3NTC5P1

Course Outcome

Upon completion of the course, students will be able to

CO1	Implement Android platform, Architecture and features
CO2	Design User Interface and develop activity for Android App
CO3	Use Intent , Broadcast receivers and Internet services in Android App

CO4	Design and implement Database Application and Content providers

1. Develop an Android application that displays a flower, its species and family name using Text View and Image View.
2. Develop an Android application that displays buttons in rainbow color.
3. Develop an Android application which tells the availability of doctor using Toggle Button.
4. Develop an Android application that displays two emojis using Image Button.
5. Develop an Android application that allows the user to select their favorite countries using Check Box.
6. Develop an Android application which gives a warning message using Alert Dialog.
7. Develop an Android application that displays student performance based on their marks using Toast.
8. Develop an Android application that allows the user to select their smart phone android version using Spinner.
9. Develop an Android application that allows the user to choose their payment method using Radio Button.
10. Develop an Android application to display email composing model using Linear Layout.
11. Develop an Android application to display weather report of 4 cities using Table Layout.
12. Develop an Android application to display parking details record using Relative Layout.
13. Develop an Android application to display a conference home page using Grid Layout.
14. Develop an Android application to display plant taxonomy by combining both Linear Layout and Relative Layout.
15. Develop an Android application to check the given number is Armstrong or not using onClick event.
16. Develop an Android application for string manipulation using onClick event.
17. Develop an Android application to display taxonomy of an animal using onTouch event.
18. Develop an Android application to welcome the user with success page using Intent.
19. Develop an Android application to display different country details using Fragment.
20. Develop an Android application to display food recipes with image and text using List view.
21. Develop an Android application to create gallery of images using Swipe View.
22. Develop an Android application to perform bouncing ball animation.
23. Develop an Android application to calculate electricity bill for customers using SQLite.

CORE 15 – LAB: WEB PROGRAMMING

Contact Hours per Semester: 65hrs **Credits: 3**

Subject Code: U3NTC5P2

Course Outcome

Upon completion of the course, students will be able to

CO1	Build dynamic web pages using JavaScript (Client side programming).
CO2	Use scripting languages and web services to transfer data and add interactive components to web pages.
CO3	Select and apply Markup Lnguages for processing, identifying, and

	presenting information in web pages
CO4	Implement static, dynamic and interactive web pages and web applications.

JAVA SCRIPT

1. Write a JavaScript program to display the current day and time.
2. Write a JavaScript program to find the area of a triangle.
3. Write a JavaScript program to determine whether a given year is a leap year or not.
4. Write a JavaScript program to calculate days left until next Christmas.
5. Write a JavaScript program to calculate multiplication and division of two numbers.
6. Write a JavaScript program to convert temperatures to and from Celsius, Fahrenheit.
7. Write a JavaScript program to find the largest of five numbers using conditional statement and alert box to show the result.
8. Write a JavaScript program to reverse a number using function.

PHP & MYSQL

9. Write a PHP program to design a client page to get two numbers and perform basic arithmetic operations in server.
10. Write a PHP program to design a client page to get five marks of a student and display Total, Average, Grade in server page
11. Write a PHP program to get 'n' value in the client page and display its factorial value in the server page
12. Write a PHP program to get 'n' value in the client page and display Fibonacci series in the server page
13. Write a PHP program to get 'n' value in the client page and display multiplication table of n in the server page.
14. Write a PHP program to get two text value in client page, perform string manipulation and display the result in server page
15. Write a PHP program to find Sum of digits
16. Write a PHP program to find the Biggest number using Function
17. Write a PHP program to display Book details using Foreach Loop
18. Write a PHP program to display Registration Form
19. Write a PHP program to Copy from one file to another file
20. Write a PHP program to Multiples of 7 using REQUIRE
21. SELECT commands in MY - SQL
22. DML/TCL commands in MY - SQL
23. Retrieve and process Employee Pay - bill calculation using PHP & MY - SQL
24. Retrieve and process EB - Bill calculation using PHP & MY - SQL

SBE 2 – ANDROID PROGRAMMING

Contact Hours per Semester: 26hrs **Credits: 2**

Subject Code: U3NTS51

Course Outcome

Upon completion of the course, students will be able to

CO1	Expose on Android OS architecture
CO2	Familiarize with Android's APIs for data storage, retrieval, user preferences, files and content providers
CO3	Identify, analyze and choose tools for Android development including device emulator, profiling tools and IDE
CO4	Construct user interfaces
CO5	Design and implement Database Application and Content providers

UNIT I **(5 hrs)**

The First App: How Java and Android work together - The development environment - What makes an Android app - Our first Android app - Deploying and Testing the app

Exploring Android Studio: The Android Studio guided tour - Parts of the UI - Transforming the editor into a design studio - The project folder and file structure

Designing Layouts: Exploring Android UI design - Structure of a UI design - Configuring and using widgets - Widget properties - Containing widgets in layouts

Real - World Layouts: Building a real - world UI

UNIT II **(5 hrs)**

The Life and Times of an Android App: Introduction to the Android lifecycle - A simplified explanation of the Android lifecycle - Lifecycle phases – what we need to know - Lifecycle phases – what we need to do - The lifecycle demonstration app - The structure of Java code revisited.

Widget Mania: Exploring Android UI objects - Exploring the palette - Android permissions and Marshmallows - The Widget exploration mini app

UNIT III **(5 hrs)**

Having a Dialogue with the User: Dialog windows - Implementing the dialog designs - Coding the dialog boxes

Handling and Displaying Arrays of Data: Array Lists - The enhanced for loop - Arrays and Array Lists are polymorphic - List View and Base Adapter

UNIT IV **(5 hrs)**

Android Intent and Persistence: Good Intents - Adding a settings page to the Note To Self app - Persisting data with Shared Preferences - Making the Note To Self app's settings persist

UI Animations: Animations in Android - The Animations Demo app – introducing Seek Bar

UNIT V **(6 hrs)**

Using Multiple Fragments: Using singletons for the model layer - Inter - Fragment communications – interfaces revisited

Paging and Swiping: Building an image gallery/slider app - Building a Fragment pager/slider app

Using SQLite Databases in Our Apps: Database101 - The SQL syntax primer - The Android SQLite API - The database mini app

TEXT BOOK

"Android Programming for Beginners" by **John Horton**, Packt Publishing Ltd,1st Edition, 2015

Unit I	**:**	Chapter 1, 3, 4, 5
Unit II	**:**	Chapter 6, 11
Unit III	**:**	Chapter 12, 13
Unit IV	**:**	Chapter 15, 16
Unit V	**:**	Chapter 19, 20, 23

REFERENCE BOOKS

1. **"Practical Approach for Android Programming"** by **Muthuvijayaraja, Vijayavel**, VHNSNC Publishers, 1st Edition, 2018

2. **"The Busy coders Guide to Android Development"** by **Mark.L.Murphy,** Commonsware LLC, 2nd Edition, 2009

SBE 3 - EMPLOYABILITY SKILLS

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

Contact Hours per semester: 26 hrs

Objectives:

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

UNIT I **(5 hrs)**

Quantitative Aptitude – Averages, Percentage, Profit & Loss, Ratio & Proportion, Time & Work, Time & Distance, Clock.

UNIT II **(6 hrs)**

Quantitative Aptitude –Problems on Ages, Boat & Stream, Simple Interest, Compound Interest, Area, Partnerships.

UNIT III **(5 hrs)**

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

UNIT IV **(5 hrs)**

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

UNIT V **(5 hrs)**

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 – INTRODUCTION TO INFORMATION TECHNOLOGY

Contact Hours per Semester: 26hrs **Credits: 2**

Subject Code: U3NTN51

Course Outcome

Upon completion of the course, students will be able to

CO1	Know about the characteristics and uses of computers
CO2	Gain knowledge about the classification of computers
CO3	Acquire knowledge about CPU RAM and ROM
CO4	Interpret the mechanisms of various secondary storage devices
CO5	Understand the basics of Networks, Internet and Web browser

UNIT I **(5 hrs)**

Introduction to Computers: Importance of Computers – Characteristics of Computers – Uses of Computers – Overview of the computer system – Parts of a computer – Importance of Hardware.

UNIT II **(5 hrs)**

Classification of Computers: Portable computers – Personal computers (PCs) – Workstations – Minicomputers – Mainframes – Super computer – Comparison of computers.

UNIT III **(6 hrs)**

Central Processing Unit (CPU): Central Processing Unit – Memory – Registers.

Computer Memory: Evaluation of memory requirements – Random Access Memory (RAM) – Read Only Memory (ROM).

UNIT IV **(5 hrs)**

Secondary Storage Devices: Classification of secondary storage devices – Advantages of secondary storage – Magnetic disks – Optical disk – Magnetic tape.

UNIT V **(5 hrs)**

Telecommunication and Networks: Types of Network – Network Topologies – Network protocols – Network architecture – Network standardization.

Internet and WWW: What can I do on the Internet? – Internet addressing – Web browsers.

TEXT BOOK

"Introduction to Information Systems" by **Alexis Leon, Mathews Leon,** McGraw Hill Education (India) Pvt. Ltd., Second Reprint 2009.

Unit I **:** Chapters 2
Unit II **:** Chapter 3
Unit III **:** Chapter 4 (Pg.No 39 - 42),
Chapter 5
Unit IV **:** Chapters 6 (Pg.No 57 - 65)
Unit V **:** Chapter 12(Pg.No 156 - 163),
Chapter 13(Pg.No 168 - 170,177 - 179,182 - 184)

REFERENCE BOOKS

1. **"Fundamentals of Information Technology"** by **Alexis Leon, Mathews Leon,** Leon Vikas Pvt. Ltd, Chennai.,Second Edition 2009.
2. **"Computers Today"** by **Suresh K.Basandra**, Galgotia Publications Pvt Ltd., ISBN:81 - 86340 - 74 - 2, Reprint 2010
3. **"Information Technology"** by **Dennis P.Curtin,Kim Foley,Kunal Sen,Cathleen Morin**, Tata McGraw Hill, ISBN13:978 - 0 - 07 - 463558 - 2, 26th Reprint 2010.
4. **"Introduction To Information Technology" by V.Rajaraman,** PHI Learning Pvt. Ltd., Third Edition, 2018

SEMESTER VI

CORE 16 – SOFTWARE ENGINEERING

Contact Hours per Semester: 52hrs **Credits: 4**
Subject Code: U3NTC61 / U2NTE52

Course Outcome

Upon completion of the course, students will be able to

CO1	Learn basic software engineering definitions, size factors, quality and productivity factors.
CO2	Acquire knowledge in software cost factors and software cost estimation techniques.
CO3	Produce efficient, reliable, robust and cost - effective software solutions.

CO4	Design a system, component, or process to meet desired needs within realistic constraints
CO5	Apply testing principles on software project and understand the maintenance concepts.

UNIT I **(10 hrs)**

Introduction to Software Engineering: Introduction – Some Definitions - Size Factors - Total Effort Devoted to Software - Distribution of Effort - Project Size Categories - How Programmers Spend their Time - Quality and Productivity Factors - Managerial Issues.

Planning a Software Project: Introduction – Defining the Problem : Goals and Requirements - Developing a Solution Strategy - Planning the Development Process : The Phased Life - Cycle Model - Milestones, Documents, and Reviews - The Cost Model - The Prototype Life - Cycle Model - Successive Versions - Planning an Organizational Structure : Project Structure - Programming Team Structure - Management By Objectives - Other Planning Activities : Planning for Configuration Management and Quality Assurance - Planning for Independent Verification and Validation - Planning Phase - Dependent Tools and Techniques - Other Planning Activities.

UNIT II **(10 hrs)**

Software Cost Estimation: Introduction - Software Cost Factors: Programmer Ability - Product Complexity - Product Size - Available Time - Required Level of Reliability - Level of Technology - Software Cost Estimations Techniques: Expert Judgment - Delphi Cost Estimation - Work Breakdown Structures - Algorithmic Cost Models - Staffing Level Estimation - Estimating software Maintenance costs.

UNIT III **(10 hrs)**

Software Requirements Definition: Introduction - Software Requirements Specification – Formal Specification Techniques: Relational Notations - State - Oriented Notations – Summary - Languages and Processors for Requirements Specification: PSL/PSA - RSL/REVS - Structured Analysis and Design Technique (SADT) - Structured System Analysis (SSA) - GIST.

UNIT IV **(11 hrs)**

Software Design: Introduction - Fundamental Design Concepts : Abstraction - Information Hiding – Structure – Modularity – Concurrency – Verification – Aesthetics - Modules and Modularization Criteria : Coupling and Cohesion - Other Modularization Criteria - Design Notations : Data Flow Diagrams - Structure Charts - HIPO Diagrams - Procedure Templates – Pseudocode - Structured Flowcharts - Structured English - Decision Tables - Design Techniques : Stepwise Refinement - Levels of Abstraction - Structured Design - Integrated Top - Down Development - Jackson Structured Programming - Summary of Design Techniques - Detailed Design Considerations – Real Time and Distributed System Design - Test plans.

UNIT V **(11 hrs)**

Verification and Validation Techniques: Quality Assurance - Walkthroughs and Inspections: Walkthroughs – Inspections - Static Analysis - Symbolic Execution - Unit Testing and Debugging: Unit Testing – Debugging - System Testing: Integration Testing - Acceptance Testing.

Software Maintenance: Enhancing Maintainability during development – Managerial Aspects of Software Maintenance– Configuration Management – Source - Code Metrics – Other maintenance Tools and Techniques.

TEXT BOOK

"Software Engineering Concepts" by **Richard Fairley**, TMH, 1997, Reprint 2012

Unit I **:** Chapters 1.1 - 1.4, 2
Unit II **:** Chapter 3
Unit III **:** Chapter 4
Unit IV **:** Chapter 5.1 – 5.7
Unit V **:** Chapters 8.1 – 8.6, 9

REFERENCE BOOKS

1**."Fundamentals of software engineering"** by **Rajib Mall**, Prentice Hall of India Pvt. Ltd., 2003, 4th edition
2. "**Software Engineering",** by **Ian Sommerville**, Pearson Education, 2004, 7th edition
3. **"Software Engineering - A Practitioner's Approach**", by **Roger S. Pressman**, McGraw Hill Education, 2014, 7th Edition.
4. **"Software Engineering: A Primer"**, by **Waman S. Jawadekar,** Tata McGraw - Hill Education Pvt. Ltd., 2008, first edition

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CORE 17 – DOTNET PROGRAMMING

Contact Hours per Semester: 65 hrs **Credits: 4**
Subject Code: U3NTC62

Course Outcome

Upon completion of the course, students will be able to

CO1	Learn the basics of .Net Framework and VB.NET Language
CO2	Acquire knowledge in control flow statements, loop statements and arrays in VB.NET
CO3	Interpret the basic building block of object oriented programming in VB.NET
CO4	Use ASP.NET controls in web applications.
CO5	Create database driven ASP.NET web applications and web services
CO6	Use the features of Dot Net Framework along with the features of ASP.NET and VB.NET

UNIT I **(13 hrs)**

The .Net Framework: Introduction – Components of the .Net Architecture – Principal Design Features – Web Services.

Introduction to Programming with VisualBasic .Net: Basic Concepts and Simple Application – Using Variables, Constants and Functions – Processing Decisions – Loop Structure and List.

UNIT II **(13 hrs)**

Advanced Programming Constructs: Sub Procedure – Functions – Modules – Arrays – Structure – Collection.

.Net Architecture and Advanced Tools: Object Oriented Programming with VB.Net – Creating Distributed Web Applications – XML and ADO.NET – Graphics, Printing, Reporting.

UNIT III (**13 hrs)**

ASP.NET Language Structure: Page Structure – Defining your Own Procedures – Page – Compiler Directive.

ASP.NET VB Language Quick Reference: Abs – Asc – Conversion Methods – Chr – DateAdd – DateDiff – DateSerial – Day – Do.. Loop – Fix – For.. Each – For..Next – Format Currency – FormatDateTime – FormatNumber – FormatPercent – Hex – hour – If – InStr – InsrtRev – Int – IsDate – IsNumeric – Lcase – Left – Len – Ltrim – Mid – minute – Month – MonthName – Now – Oct – Replace – Right – Rtrim – Second – Select..Case – Space – Sqrt – StrComp – TimeOfDay – TimeSerial – Today – Trim – Ucase – Weekday – WeekdayName – Year.

UNIT IV (**13 hrs)**

Basic Web Server Controls: Label Control – TextBox Control – Button Control – LinkButton Control – ImageButton Control – CheckBox Control – RadioButton Control – HyperLink Control – Image Control.

Other Web Server Controls: Calendar Control – AdRotator Control – Validation Controls.

UNIT V (**13 hrs)**

Request and Response Objects: Request Object: QueryString Collection – Form Collection – Browser Object – Server Variables Collection – AcceptTypes Collection – Headers Object – Visitor and Referrer Information – SaveAs Method – Response Object – Cookies.

System.Data and System.Data.OLEDB Namespaces: OLEDBConnection Class – OLEDBCommand Class – OLEDBTransaction Class – OLEDBDataAdapter Class – DataSet Class.

TEXT BOOK

1. **"Application of .NET Technology"** by **ISRD Group** - Lucknow, Tata McGrawHill Education Private Limited, NewDelhi, First edition, 2011.

   Unit I **:** Chapter 1, 6
   Unit II **:** Chapter 8, 9

2. **"ASP.NET Developer's Guide"** by **Greg Buczek,** Tata McGrawHill Education Private Limited, New Delhi, First Edition, 2010

   Unit III **:** Chapter 1(**Pg.No:** 3 to 20), Appendix A
   Unit IV **:** Chapter 3, 5
   Unit V **:** Chapter 8, 10 (**Pg.No:** 313 to 323)

REFERENCE BOOKS

1. **"Visual basic .Net"** by **Jesse Liberty**, O'Reilly & Associates Publication, 2003, First Edition
2. **"The Visual Basic .Net Programming language"** by **Paul Vick**, Microsoft Corporation, 2004, First Edition.
3. **"Visual Basic .Net"** by **C.Muthu**, Vijay Nicole Imprints Private Limited Publication, 2007, First Edition

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CORE 18 – DATA SCIENCE

Contact Hours per Semester: 65 hrs **Credits: 4**

Subject Code: U3NTC63

Course Outcome

Upon completion of the course, students will be able to

CO1	Understand the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics.
CO2	Acquire knowledge of statistical data analysis techniques utilized in business decision making.
CO3	Interpret principles of Data Science to the analysis of business problems.
CO4	Learn algorithms to build machine intelligence.
CO5	Develop skill in data management

UNIT I (12 hrs)

How to Sound like a Data Scientist: What is data science? - Basic terminology - Why data science? - The data science Venn diagram - The math - Computer programming - Why Python? - Python practices - Example of basic Python

Types of Data: Flavors of data - Why look at these distinctions? - Structured versus unstructured data - Example of data preprocessing - Word/phrase counts - Presence of certain special characters - Relative length of text - Picking out topics - Quantitative versus qualitative data - Example – coffee shop data

UNIT II (12 hrs)

Types of Data: The four levels of data - The nominal level - Mathematical operations allowed - Measures of center - What data is like at the nominal level - The ordinal level - Examples - Mathematical operations allowed - Measures of center - Quick recap and check - The interval level - Example - Mathematical operations allowed - Measures of center - Measures of variation - Standard deviation - The ratio level - Examples - Measures of center - Problems with the ratio level

The Five Steps of Data Science: Introduction to data science - Overview of the five steps - Ask an interesting question - Obtain the data - Explore the data - Model the data - Communicate and visualize the results - Explore the data - Basic questions for data exploration - Dataset 2 – titanic

UNIT III (13 hrs)

Basic Mathematics: Mathematics as a discipline - Basic symbols and terminology - Vectors and matrices - Arithmetic symbols - Summation - Proportional - Dot product - Graphs - Logarithms/exponents - Set theory - Linear algebra - Matrix multiplication - How to multiply matrices

Impossible or Improbable – A Gentle Introduction to Probability: Basic definitions - Probability - Bayesian versus Frequentist - Frequentist approach - The law of large numbers - Compound events - Conditional probability - The rules of probability - The addition rule - Mutual exclusivity - The multiplication rule - Independence - Complementary events

UNIT IV (14 hrs)

Basic Statistics: What are statistics? - How do we obtain and sample data? - Obtaining data - Observational - Experimental - Sampling data - Probability sampling - Random sampling - Unequal probability sampling - How do we measure statistics? - Measures of center - Measures of variation - Definition - Example – employee salaries

- Measures of relative standing - The insightful part – correlations in data - The Empirical rule

Communicating Data: Why does communication matter? - Identifying effective and ineffective visualizations - Scatter plots - Line graphs - Bar charts - Histograms - Box plots - When graphs and statistics lie - Correlation versus causation - Simpson's paradox - Verbal communication - It's about telling a story

UNIT V **(14 hrs)**

How to Tell If Your Toaster Is Learning: Machine Learning - Essentials - What is machine learning? - Machine learning isn't perfect - How does machine learning work? - Types of machine learning - Supervised learning - It's not only about predictions - Types of supervised learning - Regression - Classification - Data is in the eyes of the beholder - Unsupervised learning - Reinforcement learning - Overview of the types of machine learning - Linear regression - Adding more predictors - Regression metrics - Logistic regression

Predictions Don't Grow on Trees – or Do They?: Naive Bayes classification - Decision trees - How does a computer build a regression tree? - How does a computer fit a classification tree? - Unsupervised learning - When to use unsupervised learning - K - means clustering - Illustrative example – data points

TEXT BOOK

"Principles of Data Science" by **Sinan Ozdemir**, Packt Publishing Ltd., 1st Edition, 2016

Unit I	**:** Chapter 1, 2
Unit II	**:** Chapter 2, 3
Unit III	**:** Chapter 4, 5
Unit IV	**:** Chapter 7, 9
Unit V	**:** Chapter 10, 11

REFERENCE BOOKS

1. **"Data Science for Dummies"** by **Lillian Pierson**, Wiley Publications, 2nd Edition 2017
2. **"Data Analytics with Hadoop - An Introduction for Data Scientists"** by **Benjamin Bengfort & Jenny Kim**, O'Reilly Media, 1st Edition, 2016

ELECTIVE 3 – PROJECT & VIVA VOCE

Contact Hours per Week: 5 hrs **Subject Code: U1NT6PR**

Contact Hours per semester: 65 hrs

Objective: Enable the students to enrich the knowledge on developing software skills on various applications, to make them to prepare for industrial needs.

COURSE OUTCOMES :

In this course the students will

CO1: Analyze end user requirements, identifying and implementing solutions to user requests.
CO2: Apply algorithmic techniques in the project.
CO3: Analyze technical requirements to determine resource requirements.
CO4: Design, plan, budget and propose an IT project.
CO5: Install technical hardware and software support to the project.
CO6: Analyze and select application and operating system settings to create an optimal user

environment.

CO7: Identify and resolve technical problems using trouble-shooting methods.

Output

Students have to compile, run their project and explain its Future Enhancements. Students have to submit their project report on First week of April.

SBE 4 – LAB: DOTNET PROGRAMMING

Contact Hours per Semester: 65 hrs **Credits: 3**

Subject Code: U3NTS6P1

Course Outcome

Upon completion of the course, students will be able to

CO1	Recognize and explain the benefits of procedural, event driven, and object oriented languages
CO2	Design and Create windows programs in VisualBasic.NET programming language
CO3	Work with Visual Basic Forms, Toolbox Controls and Properties
CO4	Create user interactive web pages using ASP.Net.
CO5	Use ADO.NET in a web application to read, insert, and update data in a database.
CO6	Perform form validation with validation controls.

VB.NET

1. Unit Number checking using console application
2. Program to display the first 10 natural numbers and their sum using console application.
3. Perform String Operation using console application.
4. Program to display the addition, subtraction, multiplication and division of two numbers using Windows application.
5. Matrix Manipulation.
6. Program using Collection Class.
7. Develop a form in VB.NET to pick a date from Calendar control and display the day, month, and year details in separate text boxes.
8. Area Calculation using Inheritance in Windows application
9. Volume Calculation using Interface in Windows application

ASP.NET

10. Develop an application working with Page using ASP.Net.
11. Factorial using Function.
12. Prime Number checking using Subroutine
13. Moving the Items from One List Box to Another List Box using Array Manipulation.
14. Automatic Table Creation
15. Program to display the Today's date and selected date in neat format using Calendar Control
16. Advertisement Creation using Ad - Rotator Control.
17. PG Application Form Validation
18. Single Master Page Creation for Mobile Store.

ADO.NET

19. Develop a VB.Net application using Datagrid to display records.

20. Develop a web page using ADO.NET to perform insert, modify, update and delete operations over student database.

SBE 5 – OPEN SOURCE PROGRAMMING

Contact Hours per Semester: 26 hrs **Credits: 2**

Subject Code: U3NTS61

Course Outcome

Upon completion of the course, students will be able to

CO1	Identify the use of server - side JavaScript
CO2	Understand how Node.js is architected to allow high scalability with asynchronous code
CO3	Create basic web applications with Node.js
CO4	Organize the server by creating modules
CO5	Acquire knowledge in NoSQL database MongoDB to store data.

UNIT I **(6 hrs)**

Setting Up for Node.js Development: Installing Node.js - Using the REPL - Executing Node.js Scripts - Setting Up an Integrated Development Environment

Understanding Node.js: Variables - Functions - Closures - Understanding Node.js Performance - More Node.js Internals - More JavaScript

UNIT II **(6 hrs)**

Core Node.js: Node.js File - Based Module System - Important Globals - Core Modules - Reusing Node.js Code in the Browser

Node.js Packages: Revisiting Node Modules - JSON - NPM - Semantic Versioning - Global Node.js Packages - Package.json and require - Modules Recap - Popular Node.js Packages

UNIT III **(6 hrs)**

Events and Streams: Classical Inheritance in JavaScript - Node.js Events - Streams

UNIT IV **(6 hrs)**

Persisting Data: Introduction to NoSQL - Installing MongoDB - Important MongoDB Concepts - MongoDB Using Node.js - Mongoose ODM - Using a MongoDB as a Distributed Session Store - Managing MongoDB

UNIT V **(6 hrs)**

Front - End Basics: What Is a SPA? - Why AngularJS? - Introduction to Twitter Bootstrap - Set Up a Simple AngularJS Application - Creating a Simple To - Do List Application

TEXTBOOK

"Beginning Node.js" by **Basarat Ali Syed,** Apress Publication, 2014, First Edition

Unit I **:** Chapter 1and 2
Unit II **:** Chapter 3and 4
Unit III **:** Chapter 5
Unit IV **:** Chapter 8
Unit V **:** Chapter 9

REFERENCE BOOKS

1. **"Node Up and Running"** by **Tom Hughes**, O'Reilly Publication, 2012, First Edition
2. **"Node.js Web Development: Create real - time server - side applications with this practical, step - by - step guide"** by Packt Publishing; 3rd Revised edition edition (June 27, 2016), Packt Publishing; 3rd Revised edition edition, 2016
3. **"Node.js Design Patterns: Master a series of patterns and techniques to create modular, scalable, and efficient applications"** by **Mario Casciaro**, Packt Publishing, First edition, 2014

SBE 6 – LAB: OPEN SOURCE PROGRAMMING

Contact Hours per Semester: 26 hrs **Credits: 2**
Subject Code: U3NTS6P2

Course Outcome

Upon completion of the course, students will be able to

CO1	Understand the basics of the open source framework
CO2	Use MySQL to store data in a database
CO3	Create Interface to a MongoDB database and a web service
CO4	Build advanced, scalable and high performance web applications

1. Hello World using Node.js
2. Modules in Node.js
3. Require function in Node.js
4. HTTP module in Node.js
5. File system in Node.js
6. Events in Node.js
7. File upload in Node.js
8. Retrieve contents from MySQL in Node.js
9. Create and Sort MongoDB using Node.js
10. Perform Insert, Delete and Update in MongoDB using Node.js
11. Query MongoDB database using Node.js

NME 2 – INTRODUCTION TO INTERNET

Contact Hours per Semester: 26hrs **Credits: 2**
Subject Code: U2NTN61

Course Outcome

Upon completion of the course, students will be able to

CO1	Get familiar with basics of Internet
CO2	Acquire knowledge about Internet and different ways to access it.
CO3	Surfing the Internet effectively
CO4	Interpret E - mail and explain the benefits and challenges of using E - Mail
CO5	Learn the web page designing and website hosting

UNIT I **(5 hrs)**

Introduction to Internet: Introduction – Some Statistics – What is Internet – How does Internet Work? – What is Special about the Internet? – A Brief History of Internet.**How Internet Works?:** Introduction – People and Organizations – Hardware .

UNIT II **(5 hrs)**

Getting Connected..: Introduction – Dial - up Connection – Dedicated Lines – ISDN – DSL – Cable Modem – Satellite Internet – Cellular broadband – Wireless Broadband – Wired and Wireless Broadband Internet Access – Choosing the best Internet Connection.

World Wide Web (WWW): Introduction – Internet and Web – How the Web Works? – A Brief History of WWW.

UNIT III **(6 hrs)**

Searching the Web: Introduction – Information Sources – Organisations – Companies – Newspapers and the Media – Electronic Books – Library Catalogs and Bookshops – Finding Information on the Internet – Searching the Web – Web Index - Web Directory – Search Engines – Meta - search Engines – Making Your search – Improving Your Searching – Tips for Internet Research – Invisible Web.

UNIT IV **(5hrs)**

E - Mail: Introduction – How E - mail works? - Why Use E - mail? – E - mail - Names and Addresses – Mailing Basics**:** Address Book – File Attachments - Signature – Setting Priority – Replying and Forwarding E - mail Messenges – Customerizing your Mail Program. How Private is the E - mail? – E - mail Ethics – Spamming – E - mail – Advantages and Disadvantages – Tips for effective e - mail use – E - mail Safety Tips – Smileys(Emotions) – Free E - mail Providers.

UNIT V **(5 hrs)**

Websites and WebPages: Introduction - Web design - Creating Website - Web Hosting - Website Promotion.

Making Money on the Internet: Introduction – Writing - Product Reviews – Sharing Your Knowledge – Advertising – Affiliate Programs – Selling – On - line Tutoring.

TEXT BOOK

"Internet for Everyone" by **Alexis Leon and Mathews Leon, Leon** Press (a division of Win Leon Publishing Pvt Ltd)**,** 15th Anniversary Edition,

Unit I	**:** Chapter 1, 2
Unit II	**:** Chapter 3, 4
Unit III	**:** Chapter 6
Unit IV	**:** Chapter 10
Unit V	**:** Chapter 11, 18

REFERENCE BOOKS

1. **"The Internet Book: Everything You Need to Know about Computer Networking and How the Internet Works"** by Douglas E. Comer, 4th Edition, Champman and Hall CRC publications.
2. **"Internet Technology and Web Design"** by **Prof. Satish Jain, Shashank Jain, Shashi singh and M.Geetha Iyer,** BPB publications, 2014**.**
3. **"Introduction to the internet"** by **Scott D.James,** Prentice Hall, 3rd edition , 2000

Course Name : **Bachelor of Science**
Discipline : **Information Technology**
(Those who joined in 2018 and after)
COURSE SCHEME:

VALUE ADDED COURSES

Course Name	**Internal Mark = Total Mark**	**Subject Code**
ADVANCED JAVA PROGRAMMING	100 = 100	V1NT1
EMBEDDED C	100 =100	V1NT2
PYTHON WEB DEVELOPMENT WITH DJANGO	100 = 100	V1NT3
WEBRTC	100 = 100	V1NT4

ADVANCED JAVA PROGRAMMING

Contact Hours per Semester: 30hrs **Subject Code:** V1NT1

Course Outcome

Upon completion of the course, students will be able to

CO1	Explore AWT Controls
CO2	Manipulate Window Interfaces Using Swing Objects
CO3	Program with Swing Objects
CO4	Develop sophisticated, interactive user interfaces using the Java Swing class and appropriate layout managers.
CO5	Acquire practical proficiency for work with Java Database Connectivity
CO6	Understand Java framework(Hibernate)

UNIT I **(6 hrs)**

A Java Refresher: What is Java – What is AWT – The java event models – Java Beans – A review of Component, Listeners, and Events – Layout Manager – Minimum software requirement – Delivering a Final product – Just in Time Compiler.

UNIT II **(6 hrs)**

Swing Basics: What is JFC - What is Swing – Why use swing – MVC Architecture – Delegates – Pluggable Look and Feel – Creating UI objects – Jcomponent, the mother of Swing.

UNIT III **(6 hrs)**

Labels and Buttons: Basic user Interface Components – Labels – Abstract Buttons – Push Buttons – Toggle Buttons – Check boxes – Radio Buttons.

UNIT IV **(4 hrs)**

Introduction to JDBC: What is JDBC – Connecting to the Database – Connection Troubles.

UNIT V **(8 hrs)**

Hibernate: An Introduction to Hibernate 3 – Integrating and Configuring Hibernate – Building a Simple Application.

TextBook:

1. "Upto speed with Swing" by Steven Gutz, Manning Publication, Second Edition, 1998.

Unit-I : Chapter-1 (1-28)
Unit-II: Chapter-2 (29-55)
Unit-III: Chapter-5(125-155)

2. **"Database Programming with JDBC and Java"** by George Reese, O'Reilly, Second Edition, 2000.

Unit-IV: Chapter-3 (22-47)

3. **"Beginning Hibernate**" by Dave Minter and Jeff Linwood, Apress Publication, Third Edition, 2014.

Unit-V: Chapters (1, 2, 3) (1-62)

EMBEDDED C

Contact Hours per Semester: 30hrs **Subject Code:** V1NT1

Course Outcome

Upon completion of the course, students will be able to

CO1	Understand the basics of PIC Microcontroller
CO2	Explore the architecture, pin diagram, and deport input-output configuration
CO3	Get comprehensive knowledge on the interrupts and timers
CO4	Understand the significance of input-output device interface
CO5	Ability to use ANSI C to develop embedded software

UNIT I: **(5 hrs)**

The PIC Microcontrollers: History and Features: Microcontrollers and Embedded processors - Overview of PIC18 family.

UNIT II: **(5 hrs)**

PIC architecture & Assembly Language Programming: The WREG register in PIC - PIC file register - Using instructions - PIC status register - PIC data format and directives - Introduction to PIC assembly programming - Assembling and linking PIC program - RISC architecture in PIC.

UNIT III: **(5 hrs)**

Branch instructions and looping - I/O port programming in PIC18.

UNIT IV: **(8 hrs)**

PIC programming in C: Data types and Time delays in C - I/O programming in C - Logic operations in C - Data serialization in C - Program ROM allocation in C - Data RAM allocation in C.

UNIT V: **(7 hrs)**

Timer programming in C - Serial port programming in C.

Text book:

"PIC Microcontroller and Embedded Systems – Using Assembly and C for PIC18", Muhammad Ali Mazidi, Rolin D.McKinlay, Danny Causey, Pearson Education, First Edition, 2008.

Unit I : Chapter 1
Unit II : Chapter 2
Unit III : Chapter 3, 4
Unit IV : Chapter 7
Unit V : Chapter 9, 10

Reference Book:

1. **"Programming Embedded Systems in C and C++",** Michael Barr and Andy Oram, O'Reilly Media, First Edition, 1999.
2. **"The 8051 Microcontroller and Embedded Systems: Using Assembly and C",** Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, Pearson Education, Second Edition, 2006.

VALUE ADDED COURSES

(For PG Students only) **Subject Code: V1NT3**

PYTHON WEB DEVELOPMENT WITH DJANGO

Contact Hours per Semester: 30hrs

Course Outcome

Upon completion of the course, students will be able to

CO1	Map views to URLs
CO2	Create Django templates for easy-to-modify views
CO3	Define data models
CO4	Understand the architecture of a Django-based web site
CO5	Provide HTML form processing
CO6	Use Django as a back end for the websites

UNIT I **(6 hrs)**

Introduction to Django: What Is a Web Framework? - The MVC Design Pattern - Django's History –

The Basics of Dynamic Web Pages: Your First View: Dynamic Content - Mapping URLs to Views - How Django Processes a Request - URLconfs and Loose Coupling - 404 Errors - Your Second View: Dynamic URLs - Django's Pretty Error Pages.

UNIT II **(4 hrs)**

The Django Template System: Template System Basics - Using the Template System - Basic Template Tags and Filters - Philosophies and Limitations - Using Templates in Views - Template Loading - Template Inheritance.

UNIT III **(8 hrs)**

Interacting with a Database: Models: The "Dumb" Way to Do Database Queries in Views - The MTV Development Pattern - Configuring the Database - Your First App - Defining Models in Python - Your First Model - Installing the Model - Basic Data Access - Adding Model String Representations - Inserting and Updating Data - Selecting Objects - Deleting Objects - Making Changes to a Database Schema.

UNIT IV **(6 hrs)**

Form Processing: Search - The "Perfect Form" - Creating a Feedback Form - Processing the Submission - Custom Validation Rules - A Custom Look and Feel - Creating Forms from Models.

Advanced Views and URLconfs: URLconf Tricks - Including Other URLconfs –

Generic Views: Using Generic Views - Generic Views of Objects - Extending Generic Views

UNIT V **(6 hrs)**

Other Contributed Subframeworks: The Django Standard Library – Sites – Flatpages – Redirects - CSRF Protection - Humanizing Data - Markup Filters.

Deploying Django: Shared Nothing - A Note on Personal Preferences - Using Django with Apache and mod_python - Using Django with FastCGI – Scaling - Performance Tuning.

TEXTBOOK

"Django - The Definitive Guide to Django: Web Development Done Right" by Adrian Holovaty, Jacob K. Moss, Apress, First Edition, 2009.

Unit I	**:**	Chapter 1, 3
Unit II	**:**	Chapter 5, 6
Unit III	**:**	Chapter 7 → **Pg.No:** 151 – 167 Chapter 9
Unit IV	**:**	Chapter 10, 11
Unit V	**:**	Chapter 13, 24 → **Pg.No:** 666 – 681

REFERENCE BOOK

1. **"Beginning Python from novice to Professional"** by Margnus Lie Hetland, Dream Tech Press, Second Edition, 2008.
2. **"Learning with Pythons"** by Allen Downey et al, Dream tech Press, First Edition, 2015.
3. **"The Complete Reference Python"** by Matic C.Brown, M.C.Graw Hill Education, First Edition, 2001.

VALUE ADDED COURSE
WEBRTC

Contact Hours per Semester: 30hrs **Subject Code: V1NT4**

Course Outcome

Upon completion of the course, students will be able to

CO1	Develop programs using core concepts of Java
CO2	Design a Page using HTML5 Components
CO3	Decorate Page elements using CSS
CO4	Validate Page Components using JavaScript
CO5	Develop WebRTC Application

UNIT I **(6 Hrs)**

Java: Introduction to Java - Naming Conventions and Data Types - Operators - Control Statements - Arrays - String - Collection Frameworks

UNIT II **(6 Hrs)**

HTML5: Elements of HTML5 - Web Form Controls

UNIT III **(6 Hrs)**

CSS: Formatting Text with HTML and CSS - Using CSS to Style a Site

UNIT IV **(6 Hrs)**

JavaScript: Getting Started with ES6 - Introduction to WebRTC

UNIT V **(6 Hrs)**

WebRTC: Debugging a WebRTC application - Working with Filters - Advanced Functions

TEXT BOOKS

1. **"Core Java"** by **Nagendra Rao**, DreamTech Press, 2011
   Unit I **:** Chapters: 2, 4, 5, 6, 8, 9, And 23

2. **"Teach Yourself HTML5"** by **Steven Holzner**, Sams, 2011
   Unit II **:** Chapters: 1, 4

3. **"Web Publishing with HTML and CSS"** by **Laura Lemay**, Sams, 6th Edition, 2011
   Unit III **:** Chapters: 7, 8

4. **"JavaScript by Example"** by **Dani Akash**, Packt, 2017
   Unit IV **:** Chapers: 1, 4

5. **"WebRTC CookBook"** by **Andrii Sergiienko**, Packt, 2015
   Unit V **:** Chapters: 4, 5, And 8

REFERENCE BOOKS

1. **"Real Time Communication with WebRTC"** by **Salvatore Loreto et al,** O'Reilly Publication, First Edition, 2014
2. **"WebRTC"** by **Alan B.Johnson**, Digital Codec LLC, 3rd Edition, 2014
