BSc Computer Science Syllabus

Semester-I

SEMESTER – I	
Introduction to Programming and Algorithm using C - Practical	
Unit	**Unit Details**
I	**Fundamentals of Programming Techniques:** **Tools and Techniques of Problem Analysis:** Algorithm Development and Flow Chart - Examples in Algorithm Development and Flow Chart **Introduction to Programming Languages:** Introduction to Machine level language, Assembly language, Higher level language, Limitations and Features - Classification of Computer Language - Procedural Language and Non Procedural Language. **Introduction of C Language:** History of C, Basic Structure of C, Executing C program - Character set & C Tokens - Identifiers & Keywords - Data Types - Storage Class - Constants and Variables - Type Casting - Comments
II	**C Language Operators and Decision Making:** **Console based I/O and related built-in I/O function:** Formatted functions :printf(), scanf() - Unformatted functions: getch(), getchar(), putchar(), getche, putch(), gets(), puts() - Concept of Header files and #include, #define **Operators & Expression:** Types of Operators and Expression, Precedence & Associativity - Decision Making Structure-If, If-else, Nested If-else, Switch
III	**Control Structure & Array:** **Loop Control Structure:** While, Do-While, For, Nested loop **Other Statements:** break, continue, goto, exit **Array:** One, Two-Dimensional Arrays - Initialization and working with Array - Introduction to Multidimensional Arrays.
IV	**String & Functions:** **Character Arrays and Strings:** Initialization and working with String - Comparing and String Handling functions. **User Defined Functions:** Introduction of UDF - Elements of UDF - Categories of UDF: *No argument no return value - Arguments but no return value - No argument but returns a value - Arguments with return value* – Recursion - Nesting Function - Variable Scope - Visibility and lifetime in function.

Text Book:

1. Programming in ANSI C. (6^{th} Ed.) – Balaguruswami - Tata McGraw Hill Publication

Reference Books:

1. Programming In C (2^{nd} Ed.) - Ashok N. Kamthane - Pearson Education
2. The C Programming Language - DENNIS M. RITCHIE- AT&T Bell Laboratories Murray Hill, New Jersey
3. Let us C – (15^{th} Ed.) - Yashwant Kanetkar - BPB Publications
4. Programming in C - Reema Thareja - Oxford University Press

PRACTICALS	
Introduction to Programming and Algorithm using C - Practical	
Unit	**Practical List**
I	1. Find the Simple Interest. Inputs are principal amount, period in year andrate of interest. 2. Find the area and perimeter of square and rectangle. Input the side(s) through the keyboard. 3. Accept any three numbers and find their squares and cubes. 4. Write a program to enter the temperature in Fahrenheit and convert it to Celsius.[C = ((F-32)*5)/9] 5. Write a program to store and interchange two numbers in variables a andb. 6. Write a program to accept an integer and display it in octal and hexadecimal formats. 7. Write a program to enter two numbers and find the smallest out of them.Use conditional operator. 8. Write a program to find the average temperature of five sunny days. Assume the temperature in Celsius. 9. Write a program to enter text with gets() and display it using printf() statement also find the length of the text. Write a program to enter a number and carry out modular division operation by2, 3 and 4 and display the remainders.
II	1. Write a program to check given year is a Leap year or not. 2. Write a C program to find minimum from given 3 numbers (Using Conditional Operator). 3. Write a C program to find the maximum from given three numbers (Using Nested IF). 4. Write a C program to find that the accepted no is Negative, Positive or Zero. 5. Write a C program to find the maximum from given three numbers (Without using Nested if, or Logical Operator, Or Conditional operators). 6. Take marks from the user and print grade accordingly (>=75 marks – Distinction, <75 and >=60 marks – First, <60 and >=50 – Second, <50 and >=35 – Pass, <35 – Fail) using if … else if….else statement and also by usinglogical operators). 7. Write a program to accept number of seconds and display its correspondinghours, minutes and seconds. 8. Take 2 numbers from the user and print the greater number (Number can beequal). 9. Write a program to check whether the blood donor is eligible or not for donating blood. The conditions laid down are as under. Use if statement.a)Age should be above 18 yrs but not more than 55 yrs. 10. Write a program to calculate bill of a job work done as follows.Use if else statement.a) Rate of typing 3 Rs/pageb) Printing of 1st copy 5Rs/pages & laterevery copy 3Rs/page.The user should enter the number of pages and print out copies he/she wants.
III	1. Write a program to find sum of N numbers. (Using while loop) 2. rite a program to print 1,2,3,...N where N number scanned by user. (Using while loop) 3. Write a program to find factorial of given number . 4. Write a program to find reverse of a given number. 5. Write a program to find the sum of first 100 odd nos. and even nos. 6. Write a program to find maximum from given N inputs by user. 7. Write a program to find sum of the digits entered by the user.

	8. Write a program to generate Fibonacci series up to N numbers. 9. Write a program to find GCD and LCM of given 2 numbers. 10. Write a program to check whether given number by the user is Palindrome or not. 11. Write a program to check Whether the given number is Prime or not. 12. Write a C program to find xl+x2+x3+x4+ 13. Write a program to print following pyramid. * ** *** **** 14. Write a program that accepts an integer N, if the integer N = 4, then print the pyramid: 1 121 12321 121 1
IV	1. Write a program which will take 10 numbers from user and stored it in the array. It will print all the numbers, their sum and average of it. 2. Write a program to find binary of given number. 3. Write a program to sort and array. 4. Write a program to search an element from the array. 5. Write a program to find addition of two matrices of 3*3. 6. Take two strings from the user and check whether the string is palindrome or not. 7. Write a program to find sum, average of two numbers passed to user defined functions called sum(int,int) and average(int,int). 8. Write a program to print Fibonacci series using recursive UDF. 9. Write a program to find length of the given string (without including string.h). 10. Write a program which will accept two strings from the user and print the message that the strings are same or not. 11. Write a program that uses function digit(N,k) that return the value of the kth digit from the right of the number N. For eg. The function call digit (254693,2) should return 9.

SEMESTER –I	
Digital Computing	
Unit	**Unit Details**
I	Introducing Today's Technologies – Computers, Devices, and the Web: Today's Technology – Computers – Types Of Computers: Servers-Mobile Devices- Game Devices- Embedded Computers - Generations of Computers - Data and Information - The Web - Digital Security and Privacy -Programs and Apps - Operating Systems – Applications - Technology Uses - Technology Users - Cloud Computing – Artificial Intelligence Ports and Connectors – Buses
II	Processors, Memory, Adapters and Buses:Inside the case: Motherboard – Processors – Memory - Adapters Digital Storage: Storage Hard Drives -Portable Flash Memory Storage - Optical Discs -Enterprise Storage
III	Input and Output Devices: Input Devices: Keyboards - Pointing Device - Touch Screens - Pen Input - Motion, Voice, andVideo Input - Scanners and Reading Devices Output Devices: Displays – Printers - Other Output Devices
IV	Computer Codes: Introduction to Computer Codes: Decimal System-Binary System-Hexadecimal System-OctalSystem-4-bit BCD System-8-bit BCD System-ASCII code-16-bit Unicode Conversion of Numbers (includes fixed and fractional number): Non decimal to decimal -Binary to decimal - Decimal to Binary - Octal to Binary - Octal to Decimal - Decimal to Octal - Binary to Hexadecimal - Hexadecimal to Binary - Hexadecimal to Decimal - Decimal toHexadecimal - Hexadecimal to Octal - Octal to Hexadecimal
Text Book: Discovering Computers 2016 - 1st Ed. - Misty E. Vermaat; Susan L. Sebok; Steven M. Freund; Jennifer T. Campbell; Mark Frydenberg (Shelly Cashman Series) - Cengage Learning	
Reference Books: 1.Computer System Architecture – 3rd Ed. - M. Morris R. Mano- Pearson India 2.Fundamentals of Computer - 1st Ed. Publisher – Balaguruswamy- McGraw-Hill 3.Computer Fundamentals - P.K Sinha 4. Fundamentals of Computers – 5th Ed. – PHI - V. Rajaraman	

SEMESTER-I	
	Matrix Algebra and Co-ordinate Geometry (Theory)
Unit	**Unit Details**
I	Introduction to matrices, different types of matrices, operations on matrices, Theorems on matrices, Elementary operations on matrices and types of matrices, Symmetric and skew-symmetric matrices, Hermitian and skew-Hermitian matrices, orthogonal matrices, unitary matrices, normal matrices, Elementary Matrices. Linear dependence and independence of row and column matrices, Row rank, column rank and rank of a matrix, Row Reduced Echelon (RRE) form of a matrix and matrix inversion using it.
II	Eigen values, Eigen vectors and the characteristic equation of a matrix. Cayley-Hamilton (CH) theorem and its use in finding inverse of a matrix, Application of matrices in solving a system of simultaneous linear equations, Cramer's rule, Theorems on consistency of a system of simultaneous linear equations.
III	**Sphere and Introduction to conicoid:** Definition of a sphere in R3, Cartesian equation of a sphere, General equation of a sphere, Equation of a sphere with diametrically opposite end points, Intersection of a sphere with Line/plane/sphere(No theory but only problems), Equation of a tangent plane to a sphere. The tangency of a plane and normality of a line to a sphere, Orthogonal spheres. Conicoids: Introduction to conicoid, types of central and non central conicoids in R3, figures of conicoids.
IV	**Various coordinate systems and Cone and cylinder in R^3:** Polar coordinates in R2& R3 and its Relationships with Cartesian coordinates, polar equation of line/circle/conic and properties of conics. Spherical, Cylindrical, Conical coordinates in R3. Introduction to different types of cone and cylinder, Equations of enveloping cone/cylinder, Right circular cone/cylinder (without proof), Problems on cone and cylinder.
Text Book:	
Reference Book: 1. H. Anton, Elementary linear algebra with applications (8th Edition),John Wiley (1995). 2. Linear Algebra Theory and Applications – Ward Cheney, David Kincaid. Jones and Bartlet India Pvt. Ltd. 3. Introduction to Linear Algebra – Serge Lang. Springer (India). 4. Gilbert Strang, Linear Algebra and its Applications (English) 4th edition, Academic press, Indian edition. 5. Matrix and Linear Algebra – K. B. Dutta, Prentice Hall. 6. A Textbook of Matrices – Shanti Narayan, P K Mittal, S. Chand Group. 7. AnalyticalSolid Geometry- Shanti Narayan 8. Co-ordinate Geometry By : R.J.T. Bell. 9. Solid Geometry(three dimension) – H. K. Das ,S. C. Saxena and Raisinghania , S. Chand 10. Coordinate Geometry, Polar Coordinate approach, M M Tripathi, Alpha Science International	

SEMESTER-I	
	Practicals: Matrix Algebra and Co-ordinate Geometry
Units	**Unit Detail**
	1. Matrix algebra. 2. Different methods of finding Inverse of a matrix. 3. RRE form and rank of a matrix. 4. Solution of system of linear equations using row operations and Cramer's rule. 5. Linearly independent and dependent vectors. 6. The Cayley-Hamilton theorem and its applications 7. Eigenvalues and eigen vectors of matrices. 8. Various coordinate systems in R2 and polar equation of line. 9. Various coordinate systems in R3.Transformation equations from one system to another system. 10. Polar equations of Circle. 11. Polar equations of Conic. 12. Sphere-I. 13. Sphere-II. 14. Cone. 15. Cylinder. 16. Project on Identification of curves/surfaces

SEMESTER-I	
	Descriptive Statistics and Regression Analysis
Unit	**Unit Details**
I	Data and data visualization: Types of data, Classification of data, Levels of data measurement, Classification, Presentation: Graphical and Diagrammatic presentation (concepts only) of data, Measures of central tendency: Mean, Median and Mode, Empirical relation between mean, median and mode, Partition values, Merits and demerits, Boxplot.
II	Measures of dispersion and Shape: Measures of Dispersion, Absolute and relative measures of dispersion with their merits and demerits, Moments: raw moments, central moments, factorial moments and their interrelationship , Skewness and Kurtosis and their measures.
III	Bivariate data: Concept of bivariate data, Correlation: Introduction, Scatter diagram, Types of Correlation, Methods of Measuring Correlation: Karl Pearson's correlation, Spearman's Rank correlation, Kendall rank Correlation, Association of attributes, Methods of measuring association of attributes.
IV	Regression Analysis: Concept of Regression for two variables, Lines of regression, properties of regression coefficient, regression curve, Regression and correlation in three variables, Yule's notations, plane of regression, Properties of Residuals, Multiple and Partial Correlation coefficient and their interrelationships.
Text Book:	
Reference Book:	

SEMESTER-I	
	Probability Theory
Unit	**Unit Details**
I	Probability: Introduction to probability, Basic concepts, random experiment, events, equally-likely events, mutually exclusive events, exhaustive events, Independent events, Classical, statistical and modern approach to probability, Addition and Multiplication theorem (without proof), Conditional probability, Baye's rule.(without proof for two events)
II	Random Variables and Mathematical Expectation: Concept and Types of Random variables, Probability mass function (p.m.f.), probability density function (p.d.f.) (simple problems), Distribution function, Expectation and variance of a random variable and their basic properties.
III	Generating functions: Moments and Cumulants, Moment generating function, Cumulant generating function and Characteristic Function, Uniqueness and Inverse Theorems (without proof) along with applications..
IV	Bivariate Random Variables, Joint, marginal and conditional p.m.f. of two random variables. Joint, marginal and conditional p.d.f. of two random variables, Independence of two random variables, Conditional mean and conditional variance
Text Book:	
Reference Book:	

SEMESTER-I	
Electives	
Logic	
Unit	**Unit Details**
I	**Mathematical Logic:** Statement, negation, conjunction, disjunction, statement formulas and truth table, conditional and bi-conditional, well-formed formula, tautology, equivalence of formulas, duality law, tautological implications, functionally complete set of connectives, other connectives, D.N.F, C.N.F, P.D.N.F, P.C.N.F
II	**Theory of Inference and the Predicate Calculus:** Rules of inference, consistency of premises, the indirect method of proof, automatic theorem proving, Predicates, the statement function, variables, Quantifiers, predicate formulas, free and bound variables, the universe of discourse, the theory of inference for predicate calculus
TextBooks:	

Reference Book:

1. Discrete Mathematical Structure with application to computer science – J. P. Trembly & R. Manohar, McGraw Hill
2. Logic for computer science – Uwe Schoning, Birkhauser, Boston
3. Elements of Discrete Mathematics – A computer oriented approach – C. L. Liu, D. P. Mohapatra, TMT
4. Discrete Mathematics – N. Chandrasekaran, M. Umaparvathi, PHI
5. Discrete Mathematics & Combinatorics – T. Sengadir, Pearson
6. Discrete Mathematics – Schaum series
7. Discrete Mathematics Kenneth Rosen
8. Logic and Discrete Mathematics, A concise Introduction- Willem Conradie and Valentin Goranko, Wiley.

SEMESTER-I	
Electives	
General English	
Unit	**Unit Details**
I	Selected Stories from Malagudi Days by R K Narayan Indian thought Publication List ofstories. **Note**: Short question-answers and theme based short notes should be asked.
II	**Animal Farm** – George Orwell. Critical study of the novel. **Note:**Short question-answers and theme based short notes should be asked.
III	**Grammar** • Tenses -Subject-verb agreement-Preposition- Articles - Modals
IV	**Speaking Skills** • Pronunciation (identification of sounds, vowels & consonants) - Syllable division (fromthe list attached) -Rhyming words - Vocabulary from the texts
TextBooks: 1. Malgudi Days By- R.K Narayan. 2. Animal Farm By- George Orwell	
Reference Book: 1. Enrich your English – by CIEFL (Academic Skills book) 2. Contemporary English Grammar – by Raymond Murphy 3. Essential English Grammar - by Raymond Murphy	

SEMESTER-I	
Electives	
Office Automation	
Unit	**Unit Details**
I	Introduction to Operating System, DOS and Windows DOS - Definition - Types - Functions - Booting Process - Introduction To DOS - Comparison with GUI - Wildcard characters - Working with DOS cmds: DIR, MD, RD, CD, Copy, Type, DEL, REN, Date, time CLS, VER, Move, ATTRib, Xcopy Windows : Components Of Windows : Desktop - Icon - My computer - My documents - Network Neighborhood - Recycle bin - Start menu - Taskbar - Windows explorer Control Panel: Date & time - Display - Mouse - User accounts - Add & remove programs Files and Folders Creating Folder - Folder Operations(copying , moving and deleting) - Creating files & file operations - Creating Shortcuts System Tools: Disk Defragmentation
II	MS Word & Introduction to Excel MS Word Introduction Creating word documents - Navigating and editing word documents - Formatting, viewing and printing a document MS Word Advanced Features: Working with tables and graphics - Mail Merge - Other Features Autocorrect - Autotext - Macros - Protecting documents MS Excel: Introduction To Excel - Concept of Workbook - Worksheet, Workspace - Types of data -Formatting Workbook - Conditional formatting - Sorting Data
III	MS PowerPoint MS Powerpoint Introduction : Creating ,browsing &saving Presentation -Editing & formatting slides - Working with objects Enhancing presentation using multimedia - Transitions - Preset Animation -Rehearse Timings - Pack & go wizard - Pen - Custom Show
IV	Advanced Excel Advanced Excel Features: Data validation - Data filter (Auto & Advance) - Charts - What if analysis - Goal seek - Scenario - Protecting Worksheet - Types of error Functions and Formulas : Mathematical Round, ceil, floor, fact, subtotal, sum , sumif - Logical AND, OR, NOT, if - Statistical Min, max, avg, count if - Text Concatenate, Exact, find, left, right, len, lower, upper, trim – Lookup: Hlookup, Vlookup - Date and Time : Date, day, days360, hour, minute, now, second, time, today, year, datediff
Text Book: Office 2013 for Dummier - Wallace wang - Publisher: John Wiley and sons, Inc	
Reference Book: Office 2013 in Simple StepBible – Lisa A. Bucki, John akenbanch, Fathe wempen, Michael Alexander and Dick kuseika - Publisher: Wiley	

Semester-II

SEMESTER - II	
Web Designing	
Unit	**Unit Details**
I	**Introduction to HTML 5** • Introduction to HTML5 • New Structure • New Form Elements and Attributes • Browser support , migration html4 to html 5 • The <!DOCTYPE html> Element • Introduction to new elements in HTML 5 • The Markup Elements using : ▪ <section> , ▪ <article> ▪ <aside> ▪ <details> ▪ <figcaption> ▪ <figure> ▪ <footer> ▪ <header> • The Media Elements ▪ <audio> ▪ <video> ▪ <plug-ins> • HTML Graphics: • The Canvas Elements • And SVG (Scalable Vector Graphics) **The form elements**
II	**Introduction to CSS** : Understanding the concepts of CSS - Advantages and disadvantages - **CSS syntax** - Grouping selectors and rulers - Using the class selectors - Using the ID selectors - Comparing ID and classes selectors - UsingCSS comments **Types of Style sheets**: External – Internal – Inline **CSS properties and text attributes:** Color – Alignment – Decoration – Transformation – Indent - Letter spacing and word spacing - White - pace -Line-height – Direction - Unicode-bidi **CSS Padding:** Using padding properties - Setting padding for all sides - Setting padding for each side - List properties (list-style-images, list- style-position, liststyle - type, list-style) - CSS positioning(relative, absolute, fixed and Z-index) - CSS properties and table attributes **Advance CSS:** Css rounded corners - Border images - Css gradient - Css shadow - Css font & Text effects - Css 2D & 3D Transform - CSS transition &Animations

III	**JavaScript Introduction:** Understanding JavaScript - About Dynamic HTML - Selecting an development environment for JavaScript - HTML and JavaScript **Advanced JavaScript:** Element of JavaScript – Variables – Operators - Flow control statement – Arrays – Functions - Event handling - Browser and JavaScript - Web page and JavaScript - validating User forms
IV	**Introduction to jquery :**About jquery **Using jquery:** The two jquery downloads - Including jquery (Using script) -Basic jquery syntax - Connecting jquery to the load event **Using Selectors:** Selecting elements by ID - Selecting elements by Class - Selecting elements by Type - Selecting elements by Hierarchy - Selecting elements by Attribute **Functions:** Traversing the DOM - Changing text and HTML - Inserting Elements **Events:** Binding and Unbinding - All Events

Textbook:

1. **A Complete Guide to Internet and Web Programming (Edition-2010)**
   Publisher: Dream Tech Press.
   By Deven N. ShahPublisher: DreamTech Press
   (Chapter- 3, 4 for unit 1,2)
2. **Javascript 2nd Edition Step by step**
   Publisher: Microsoft Corporation by: O'Reilly Media, IncBy
   Steve suehring
   (Chapter-22 for unit 3)
3. **XML and Related Technologies (First Edition 2009)**
   Pearson Education
   By Atul Kahate
   (Chapter-1,2,3 for unit 3)
4. **HTML 5 in SIMPLE STEPS**
   Publisher : DREAMTECH PRESS
   BY Kogent Learning Solutions Inc

Reference Books:

1. **DHTML and CSS Advanced(First Edition-2006)**
   Publisher: Pearson Education.By
   Jason cranford Teaue
2. **Java Script Indian Edition(First Edition-2008)**
   Publisher: CENGAGE LearningBy
   Gosselin
3. **HTML 5, Javascript and jQuery 24-Hour Trainer** ,
   Publisher: Wiley Publication
   By Dane Cameron
4. **Step By Step XML(First Edition-2000)**
   Publisher: PHI Practice-Hall India. By
   Michael J. Young
5. **Sams Teach Yourself XML in 24 hours (First Edition-2006)**
   Publisher: PEARSON EducationBy
   Michael Morrison

SEMESTER - II	
Web Designing Practicals	
Unit	**Unit Details**
I	**Tags of HTML5, audio video images** 1. Create a webpage for online Jwellary shopping. Display Menu in left frame. Clicking on menu should display related webpage in right frame. Keep header andfooter frames to display related information. 2. Create Web page to apply in job using filling form online. 3. Create a webpage with images, with audio and video. 4. Inserting Image on a web page (with all attributes). 5. Write HTML program in which make image as a link. 6. Write HTML program to e-mail registration form. 7. Write code for create images using canvas 8. Create a web page for user registration form. Assume related information and useappropriate control.
II	9. Write HTML program which contains internal cascaded style sheet for p, h2, h3,body and font attribute. 10. Write HTML program which contains inline cascaded style sheet for text attributes. 11. Write HTML program which contains external cascaded style sheet for Listproperties user defined Classes and Id. 12. Write HTML program which contains all the css positioning properties throughinternal css using class selector. 13. Write HTML program using clip property & z-index property through external css. 14. Write HTML program which contains cascaded style sheet with margin attributes ofstyle sheet. 15. Write HTML program which contains internal style sheet with background & borderattributes of style sheet. 16. Write HTML program which contains external style sheet with Css font & css texteffects 17. Write HTML program which contains cascaded style sheet with Css 2D & 3DTransform. 18. Write HTML program which contains external css using CSS transition &animations.
III	19. Write a Javascript to print your name and surname on screen. 20. Write JavaScript to demonstrate the use of different dialogue boxes. For example: write messages good morning, good bye etc, take value from alert, confirmation forany operation. 21. Write a JavaScript program to calculate area of circle.(3.14*r*r) 22. Write a javascript to find the grade from student result using if condition. 23. Write a javascript to find sum of N numbers entered by user. 24. Write a JavaScript program to find factorial of a number. 25. Write a javascript to find reverse of given string. 26. Create JavaScript program which have list of color buttons, if user moves the mouseover to any color button that color will set to the background of document. 27. Create JavaScript program to create mathematical calculator. (functionality +,*,-,/) 28. Write a JavaScript program to validate a form which consist of name, Age, address,hobby(checkbox), gender(radio button), email.

IV	29. Small Project: Select the topic for website designing and design five attractive webpages using all css properties also use java script for login , registration form ect. 30. Write a simple jquery program to print alert message hello world. 31. Test if jQuery is loaded. 32. Scroll to the top of the page with jQuery 33. Disable right click menu in html page using jquery 34. Write a jquery for Limit character input in the text area including count 35. Write a jquery to Display a message when the context menu event is triggered onthe paragraph elements.

Reference Books:

1. DHTML and CSS Advanced(First Edition-2006)

Publisher:
Pearson
Education.
By Jason
cranford
Teaue

2. Java Script Indian Edition(First Edition-2008)

Publisher:
CENGAGE
LearningBy
Gosselin

3. HTML 5, Javascript and jQuery

24-Hour Trainer ,Publisher:
Wiley Publication
By Dane Cameron

SEMESTER – II	
Computer Organization and Advanced Microprocessors	
Unit	**Unit Details**
I	**Basic Computer Organization -** Von-Neumann Architecture - Functional Units - CPU operational Concept - Interrupt Concept - Bus Concept **Digital Systems and Basic Components of Circuit Design -** Digital Computer - Binary Information and signals - Binary Logic with Boolean algebra - Logic Gates **Analysis and Design of Digital Circuits -** Sequential circuits Vs. Combinational Circuits - Flip-Flops - Half Adders and Full Adder
II	**Integrated Circuits -** SSI , MSI , LSI , VLSI - Logic Families - Decoder and Encoder - Multiplexer and De-multiplexer **Data Representation** **Fixed point Numbers -** 1's complement - 2's complement **Floating point Numbers –** Normalization - IEEE Representation (Single precision)
III	**Memory Organization & Management -**Memory parameters **Classification of memory -** By functionality - By access method - By capability - Main memory Limitation - Instruction pre-fetch - Write Buffer **Cache memory -** Cache principle - Cache hit and cache miss - Cache replacement - Cache write - Cache coherence - Mapping(direct, associative, se associative)
IV	**Introduction to microprocessors –** Microcontroller - RISC & CISC Microprocessors - Scalar & super scalar processors - Vector & array processors **Intel 8086 -** Overview of 8086 Pin Diagram - 8086 Register organization - BIU & EU - Addressing modes of 8086 **Introduction to Advanced Microprocessors -** Introduction of AMD , MIPS and SUN's Sparc - Chronology of Intel processors - Mobile processors

Text Book:

1) Computer System
   ArchitectureBy:M. Morris
   Mano
   Publisher: PHI
2) Computer Architecture and Organization
   By:B. Govindrajalu
   Publisher: McGrawHill
3) Computer Organization and Advanced Microprocessors
   By: Tripti Dodiya & Zakiya Malek
   Publisher: Cengage

Reference Books:

1) Advanced Microprocessors and InterfacingBy:
   - Badri Ram
   Publisher: Tata Mcgraw Hill

SEMESTER-II	
	Calculus and Differential Equations (Theory)
Units	**Unit Details**
I	**Prerequisites (not to be asked but must be done):** Introduction of Differential equations, its order and degree. Family of curves leading to differential equation and its solution in family of curves, Different types of solutions (viz. General, Particular and Singular solutions). Constant of integration, Boundary/initial conditions, Differential equations of first order and first degree. a) Successive Differentiation: Introduction to successive derivatives, nth derivatives of some standard functions, Lebnitz theorem b) Mean Value theorems: Rolle's mean value theorem, Lagrange's mean value theorem, Different forms of LMVT, Cauchy's mean value theorem, Applications of MVTs.
II	a) Convergence and divergence of infinite series: Definition of series, Convergent and divergent series of real numbers, sum of series, different test of convergence of infinite series-convergence of geometric series, comparison test, practical comparison test, D'Alembert ratio test, Cauchy's root test, alternating series, power series. b) Taylor's and Maclaurin's Theorems (without proof), Expansions of some standard functions as infinite power series without validity of the expansions
III	a) Methods of solving differential equations of first order and degree one: Variable separable, Homogeneous and non- homogeneous differential equations, exact differential equations (without proof), Integrating factors, linear differential equation, Bernoulli's differential equation and Differential Equations reducible to them. b) Method of solving differential equations of first order and higher degree solvable for *y*, solvable for *x* ,solvable for*p* (where), Clairaut's differential equation, Lagrange's differential equation. dy p dx □
IV	a) Linear differential equations of higher order and degree one: Differential operators. Linear differential equations of higher order and degree one with constant coefficients, Complementary and particular integrals. Inverse operator, operational methods for its solutions, Euler form of homogeneous linear differential equations with variable coefficients.
Text Book:	

Reference Books:

1 Differential Caculus, Shanti Narayan, S. K. Mittal, S. Chand and Co. Publication.
2 Anton, Biven and Davis, Calculus, 10th edition, Willey Publication.
3 Thomas, Calculus early transcendental, Addison-Wesley person publication.
4 Integral calculus, Shanti Narayan, S. Chand Limited, 2005.
5 Elementary Differential Equations, Rainville and Bedient, Macmillan Publication.
B. Sc. Mathematics Page 4
6 Ordinary and Partial Differential Equations, M. D. Raisingania, S. Chand and Company, 2009.
7 Differential Equations- D.A. Murray, Tata McGraw Hills.
8 Ordinary Differential Equations and Partial Differential Equations, Nita shah, PHI Ltd.
9 Theory and problems on Differential Equations- Frank Ayres, McGraw Hill Book Co., New York.

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SEMESTER-II	
	MT 2502L: Calculus and Differential Equations (Practical)
Units	**Unit Details**
I	1.Gaphs of some Cartesian curves R2. (Trigonometric function, conic, polynomial) 2. Graphs of some parametric and polar curves in R2. (Cycloid, conic, asteroid, cardioids) 3. Discuss concavity and point of inflexion of the curve in R2 4. To find asymptotes of curves including Cauchy's method. 5. Method of Integration: Partial fraction, Limit of sum using definite integral, substitution 6. Method, Integration by parts. 7. Reduction formulae only for definite integrals. 8. Application of Integration-I (Arc length and Area) 9. Application of Integration-II (Volume and surface Area) 10. Application of Leibniz theorem. 11. Discuss convergence of the infinite series. 12. Problem on Mean value theorem 13. Expansion of function in infinite power series using Taylor's and Maclaurin's formula 14. Evaluate limits using L'Hospital's Rule 15. The differential equations of order 1 and degree 1. 16. The differential equations of order 1 and higher degree. 17. The differential equations of higher order and degree
Text Book:	
Reference Books:	

SEMESTER-II	
	Applied statistics
Units	**Unit Details**
I	Sampling Methods: Concept of population and sample, Characteristics of good sample. Simple random Sampling (with replacement and without replacement), Systematic sampling, Stratified random sampling (simple examples), Cluster sampling (concept only), Advantages and disadvantages
II	Time series: Introduction, various components of time series: Trend, Seasonal, Cyclic and Random components. Methods of measuring Trend by (a) Graphical method (b) Moving average method, (c) Least squares method, Concept of principle of least squares, linear and quadratic functions by the principle of least squares and to estimate trend for simple numerical data. Seasonal indices and simple examples to obtain seasonal indices.
III	: Index Numbers: Introduction, Use of Index Numbers, Types of Index numbers, Construction of Index Numbers of prices and quantities, Tests of consistency of Index numbers.
IV	Economic Statistics: Demand and supply function, Demand law, Supply law, Market Equilibrium, Revenue , Concept of price elasticity of demand and supply, Interpretations of their values, Idea of Monopoly, Maximization of profit under monopoly, Concept of total utility and marginal utility, Maximization of utility, Examples.
Text Book:	
Reference Books:	

SEMESTER-II	
	Statistics Using R
Units	**Unit Details**
I	Fundamentals of R
II	Data exploration and Data visualization, Univariate and Bivariate Data
III	Descriptive statistics, Correlation and regression using R
IV	• Sampling methods and Time series using R
Text Book:	
Reference Books:	

SEMESTER – II	
Electives	
Environmental Studies	
Units	**Unit Details**
I	Definition, scope and importance, need for public awareness.
II	**Renewable and non-renewable resources :** Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles. (8 lectures)
III	**Ecosystems** • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of thefollowing ecosystems :- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)(6 lectures)
IV	**Biodiversity and its conservation** (8 lectures) • Introduction – Definition: genetic, species and ecosystem diversity. • Biogeographical classification of India • Value of biodiversity : consumptive use, productive use, social, ethical, aestheticand option values • Biodiversity at global, National and local levels. • Inida as a mega-diversity nation • Hot-sports of biodiversity. • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. • Endangered and endemic species of India • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
V	**Environmental Pollution** (8 lectures) Definition

	• Cause, effects and control measures of :- a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards • Solid waste Management : Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution. • Pollution case studies. • Diaster management: floods, earthquake, cyclone and landslides.
VI	**Social Issues and the Environment** (7 lectures) • From Unsustainable to Sustainable development • Urban problems related to energy • Water conservation, rain water harvesting, watershed management • Resettlement and rahabilitation of people; its problems and concerns. Case Studies • Environmental ethics: Issues and possible solutions. • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. • Wasteland reclamation. • Consumerism and waste products. • Environment Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act • Issues involved in enforcement of environmental legislation. • Public awareness.
VII	**Human Population and the Environment** (6 lectures) • Population growth, variation among nations. • Population explosion – Family Welfare Programme. VII • Environment and human health. • Human Rights. • Value Education. • HIV/AIDS. • Women and Child Welfare. • Role of Information Technology in Environment and human health. • Case Studies.
VIII	**Field work** • Visit to a local area to document environmental assetsriver/forest/grassland/hill/mountain • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural • Study of common plants, insects, birds. • Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)
Book: Prof. Erach Bharucha Director Bharati Vidyapeeth Institute of Environment Education & Research, Pune	

SEMESTER-II	
Electives	
Writing and Presentation Skills	
Units	**Unit Details**
I	**Theory of Communication** Definition & process of Communication - Verbal – Non-verbal Communication – General and Technical Communication -Dimensions of Communication – Language as a tool – Levels of Communication - Flow of Communication - Features of effective Communication - Barriers to effective Communication - Objectives of Communication
II	**Written Communication** Understanding the basics of traditional letter writing - Business Letters: Inquiry & Reply letters, Placing, Execution and Cancellation of an orders – Covering Letter – Email Communication – Job Application - Resume
III	**Speaking Strategies/Presentation Skills** Listening skills: Importance - Cultivating Listening Skills - Interview: Introduction, General preparation for an Interview, Types of questions generally asked – Presentation: Preparing an outline of the presentation, Using visual aids - Body language and effective presentation.
IV	**Reading Skills** • Importance of Reading • Pleasure of Reading • Types of Reading • Calculating Reading speed and Accuracy • Techniques to read faster and better • Technique of SQ3R, Practising Comprehension • How to identify the core ideas of reading material

Text Book:

1. Communication Skills Publisher - Meenakshi Raman, Sangeeta Sharma- Oxford University press.

2. The ACE of Soft skills
   Publication: Pearson
   By Gopalaswamy Ramesh, Mahadevan Ramesh
   Corporate Skills
   Publication: Rupa & Co 2010, New Delhi .By
   Gulati, Sarvesh

Reference Books:

1. Communication Skills Publisher – Leena Sen - Prentice Hall of India Pvt. Ltd.
2. Effective Technical Communication - M Asharaf Rizvi - Tata Mac. Co. Ltd.
3. Business English & Communication - Lyn R. Clark, Kenneth Zimmer and JoshophTinervia - Mac Graw Hill International edition