Kristu Jayanti College

AUTONOMOUS | Bangalore

Accredited 'A' Grade by NAAC | An Institution Managed by CMI Fathers

DEPARTMENT OF COMPUTER SCIENCE

Bachelor of Science [B Sc. (CSME)]
B Sc. (Computer Science, Mathematics, Electronics)
Curriculum 2014 -17 Batch

http://www.kristujayanti.edu.in

CURRICULUM OVERVIEW

1. Aim

The programme aims to make student equip with the knowledge background required to be a successful career/higher studies in the field of Mathematics, Electronics and Computer Science.

2. Eligibility

A student should have passed 10 + 2 or equivalent academic stream.

3. Credits

A student has to earn a total of 140 credits for the successful completion of the programme.

Part	Category	Category Description	Hours per week	Credits	Total credits	Semester
I	Language	Theory	4	3	12	I,II,III,IV
	English	Theory	4	3	12	I,II,III,IV
II	Major (Core)	Theory	5	4	92	I,II,III,IV,V,VI
		Practical/Project	2	1	13	I,II,III,IV,V,VI
			4	3	3	VI
III	Non – Core	-	2	1	3	I,II,IV
IV	Life Skill Education (LSE)	-	3	2	2	I
V	NSS/NCC/ Certificate Program/ Extra- Curricular/ Co-curricular and Social Outreach	-	-	3	3	I, II, III,IV

Note :

In case of Part V – one credit is equal to 20 hours.

4. Attendance

1. A student should have 85 percentage of attendance in each course
2. Any student who is not complying to this requirement will not be allowed to appear for End Semester Examination

5. Passing Criteria

- No minimum pass mark for CIA
- ESE (End Semester Examination) alone 35% - (35 marks out of 100 / 21 marks out of 60)
- (ESE + CIA) aggregate 40 % or 40 marks out of 100
- Student has to get pass mark in non -core course of the respective semester to get Overall "Pass" status.

ESE alone 35% - (32 marks out of 90 / 16 marks out of 45) and (ESE + CIA) aggregate 40% or 20 marks out of 50

- Student should achieve the total number of 140 Credits for the UG programme.

6. **Specialization / Electives**

   Electives are not offered for this programme.

7. **Orientation & Bridge Programmes**

   Orientation Programme

   Orientation is offered at the beginning of the programme. It basically includes sessions as mentioned below:
   - Campus Culture
   - Introduction to the Programme and Syllabus
   - Soft Skills
   - Basic Computing
   - English Communication
   - Basic Electronics
   - Introduction to Programming

   Bridge Programme

   Bridge courses are offered on different subjects in order to cop up with the syllabus of the programme.

   I Semester
   - Basic Problem Solving Techniques

   II Semester
   - Basic Mathematics
   - Project Designing Tools

8. **Value Added Courses / Certificate Courses**

   Value Added Courses

   II Semester
   - MS Excel

   III Semester
   - Electronic Simulation Software Tool

   IV Semester
   - PL/SQL & Database Connectivity

   Certificate Courses

   V Semester
   - Quantitative Aptitude

   VI Semester
   - Advanced Java

9. Internship / Project

The student has to undergo two projects during the programme.

10. Skill Development Activities

The Computer Academy offers provisions for students to be a part of the different technical communities which aims at the skill development in the respective domain. The various communities include:
- Coding and Debugging
- IT Quiz
- IT Manager
- Electronics
- Mathematics
- Statistics
- Designing
- Event Management

11. Co-curricular Activities

The department has an auspicious club namely "Computer Academy" which organizes the various activities like:
- Synchronize: Intra collegiate IT Fest
- Xactitude: Inter collegiate IT Fest
- Galaxia: Science Exhibition
- Industrial Visit
- Guest Lecture
- Workshop

12. Any Other Activities
- Computer Literacy Programme
- Social Outreach Programme

13. Program Matrix

Abbreviations

ESE - End Semester Examination
CIA - Continuous Internal Assessment
MC - Major Core
MC Lab - Major Core Laboratory
NC - Non Core
Lang - Language

* A Pass marks in the non core course is mandatory but marks secured for the same is not considered for grand total/grade/class
** Non-core subjects (Marks are not added to the total).
*** Vernacular languages syllabus is available in the college library.

SEMESTER I

Course Code	Course Title	Course Type	Hrs / Week	Credits	CIA	ESE	Max Marks
13ENG1201	English I	Lang	4	3	40	60	100
13AEN1201	II Language : Additional English***	Lang	4	3	40	60	100
14HIN1201	II Language : Hindi ***						
13KAN1201	II Language : Kannada***						
13CSC1201	Computer Science I - Programing in C	MC	5	4	40	60	100
13CSC12L1	Computer Science Practical I - Programing in C Practical	MC Practical	2	1	20	30	50
13ELE1201	Electronics I - Basic Electronics I	MC	5	4	40	60	100
13ELE12L1	Electronics Practical I - Basic Electronics I Practical	MC Practical	2	1	20	30	50
13MAT1201	Mathematics I - Calculus and Analytical Geometry	MC	5	4	40	60	100
13NHU0102	Indian Constitution **	NC	2	1	5*	45*	50*
Total			**29**	**21**	**240**	**360**	**600**

SEMESTER II

Course Code	Course Title	Course Type	Hrs / Week	Credits	CIA	ESE	Max Marks
13ENG2201	English II	Lang	4	3	40	60	100
13AEN2201	II Language : Additional English***	Lang	4	3	40	60	100
13HIN2201	II Language : Hindi ***						
13KAN2201	II Language : Kannada***						
13CSC2201	Computer Science II - Data Structures	MC	5	4	40	60	100
13CSC22L1	Computer Science Practical II - Data Structures Practical	MC Practical	2	1	20	30	50
13ELE2201	Electronics II - Basic Electronics II	MC	5	4	40	60	100
13ELE22L1	Electronics Practical II - Basic Electronics II Practical	MC Practical	2	1	20	30	50
13MAT2201	Mathematics II - Algebra and Differential Calculus	MC	5	4	40	60	100
13NCS0101	Computer Fundamentals **	NC	2	1	5*	45*	50*
Total			**29**	**21**	**240**	**360**	**600**

SEMESTER III

Course Code	Course Title	Course Type	Hrs / Week	Credits	CIA	ESE	Max Marks
13ENG3201	English III	Lang	4	3	40	60	100
13AEN3201	II Language III : Additional English***	Lang	4	3	40	60	100
13HIN3201	II Language III : Hindi ***						
13KAN3201	II Language III : Kannada***						
13CSC3201	Computer Science III – Java Programming	MC	5	4	40	60	100
13CSC32L1	Computer Science Practical III - Java Programming Practical	MC Practical	2	1	20	30	50
13ELE3201	Electronics III - Digital Electronics and Verilog	MC	5	4	40	60	100
13ELE32L1	Electronics Practical III - Digital Electronics and Verilog Practical	MC Practical	2	1	20	30	50
13MAT3201	Mathematics III - Algebra, Differential Calculus, Improper Integrals and Linear Programming	MC	5	4	40	60	100
13MAT3202	Mathematics IV- Algebra, Differential Equations, Laplace Transforms and Fourier Series	MC	5	4	40	60	100
Total			**32**	**24**	**280**	**420**	**700**

SEMESTER IV

Course Code	Course Title	Course Type	Hrs / Week	Credits	CIA	ESE	Max Marks
13ENG4201	English IV	Lang	4	3	40	60	100
13AEN4201	II Language : Additional English***	Lang	4	3	40	60	100
13HIN4201	II Language : Hindi ***						
13KAN4201	II Language : Kannada***						
13CSC4201	Computer Science IV - DBMS & Visual Programming	MC	5	4	40	60	100
13CSC42L1	Computer Science Practical IV- DBMS Practical	MC Practical	2	1	20	30	50
13ELE4201	Electronics IV - Communication Systems	MC	5	4	40	60	100
13ELE42L1	Electronics Practical IV - Communication I Practical	MC Practical	2	1	20	30	50
13MAT4201	Mathematics V - Real and Complex Analysis	MC	5	4	40	60	100
13MAT4202	Mathematics VI - Total and Partial Differential Equations, Particle Dynamics and Numerical Analysis	MC	5	4	40	60	100
13NHU0101	Environment Studies & Civic Sense **	NC	2	1	5*	45*	50*
Total			**34**	**25**	**280**	**420**	**700**

SEMESTER V

Course Code	Course Title	Course Type	Hrs / Week	Credits	CIA	ESE	Max Marks
13CSC5201	Computer Science V- Software Engineering	MC	5	4	40	60	100
13CSC5202	Computer Science VI - Operating System Concepts and UNIX /LINUX	MC	5	4	40	60	100
13CSC52L1	Computer Science Practical VI - UNIX /LINUX Practical	MC Practical	2	1	20	30	50
13ELE5201	Electronics V - Advanced Communication Systems	MC	5	4	40	60	100
13ELE52L1	Electronics Practical V - Communication II Practical	MC Practical	2	1	20	30	50
13ELE5202	Electronics VI - Microprocessor & Microcontroller	MC	5	4	40	60	100
13ELE52L2	Electronics Practical VI - Microcontroller and Interfacing Practical	MC Practical	2	1	20	30	50
13MAT5201	Mathematics VII - Geometry of Space Curves and Vector Calculus	MC	5	4	40	60	100
Total			**31**	**23**	**260**	**390**	**650**

SEMESTER VI

Course Code	Course Title	Course Type	Hrs / Week	Credits	CIA	ESE	Max Marks
13CSC6201	Computer Science VII - Internet Technology	MC	5	4	40	60	100
13CSC62P1	Computer Science VIII - Enterprise Computing Project Using .Net Technology	MC Project	4	3	40	60	100
13ELE6201	Electronics VII - Digital Signal Processing	MC	5	4	40	60	100
13ELE62L1	Electronics Practical VII – Matlab Practical	MC Practical	2	1	20	30	50
13ELE6202	Electronics VIII - Biomedical Electronics	MC	5	4	40	60	100
13ELE62L2	Electronics Practical VIII – Electronics Project Work	MC Project	2	1	20	30	50
13MAT6201	Mathematics VIII - Matrices, Linear Algebra, Calculus of Variations and Fourier Transforms	MC	5	4	40	60	100
Total			**28**	**21**	**240**	**360**	**600**

Credit Structure

Semester	1	2	3	4	5	6	Total
Credits	21	21	24	25	23	21	135
Life Skill Education - Part IV							2
NCC/NSS/Certificate Program/Extracurricular/ Co-curricular - Part-V							3
						Total Credits	140

Subject Description

Computer Science I	Programming in C
Computer Science II	Data Structures
Computer Science III	Java Programming
Computer Science IV	DBMS & Visual Programming
Computer Science V	Software Engineering
Computer Science VI	Operating System Concepts and UNIX /LINUX
Computer Science VII	Internet Technology
Computer Science VIII	Project
Mathematics I	Calculus and Analytical Geometry
Mathematics II	Algebra and Differential Calculus
Mathematics III	Algebra, Differential Calculus, Improper Integrals and Linear Programming
Mathematics IV	Algebra, Differential Equations, Laplace Transforms and Fourier Series
Mathematics V	Real and Complex Analysis
Mathematics VI	Total and Partial Differential Equations, Particle Dynamics and Numerical Analysis
Mathematics VII	Geometry of Space Curves and Vector Calculus
Mathematics VIII	Matrices, Linear Algebra, Calculus of Variations and Fourier Transforms
Electronics I	Basic Electronics I
Electronics II	Basic Electronics II
Electronics III	Digital Electronics and Verilog
Electronics IV	Communication Systems
Electronics V	Advanced Communication Systems
Electronics VI	Microprocessor & Microcontroller
Electronics VII	Digital Signal Processing
Electronics VIII	Biomedical Electronics

SEMESTER I

13ENG1201 ENGLISH I

Credits: 3   **Total: 60 Hours**

Objectives:
- To attune young minds to concerns and issues which have a broad and wide scope of use and application to life.
- To cut across the history of creative expression in focusing primarily on the core values that governs human lives.

UNIT 1: Prose   **15 hrs**
On Saying Please- A G Gardiner; Are the Rich Happy- Stephen Leacock; The Lost Child- Mulk Raj Anand; Mrs.Packletide's Tiger- Saki; Lamb to the Slaughter -Roald Dahl.

UNIT 2: Poetry   **15 hrs**
On His Blindness- John Milton; The Village Schoolmaster - Oliver Goldsmith; The Solitary Reaper -William Wordsworth; Ozymandias- P.B.Shelley; La Belle Dame Sans Merci- John Keats.

UNIT 3: Remedial Grammar   **15 hrs**
Subject-Verb Agreement-Tenses-Do-Forms-Active and Passive Voices-Use of Negatives-Prepositions-Vocabulary.

UNIT 4: Communication Skills   **15 hrs**
Understanding Communication-Greeting and Introducing-Making Requests-Asking for and Giving Permission-Offering Help-Giving Instructions and Directions.

References:
Glendinning, Eric H. and Beverly Holmstrom (2008*), Study Reading: A Course in Reading Skills for Academic Purposes*, New Delhi: CUP.
Joan Van Emden and Lucinda Becker Palgrave. *Effective Communication for Arts and Humanities Students.* Macmillan.
Langan, John (1996). *College Writing Skills*. McGraw Hills.
Murphy,Raymond.(1998), *Intermediate English Grammar*.New Delhi: CUP.
Wren & Martin (2001),*English Grammar & Composition*. S.Chand & Company Ltd.

13CSC1201 COMPUTER SCIENCE I: PROGRAMMING IN C

Credits: 4   **Total: 60 Hours**

Objective:
Make the students aware of the nuances of programming and how to implement it by using C language.

UNIT 1: Introduction   10 hrs
Introduction to Programming Concepts - Types of programming languages; Software; Classification of software, application software and system software; Structured programming; Algorithms and flowcharts with examples.
Introduction to C - History of C; Structure of a C program; The C character set; Constants; Variables and keywords; Types of constants and variables.

UNIT 2: Instructions & Control Structures   13 hrs
C Instructions - Type declaration and arithmetic instructions; Integer and float conversions: Type conversion in assignment; Operators in C: Arithmetic operators, Logical operators, relational operators, bitwise operators; Hierarchy of operators; Input-Output statements in C: Formatted and unformatted.
Control Structures - Decision control structures; ternary operators; switch-case control structure; Loop control structures: while; do-while; for loop; break statement; Continue statement; go to statement.

UNIT 3: Arrays & Functions   14 hrs
Arrays - One dimensional, two dimensional and multidimensional arrays, declaration; initialization and array manipulations; Sorting: Bubble sort; String: Basic concepts; String manipulation programs.
Functions - Definition and prototyping; types of functions; types of arguments; recursion; passing arrays to functions; storage class in C: automatic; register; external and static variables.

UNIT 4: Pointers, Structures and Unions   12 hrs
Pointers - Definition; notation; pointers and arrays; array of pointers and functions: call by value and call by reference; Pointers to pointers.
Structures and Unions - Definition; declaration; accessing structure elements; Array of structure; Pointers and structures; Unions: definition; declaration; accessing union elements, typedef; enum; bit fields.

UNIT 5: Preprocessor and Files   11 hrs
C Preprocessor - Types of C preprocessor directives; Macros; File Inclusion.
Files - File opening modes; Text and Binary files; High level and Low level operations on files; Command Line Arguments.

Text Books:
Balagurusamy.E. *Programming in ANSI C*. (2nd ed.). Tata McGraw Hill.
Yashavant Kanetkar, *Let Us C,* (4th ed.). BPB Publications.

References:

Brian Kernighan**,** Dennis Ritchie.(1988). *The C Programming Language,* Prentice Hall.

Herbert Cooper. *Spirit of C,* Jaico Publishing House, New Edition.

K.N.King. *C Programming – A modern Approach* (2nd ed.). W.W.Norton Company.

Rajaraman.V. *Fundamentals of Computers* (2nd ed.).Prentice Hall India Limited. (for UNIT 1).

S. Byron Gottfried. *Programming with C,* Tata McGraw-Hill.

Stephen G. Kochan. (2005). *Programming in C,* Pearson.

Steve Oualline .(2010). *Practical C Programming,* O'reilly.

Yashavant Kanetkar .(2003). *Exploring C,* BPB publishers.

13CSC12L1 COMPUTER SCIENCE PRACTICAL I: PROGRAMMING IN C PRACTICAL

Credit: 1   **Total: 30 Hours**

Part A
1. Write a C program to generate and print first N Fibonacci numbers.
2. Write a C program to find the GCD and LCM of two integer numbers.
3. Write a C program that reverses given integer number and checks whether the number is palindrome or not.
4. Write a C program to find whether a given number is prime number or not.
5. Write a C program to read a string and check whether it is palindrome or not.
6. Write a C program to find the factorial of a number using function.
7. Write a C program to find if a character is alphabetic or numeric or special character.
8. Write a C program to accept a sentence and convert all lowercase characters to uppercase and vice-versa.

Part B
9. Write a C program to input numbers and to find mean variance and standard deviation.
10. Write a C program to find the roots of the given quadratic equation using switch case.
11. Write a C program to compute the sum of even numbers and the sum of odd numbers.
12. Write a C program to find the length of a string without using built-in function.
13. Write a C program to reverse the string using pointers.
14. Write a C program to accept different goods with the number, price and date of purchase and display them using structures.
15. Write a C program to read two matrices and perform addition and subtraction of two matrices.
16. Write a C program to copy one string to another using pointer.

Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voice	5
Total Marks	30

13ELE1201 ELECTRONICS I: BASIC ELECTRONICS I

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the student should be understand the basic components used in electronics and its applications.

UNIT 1: Introduction to Electronics Components   12 hrs
Review of passive Components- R, L and C; Characteristics of AC signal (T, f, V_{rms}, V_{pp}, V); AC circuits- Capacitive and Inductive reactance, Impedance of RC, RL and RLC circuits; RC Circuit - Charging and discharging of a capacitor through resistor with expression and derivation, RC time constant; Kirchhoff's Laws - Statement and problems related to voltage and current divider; Thevenin's Theorem, Maximum Power Transfer Theorem, Superposition and Norton's Theorems - Statement and problems.

UNIT 2: Semiconductors   12 hrs
Review of P type - N type semiconductors and PN junction; Diode VI characteristics; Zener diode-Characteristics and Breakdown mechanisms; Rectifiers-HWR, FWR derivation for ripple factor, efficiency (for FWR only). Filters-Explanation of shunt capacitor filter. Zener diode regulator, Fixed and variable regulators (78XX, 79XX and LM317). Clippers and clampers-shunt type and problems, Tunnel diode, Varactor diode, Photodiode and LED, construction, characteristics and applications.

UNIT 3: Bipolar Junction Transistor   14 hrs
Construction, working and terminologies; Configurations -CE, CB, CC. Definition of α, β, γ, Relationship between them. Leakage currents. Study of CE characteristics-different regions, DC load line, selection of Q point. Hybrid parameters. Transistor as a switch. Transistor biasing -need for Biasing, Stability, Different types of biasing, Voltage divider biasing with problems.

UNIT 4: Voltage Amplifiers   14 hrs
Classification of amplifiers, small signal CE amplifier circuit-study of Frequency response, r_e model for Ce configuration, derivation for A_i, Expression and significance of Z_{in} and Z_{out}.CC amplifier circuit and applications. Multistage amplifiers (Mention only).

UNIT 5: Electronic Instruments and Transducers   08 hrs
Introduction, Analog and Digital Instruments, Functions of Instruments, Electronics versus Electrical Instruments, Essentials of an Electronic instrument. Block diagram of CRO, Analog and digital multimeter-block diagram.
Introduction, Basic Characteristics of Measuring Devices-Static and Dynamic characteristics; Transducer- classification, Electrical transducer, basic requirement of transducer.

Text Books:
R.S. Sedha (2005). *Text book of Applied Electronics*, (1st ed.), S. Chand and Co, Ltd.
B. Basavaraj (2002). *Fundamentals of Electronics*, (1st ed.), Omkar Publications.
C S Rangan, G R Sarma, V S V Mani(1983). *Instrumentation Devices and System,* (2nd ed.),TMH Publishing Company Limited.

References:

B. L. Theraja, (2012). *Basic Electronics*,(5th ed.), S. Chand and Co. Ltd.

David A Bell(1986). *Electronics devices*,(5th ed.), Reston Publishing Company.

B. Grob, (2000).E*lectrical circuits and applications*, (8th ed.), TMH.

N.N Bhargava, D.C. Kulshresta and D.C Gupta(1984). *Basic Electronics and Linear circuits*,(1st ed.)   TMH.

A. P. Malvino,(1999). *Electronics Principles*, (6th ed.).,TMH.

Note: Scientific calculator is allowed.

13ELE12L1 ELECTRONICS PRACTICAL I: BASIC ELECTRONICS PRACTICAL

Credit: 1   **Total: 30 Hours**

Part A
Identification of Electronic Components.
Familiarization of Measuring Instruments; Digital Multimeter & CRO

Part B
1. Thevenin's Theorem
2. Superposition Theorem
3. Maximum Power Transfer Theorem
4. Center tap full wave rectifier without and with filter
5. Diode and Zener diode characteristics
6. Zener diode as a voltage regulator
7. Clippers and Clampers
8. Transistor characteristics CE ;mode determination of h Parameter.
9. Design and study voltage divider biasing
10. CE Amplifier
11. CC Amplifier
12. Fixed voltage regulators IC 7805, 7812 and 7912
13. Variable Voltage regulator using IC LM 317.

Minimum of 10 experiments to be performed.

References:
S Poornachandra Rao and B Sasikala (2004). *Hand book of experiments in electronics and   communication engineering,* VIKAS Publishing House.

Evaluation Criteria

Electronics Practical		
Sl no	**Details**	**Maximum marks**
01	Principle, Circuit diagram, Formulas, Brief procedure	10
02	Setting/Circuit connections, taking reading and tabulation	10
03	Calculation and graph	05
04	Viva Voce	05
Total Marks		30

Note : Scientific calculator is allowed.

13MAT1201 MATHEMATICS I: CALCULUS AND ANALYTICAL GEOMETRY

Credits: 4   **Total: 60 Hours**

Objective:
The course aims to develop and strengthen the foundation of calculus and its methods including partial differentiation and higher order derivatives and integrals and to offer a simple and elegant approach to the study of analytical geometry in 3 dimensions by combining vector and cartesian methods.

UNIT 1: Differential Calculus -I   **20 hrs**
Successive differentiation- nth derivatives of functions, Leibinitz theorem and its applications; partial differentiation- first and higher order derivatives, differentiation of homogeneous functions, Euler's theorem, total derivatives and total differential, differentiation of implicit and composite functions, Jacobians.

UNIT 2: Integral Calculus-I   **10 hrs**
Reduction formulae for $\int \sin^n x \, dx$, $\int \cos^n x \, dx$, $\int \tan^n x \, dx$, $\int \cot^n x \, dx$, $\int \sec^n x \, dx$, $\int \csc^n x \, dx$, $\int \sin^n x \cos^n x \, dx$; differentiation under the integral sign.

UNIT 3: Analytical Geometry of three dimensions (Lines and Planes)   20 hrs
Direction cosines of a line (as component of unit vector), directions ratios, angle between two lines, area of a triangle and volume of a tetrahedron with given vertices, equation of a line in different forms, parallel and perpendicular conditions, intersection of two lines, perpendicular from a point to a line, reflection of a point in a line.
Equation of a plane in different forms, perpendicular from a point to a plane, reflection of a point in a plane, angle between two plane, line of intersection of two planes, plane coaxal with given planes, plane bisecting the angle between two planes, angle between a line and a plane, coplanarity of two lines, shortest distance between two lines.

UNIT 4: Analytical Geometry of three dimensions(Sphere, Cylinder, Cone)
10 hrs
Equation of the sphere in general and standard forms, equation of a sphere with ends of a diameter, tangent plane to a sphere, orthogonality of spheres, standard equations of right circular cone and right circular cylinder.

Text Books:
Shanti Narayan.S and Mittal, P.K. (2008), *Differential Calculus,* S. Chand & Co. Ltd.
Shanti Narayan.S and Mittal, P.K. (2000), *Integral Calculus,* S. Chand & Co. Ltd.
Shanti Narayan.S, *Elements of Analytical Solid Geometry*, S.Chand and Co. Ltd.

References:
Maurice D Weir, Joel Hass, Frank R Giordano: Thomas' *Calculus*. (11th ed.).
 (Pearson).
Apostol,T.M, *Calculus,*Volume I & II .Wiley India.
Bali.N.P,*Golden Integral Calculus*, Laxmi Publications (P) Ltd.

Bali.N.P,*Golden Solid Geometry*, Laxmi Publications (P) Ltd.

Note : Scientific calculator is allowed.

SEMESTER II

13ENG2201 ENGLISH II

Credits: 3   **Total: 60 Hours**

Objectives:
- To develop the ability to get student's ideas across clearly to an audience, both in speech and in writing
- To help students develop important practical skills.

UNIT 1: Prose & Poetry   30 hrs
Food -J B S Haldane; A Devoted Son -Anita Desai; Love is a Fallacy -Max Schulman; Night Train at Deoli-Ruskin Bond; Incident of the French Camp - Robert Browning; A Passerby - Robert Bridges; Snake – D H Lawrence; Matilda - Hilaire Belloc; Stopping by Woods on a Snowy Evening -Robert Frost; The Speaking Tree (The Times of India) 2 extracts; Human Rights (Extensive Reading).

UNIT 2: Functional Communication   16 hrs
Essential English Grammar-Presentation Skills & Paper presentation-Note Taking-Report Writing-Letter Writing-Filling Challan, Bank forms & Application forms.

UNIT 3: Media Awareness   14 hrs
Kinds of News-Who and Which News gets Prominence?-Who Controls the News?-Types of Radio Programmes-Types of Television Programmes-Elements of Advertising-Use of blog.

References:
Glendinning, Eric H. and Beverly Holmstrom (2008), *Study Reading: A Course in Reading Skills for Academic Purposes*, New Delhi: CUP.
Joan Van Emden and Lucinda Becker Palgrave. *Effective Communication for Arts and Humanities Students.* Macmillan.
Murphy,Raymond.(1998), *Intermediate English Grammar*.New Delhi: CUP.
Langan, John (1996). *College Writing Skills*. McGraw Hills.
Wren &Martin (2001),*English Grammar & Composition*. S.Chand & Company Ltd.

13CSC2201 COMPUTER SCIENCE II: DATA STRUCTURES

Credits: 4   **Total: 60 Hours**

Objective:
To inculcate knowledge on implementing Data Structure concepts using C.

UNIT 1: Introduction to Data Structures   14 hrs
Introduction - Definition; Classification of data structures, primitive and non-primitive; Operations on data structures.
Pointers - Definition; Accessing the address of a variable; Declaring and initializing pointers; Accessing a variable through its pointer.
Dynamic Memory Allocation – Define static and dynamic memory allocation; Memory allocation functions, malloc, calloc, free and realloc.
Recursion - Definition; Types; Recursion in C; Writing Recursive Programs, binomial coefficient, Fibonacci series, gcd, towers of hanoi.

UNIT 2: Searching and Sorting   14 hrs
Searching - Basic searching techniques, sequential search, binary search ; Iterative and recursive methods; Comparison between sequential and binary search.
Sorting - Definition; Different types, bubble sort, selection sort, insertion sort, merge sort, quick sort, heap sort.

UNIT 3: Stack and Queue   12 hrs
Stack - Definition; Array representation of stack; Operations on stack; Polish notation; Reverse polish notation; Applications of stack, conversion of an infix arithmetic expression to postfix, evaluation of postfix expression.
Queue - Definition; Array representation of queue; Types of queue, simple queue, circular queue, double ended queue, priority queue, operations on all types of queues.

UNIT 4: Linked List   10 hrs
Definition; Components of linked list; Representation of linked list; Advantages and disadvantages of linked list; Types of linked list, singly linked list, doubly linked list, circular linked list, circular doubly linked list; Operations on singly linked list, creation, insertion, deletion, search and display.

UNIT 5: Tree   10 hrs
Tree - Definition, binary Tree, complete binary tree, binary search tree, heap; Tree terminology, root, node, degree of a node ,degree of a tree, terminal nodes, non terminal nodes, siblings, level, edge, path, depth, parent node, ancestors of a node; Binary Tree, array and linked representation of binary tree; Creation of binary tree; Traversal of binary tree, preorder, inorder, postorder; Variations of binary tree, binary search tree(BST); Heap, insertion and deletion of a node.

Text Books:

Kamthane Ashok. (2009), *Introduction to Data Structures in C*. (1st ed.). Pearson.
Langsam Yedidyah, Augenstein J Moshe,Tenenbaum M Aaron. (2010), *Data Structures Using C and C++*. (2nd ed.). New Delhi, PHI Learning Private Ltd.

References:

Balagurusamy .E. (2013). *Data Structures Using C,*(1st ed.). McGraw Hill Education.

Gilberg F Richard , Forouzan A Behrouz. (2007). *Data Structures : A Pseudocode Approach with C*. (2nd ed.), Cengage Learning.

Horowitz Ellis, Sahni Sartaj, Freed Anderson Susan. (2008). *Data Structures Using C*. (2nd ed.). Universities Press.

Kanetkar P Yeshwant.(2009).*Understanding pointers in C* (4th ed.). New Delhi, BPB Publications.

Kanetkar Yashavant.(2010). *Data Structures Through C,* (2nd ed.). New Delhi,BPB Publication.

Lipschutz Seymour.(2010). *Data Structures with C*. (1st ,ed.). Tata McGraw - Hill Education.

Tremblay Paul Jean, Sorenson Paul.(2001). *An Introduction to Data Structures with Application*.(2nd ,ed.).Tata McGraw - Hill Education.

13CSC22L1 COMPUTER SCIENCE PRACTICAL II: DATA STRUCTURES PRACTICAL

Credit: 1   **Total: 30 Hours**

Part A
1. Write a C program to find the Binomial Coefficient using recursion.
2. Write a C program to simulate the working of Towers of Hanoi problem for N disks, print the moves taken by the problem using recursion.
3. Write a C program to search for the greatest and smallest element in an array of integers using sequential search.
4. Write a C program to search for an element in an array using Binary Search.
5. Write a C program to sort a list of N elements using Bubble sort technique.
6. Write a C program to sort a list of N elements of integer type using Selection sort technique.

Part B
7. Write a C program to sort a list of N elements using Merge sort technique.
8. Write a C program to sort a list of N elements of integer type using Quick Sort technique.
9. Write a C program to demonstrate the working of a stack using an array. The elements of the stack may be integers. Operations to be supported are 1.PUSH, 2.POP 3.DISPLAY. The program should print appropriate messages for STACK overflow, Underflow. Use separate functions to detect these cases.
10. Write a C program to convert and print a given valid fully parenthesized infix arithmetic expression to postfix expression.
11. Write a C program to simulate the working of linear Queue using an array. Provide the operations QINSERT, QDELETE and QDISPLAY. Check the queue status for empty and full.
12. Write a C program to simulate the working of a Circular queue using an array. Provide the operations CQINSERT, CQDELETE and CQDISPLAY. Check the Circular Queue status for empty and full.
13. Using dynamic variables and pointers write a C program to construct a singly linked list consisting of the following information in each node. Roll No (Integer), Name (Character String) .The Operations to be supported are:
    a. LINSERT - Inserting a node in the front of the list and after a node.
    b. LDELETE - Deleting the node based on Roll no.
    c. LSEARCH - Searching a node based on Roll no.
    d. LDISPLAY - Displaying all the nodes in the list.
14. Write a C program to implement the operations of a Queue using linked list.
15. Using dynamic memory allocation, construct a Binary Search Tree of integers. Write C functions to do the following:
    Given a KEY, Perform a search in Binary search tree.   If it is found display Key found else insert the Key in the Binary search tree.
    While constructing the Binary search tree do not add any duplicate.
    Display the tree using all the traversal methods.

Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total Marks	30

13ELE2201 ELECTRONICS II: BASIC ELECTRONICS II

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the student should have understood the various types of amplifiers and through knowledge of IC-741 along with its applications.

UNIT 1: Special Devices   12 hrs
JFET - Construction, working, parameters and their relationships, JFET amplifier- CS mode operation; MOSFET- types, construction, working and characteristics. UJT-construction, working, characteristics and relaxation oscillator; SCR- construction, working, characteristics. Half wave and full wave controlled rectifiers, Diac and Triac - Symbol, construction, characteristics and applications.

UNIT 2: Power Amplifiers and feedback Amplifiers   12 hrs
Classification of power amplifiers and their comparison, Circuit operation and qualitative study of Complementary symmetry Class B push pull power amplifier. Tuned amplifier - Single tuned and double tuned amplifier, Frequency response and applications. Feedback -Concept of feedback, Types of feedback –positive & negative feedback, negative feedback configurations(block diagram only). Effect of negative feedback on voltage gain, Zi, Zo, BW and Stability.

UNIT 3: Oscillators   12 hrs
Basic principle of oscillator, positive feedback, Barkhausen criterion, damped and undamped oscillations; Classification of oscillators; Collpitt & Hartley oscillators using transistor-construction & working. Principle and equivalent of a crystal,- construction and working of crystal oscillator.
Multivibrator -Definition, classification of multivibrators, astable, monostable & bistable multivibrator with relevant equations.(No derivation).

UNIT 4: Operational Amplifiers   12 hrs
Differential Amplifier -Circuit configuration, Dual input balanced output. Operational Amplifiers - Block Diagram. Definitions of opamp parameters - input bias current, input offset voltage, output offset voltage, CMRR and Slew rate. Characteristics of ideal and practical opamps. Mention three different opamp IC (OP07, LM308, LM3900), comparison of opamp IC's with respect to parameters. Inverting and non-inverting amplifiers, virtual ground, derivation for A_v in each case,

UNIT 5: OPAMP Applications   12 hrs
Summing amplifiers/Adder, averaging amplifier, Scale changer, Subtractor, Integrator and Differentiator, derivation for the output voltage in each case. Comparator & Schmitt trigger.
Filters-Active filters- lowpass, highpass-derivation, bandpass (narrow band), band reject and allpass filter (first order only).
Oscillators-Phase shift & Wein bridge oscillator-construction, working Expression for frequency of oscillations (no derivation)

Text Books:

R.S. Sedha(2005). *Text book of Applied Electronics(*2nd Edition *)* S. Chand and Co Ltd.
Ramakanth Gayekwad(1999). *Operational Amplifier and Linear Integrated Circuits*, (3rd Edition.), PHI.

References:

A.P. Malviono (1999). *Electronic Principles*(6th ed.) ,TMH.
B. Grob, (2000). *Basic Electronics*.(5th ed.)., Mc Grew Hill.
B.L. Theraja (1985). *Basic electronics*, .(1st ed.)., S. Chand and Co.
N.N Bhargava, D.C. Kulshresta and D.C Gupta.(1984). *Basic Electronics and Linear circuits,*(1st ed.)., TMH.
Robert Boylstead & Louis Nashelsky.(2002). *Electronic devices & circuit theory.* .(8th ed.)., PHI.

Note : Scientific calculator is allowed.

13ELE22L1 ELECTRONICS PRACTICAL II: BASIC ELECTRONICS PRACTICAL

Credit: 1   **Total: 30 Hours**

1. Inverting and non inverting amplifiers.
2. Adder (Inverting/non inverting) and Subtractor.
3. Differentiator and Integrator (wave forms).
4. Study of first order lowpass filter and highpass filter.
5. Band pass filter, narrow band.
6. Hartley oscillator/ Collpit oscillator using transistor.
7. RC phase shift oscillator/ Wein bridge oscillator Using Op-amp.
8. Astable and Monostable multivibrators using IC555.
9. FET characteristics.
10. UJT characteristics and relaxation oscillator.
11. SCR characteristics.
12. CS mode FET amplifier –Frequency response, Zi and Zo.

Minimum of 10 experiments to be performed.

Evaluation Criteria

Details	Maximum marks
Principle, Circuit diagram, Formulas, Brief procedure	10
Setting/Circuit connections, taking reading and tabulation	10
Calculation and graph	05
Viva	05
Total marks	30

Note: Scientific calculator is allowed.

13MAT2201 MATHEMATICS II: ALGEBRA AND DIFFERENTIAL CALCULUS

Credits: 4   **Total: 60 Hours**

Objective:
Unit 1 aims at stimulating the interest of the student in abstract algebra. In Units 2 & 3, the study of differential calculus is taken forward with a strong emphasis on the properties of arcs. Some techniques of solving ordinary differential equations of first order are dealt with in Unit 4.

UNIT 1: Group Theory-I   **15 hrs**
Recapitulation of the definition and standard properties of groups; Order of an element, properties related to order of an element; Cyclic groups, properties of cyclic groups; Coset decomposition of a group, modulo relation, index of a group; Lagrange's theorem and consequences.

UNIT 2: Differential Calculus-II   **18 hrs**
Polar coordinates, angle between the radius vector and the tangent, angle of intersection of curves, polar sub tangent and polar subnormal, perpendicular form pole on the tangent;
Pedal equation, derivatives of an arc in Cartesian and polar forms, curvature of plane curves, formula for radius of curvature in Cartesian, parametric, polar and pedal forms, centre of curvature, evolutes.

UNIT 3: Differential Calculus-III   **12 hrs**
Concavity, convexity, points of inflexion, singular points, asymptotes, envelopes, tracing of standard cartesian, parametric and polar curves (Astroid, folium of Descartes, catenary, cycloid, cardioid, lemniscates, equiangular spiral).

UNIT 4: Differential Equations -I   **15 hrs**
Solution of ordinary differential equations of first order and first degree:
 i) Variable separable and reducible to variable separable forms.
ii) Homogeneous and reducible to homogeneous forms.
iii) Linear equations, Bernoulli equation and those reducible to these.
iv) Exact equations, equation reducible to exact form with standard integrating factors.
Equations of first order and higher degree (solvable for p); Clairaut's equation; Singular solution; Geometrical meaning; Orthogonal trajectories in cartesian and polar forms.

Text Books:
 Herstein, I.N.(1991). *Topics in Algebra*, (4th ed.). New Delhi: Vikas Publishing House.
 Bronson, Richard and Costa, Gabriel. *Schaum's Outline of Differential Equations*. (3rd ed.). Mc Graw Hill.
References:
 Fraleigh.J.Bm. *A First Course in Abstract Algebra,* Addison-Wesley.
 Shantinarayan.S. *Differential Calculus*. S. Chand & Co., Ltd.
 Simmons, George.F. *Differential Equations with Applications and Historical Notes*. McGraw-Hill International Edition.

 Note: Scientific calculator is allowed.

SEMESTER III

13ENG3201 ENGLISH III

Credits: 3   **Total: 60 Hours**

Objectives:
- To develop student's proficiency in the language and develop their communication skills.
- To equip learners with skills for self-learning.

UNIT 1: Prose & Poetry   **24 hrs**
Life Doesn't Frighten Me -Maya Angelou; Letters: Letter from a Concentration Camp,Letter to Scottie-F Scott Fitgerald; Kabuliwalah-Rabindranath Tagore; The Shroud -Munshi Premchand; Forum-William Shakespeare; Writing a Curriculum Vitae-Wislawa Szymborska.

UNIT 2: Play   **15 hrs**
Lady Windermere's Fan- Oscar Wilde.

UNIT 3: Writing Skills   **21 hrs**
Applying for Passport-Comprehension-Letters to the Editor-Dialogue Writing-Story Writing.

References:
Bevington, David (2002).*Shakespeare*.Oxford: Blackwell, ISBN 0-631-22719-9.
Connecticut : Greenwood Press. ISBN 978-0-313-30325-8.
Lupton, Mary Jane (1998). *Maya Angelou: A Critical Companion*. Westport,
Macmillan Publishing (published January 1952). ISBN 978-0-02-615920-3.
Murphy,Raymond.(1998), *Intermediate English Grammar*.New Delhi: CUP.
Tagore Rabindranath (1952). *Collected Poems and Plays of Rabindranath Tagore*.
Wren &Martin (2001),*English Grammar & Composition*. S.Chand & Company Ltd.

13CSC3201 COMPUTER SCIENCE III: JAVA PROGRAMMING

Credits: 4   **Total: 60 Hours**

Objective:
To inculcate knowledge on the architecture-neutral nature of java which enables us to write applications once and run anywhere anytime forever.

UNIT 1: Introduction to Java   04 hrs
History; Java and the Internet; Fundamentals of Object-Oriented Programming; Object-Oriented Paradigm; Basic Concepts of Object-Oriented Programming; Benefits of Object-Oriented Programming; application of Object-Oriented Programming; Java Evolution; History; Features; How Java differs from C and C++; Overview of Java; simple Java program; Structure; platform-independent nature of java; Java Development Kit (JDK); Java interpreter; Byte Code; Java Virtual Machine.

UNIT 2: Features of Java   06 hrs
Data types; variables; operators and expressions; programming structure; Operators and Expressions; Decision-Making and Branching: if; if..else; nested if; switch; ?: operator; Looping: while; do; for – Jumps in Loops - Labeled Loops; Array – types of Arrays.

UNIT 3: Classes, Inheritance, Packages and Interfaces   16 hrs
Classes - Class fundamentals; methods; naming conventions; declaring objects; Access specifiers; Final; static; abstract. Native. Volatile; synchronized. Introduction to Constructors; Command Line arguments.
Inheritance - Single; Multilevel inheritance; Method Overriding-Dynamic method dispatch; Abstract classes, usage of super; abstract; final keywords .
Package - Define package; CLASS PATH; access protection; importing packages. Lang-Package - Wrapper classes; Util Package:-Date; calendar; Random; IO packages:-File input stream and output stream.
Interfaces - Defining a package; CLASSPATH; Defining an Interface; Implementing interfaces; Variables in interfaces; Extending interfaces; Implementing interface.

UNIT 4: Exception Handling, Multi-threading, Applets and Event Handling
                                                                   22 hrs
Exception Handling - Fundamental of Exception; Exception types; using try & catch; multiple catch; nested try; throw; finally; built-in exception; user-defined exception
Multithreading; Thread fundamentals; priorities; creating thread using thread class and Runnable interface.
Applet- Basics; Applet Architecture; Applet life cycle; Applet display methods; Repaint; Status window; passing parameters to applets; getDocumentBase() and getCodeBase(); Applet Context and showDocument().
Event handling – Event handling mechanisms; Delegation Event Model; Event classes; Sources of events; Event listener interfaces; handling mouse and keyboard events; Adapter classes; Inner classes.

UNIT 5: AWT & AWT Controls   12 hrs
AWT-AWT classes; Window fundamentals; working with frame windows; Creating a frame window in an applet; Creating a windowed program; Displaying information within a window.

AWT Controls; Layout Managers and Menus – Control fundamentals; Labels; Buttons; Check Boxes; Check Box Group; Choice Control; Lists; Scroll Bar; Text Field; Text Area; Layout Managers; Menu Bars and Menus; Dialog Boxes; File Dialog; Handling events by extending AWT components.

Text Books:

Herbert Schildt. *The Complete Reference- Java*",(7th ed.), Tata McGraw-Hill Publishing Company Limited, NewDelhi.

Liang, Daniel.(2007). *Introduction to JAVA Programming*, (6th ed), Pearson Education.

Patrick Naughton.(1996). *The Java Handbook*, (1st ed.).Tata McGraw-Hill.

References:

Balagurusamy.E. *Programming with JAVA a Primer,* Tata McGraw-Hill Publishing Company Limited: NewDelhi.

Debasish Jana.(2005). *Java and Object-Oriented Programming Paradigm*, PHI.

Deitel and Deitel. *Java Programming*. Prentice Hall.

Deitel H M, Deitel P J . *Java – How to program*, Pearson Education Asia.

James Cohoon, Jack Davidson. *Java Program Design*, McGraw Hill International Edition.

John R. Hubbard . *Programming With Java*. (2nd ed), TMH.

Malik D S. *Java Programming*, Cengage Learning, India Edition.

Nageswara Rao.R. (2008). *CORE JAVA An Integrated Approach*, Dreamtech Press.

13CSC32L1 COMPUTER SCIENCE PRACTICAL III: JAVA PROGRAMMING PRACTICAL

Credit: 1   **Total: 30 Hours**

Part A
1. Write a Java Program to check whether two strings are equal or not.
2. Write a Java Program to reverse a string.
3. Write a Java Program to find the sum of digits of a given number.
4. Write a Java Program to display a multiplication table.
5. Write a Java Program to display all prime numbers between given ranges.
6. Write a Java Program to sort an array.
7. Write a Java Program to create object of tree set and use all the methods.
8. Write a Java Program to check all Math class functions.

Part B
9. Write a program to execute any Windows application (Like notepad, calculator etc).
10. Write a program to copy a file to another file using java IO package classes. Get the file names at run time and if the target file already exists then ask confirmation to overwrite and take necessary actions.
11. Use String Tokenizer class to split a string into tokens using different classes.
12. Write an Applet with a Text Field in which the user will be allowed to enter only numbers.
13. Create a Frame with 2 labels; at runtime display x and y coordinate of mouse pointer in the labels.
14. Create a Frame with three Scrolls; change the background color of the frame using RGB function with values of Scrolls (Use color Object to set the background of the frame).
15. Write a program that consists of a Frame with a ListBox and a TextBox. The text entered in the Text box should be displayed in the ListBox.

Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voice	5
Total Marks	30

13ELE3201 ELECTRONICS III: DIGITAL ELECTRONICS AND VERILOG

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the students are enable to understand the designing of Digital circuits using ICs and software (Verilog).

UNIT 1: Boolean algebra   12 hrs
Introduction to Logic gates- AND, OR, NOT, Logic symbol and truth table; Positive and negative logic. Boolean laws, De Morgan's theorem, simplification of Boolean expressions; SOP and POS, Derived logic gates (NAND, NOR, XOR and XNOR). Universal property of NOR and NAND gates. K-Map - 3 and 4 variable expressions. Pulse characteristics.
Logic Families - Classification of digital ICs, Characteristics of logic families, Circuit description of TTL NAND gate with totem pole and open collector, TTL sub families, Circuit description of CMOS inverter, Comparison of TTL and CMOS families.

UNIT 2: Combinational logic circuits   12 hrs
Half adder, Full adder, Half subtractor, Full subtractor, Two bit comparator, Encoder, Decimal to BCD priority encoder, Decoder 2:4 using AND gates, 3:8 using NAND gates, BCD to Decimal decoder and BCD to 7 segment decoder, Multiplexer(4:1 using gates) and Demultiplexer (1:4 using gates), Examples on Half Adder and Full Adder using MUX.
Data conversion-D/A conversion using 4 bit binary weighted resistor circuit and working, Circuit of R2R ladder - concept only; A/D conversion − characteristics, successive approximation ADC, (Mention the relevant ICs for all).

UNIT 3: Sequential logic circuits   12 hrs
Flip-flops - RS latch, NAND and NOR latches, clocked RS FF, edge triggering and level triggering, D FF and edge triggered J,K FF, T FF, Edge triggered M/S JK flip flop, clear and preset inputs, Registers and counters - 4 bit serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out, applications, Ring counter, Johnson counter and their applications; Asynchronous counters - logic diagram, Truth table and timing diagrams of 3 bit ripple counter, 3 bit up and down asynchronous counter and modified asynchronous counters, Synchronous counter -design using K maps up to mod8(3 bit counter), Example of 4 bit counter.

UNIT 4: Introduction to Verilog   12 hrs
Introduction - A Brief History of HDL, Structure of HDL, Module comparison of VHDL and Verilog, Test Benches.
Verilog - Module, Delays, brief description - data flow style, behavioral style, structural style, mixed style.
Language Elements - Introduction, Keywords, Identifiers, White space characters, integers, data types, net types, register types and parameter; Expressions - Operands, Operators and types of expressions. Gate level Modeling - Introduction, built in primitive gates, multiple input gates, Tristate gates, pull gates, MOS switches, bidirectional switches, gate delay, illustrative examples.

UNIT 5: Data Flow Modeling and Behavioral Modeling   12 hrs

Data flow modeling **-** Continuous assignment, net declaration assignments, delays, net delays and examples.

Behavioral Modeling **-** Procedural constructs, timing controls, conditional statement, loop statement, Procedural continuous assignment, illustrative examples.

Text Books:

Bhaskar.J.(1999). *A VHDL Primer*, Addison Wesley.

Jain R P.(2002). *Modern Digital Electronics* (2nd ed.). TMH Publishing Company Limited.

Kharate, G K.(2002). *Digital Electronics Fundamentals*, Subhash Stores.

Malvino, Albert Paul and Brown, Jerald A. (2009). *Digital Computer Electronics* (3rd ed.). Tata McGraw Hill Publishing co ltd.

References:

Chakravorty Jaydeep.(2012). *Digital Electronics and Logic Design*, University Press.

Kharate,G K.(2002). *Digital electronics Fundamentals*, Subhash Stores.

Rangnekar, Saroj.(2001). *Digital Electronics* (1st ed.). ISTE.

Ratan Rajeev, Batra Deepak. (2010). *Digital Electronics*, Acme Learning.

Samir Palnitkar, (1999), *Verilog HDL; A guide to digital design and synthesis,* (2nd ed.). Pearson.

Padmanabhan.T.R, and B. Bala Tripura sundari.(2004). *Design through Verilog HDL*, IEEE Press.

Note: Scientific calculator is allowed.

13ELE32L1 ELECTRONICS PRACTICAL III: DIGITAL ELECTRONICS AND VERILOG PRACTICAL

Credit: 1   **Total: 30 Hours**

Using ICs and Verilog Software.

1. Implementation of Logic gates
2. Study of universal property of NAND and NOR gates.
3. Half adder and Full adder using gates.
4. Half subtractor and Full subtractor using gates.
5. Decoder Design.
6. Encoder Design.
7. Flip flops-RS FF, D FF and JK FF.
8. 1:4 multiplexer designs. And 4:1 DE Multiplexer design.
9. Shift Register-SISO, SIPO.
10. Ring counter and Johnson counter.

Note: Any 8 Experiments to be performed.
Scientific calculator is allowed.

Evaluation Criteria

Criteria	Marks
Principle, Circuit diagram, Formulas, Brief procedure	10
Execution.	10
Result/output	5
Viva Voce	5
Total	30

13MAT3201 MATHEMATICS III: ALGEBRA, DIFFERENTIAL CALCULUS, IMPROPER INTEGRALS AND LINEAR PROGRAMMING

Credits: 4   **Total: 60 Hours**

Objective:
Unit 1 provides further insights into theoretical abstract algebra. Unit 2 & 3 comprises the different methods of solving first order differential equations and evaluating improper integrals. The section on linear programming aims at introducing the student to optimization techniques.

UNIT 1: Group theory-II   15 hrs
Normal subgroup- definition, theorems, examples and problems; homomorphism and isomorphism of groups, kernel and image of a homomorphism, normality of the kernel; quotient group, fundamental theorem of homomorphism, properties related to isomorphism; permutation group, Cayley's theorem.

UNIT 2: Differential Calculus -IV   25 hrs
Definition of the limit of a function in $\epsilon - \partial$ form-continuity, types of discontinuities, properties of continuous functions on a closed interval (boundedness, attainment of bounds and taking every value between bounds), differentiability-differentiability implies continuity, converse not true, Rolle's theorem, Lagrange's and Cauchy's first mean value theorems, Taylor's theorem, Maclaurin's expansion, evaluation of limits by L'Hospital's rule, continuity and differentiability of functions of two and three variables-Taylor's theorem and expansions of functions of two variables, maxima and minima of functions of two variables, method of Lagrange's multipliers.

UNIT 3: Improper Integrals   10 hrs
Gamma and Beta functions-results following definitions, relations connecting the two functions, duplication formula, application to evaluation of integrals.

UNIT 4: Linear Programming   10 hrs
Linear inequalities and their graphs; statement of the linear programming problem in standard form, classification of solutions, solution of linear programming problems by graphical method, examples on the solution of linear programming problems in two and three variables by the simplex method.

Text Books:
Herstein, I.N.(1991). *Topics in Algebra* ,(4th ed.). New Delhi, Vikas Publishing House.
Bronson, Richard and Costa, Gabriel. *Schaum's Outline of Differential Equations*. (3rd ed.). Mc Graw Hill.
Kalavathy. S. *Operations Research,* East-West.
References:
Fraleigh.J.B. *A First Course in Abstract Algebra*, Addison-Wesley.
Simmons, George.F. *Differential Equations with Applications and Historical Notes,* McGraw-Hill International Edition.
Shantinarayan.S. *Integral Calculus*. S. Chand & Co., Ltd.
Swarup Kanti, Gupta.P.K, Man Mohan, *Operations Research*. S.(9th ed) Chand & Co., Ltd.
Note: Scientific calculator is allowed.

13MAT3202 MATHEMATICS IV: ALGEBRA, DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS AND FOURIER SERIES

Credits: 4   **Total: 60 Hours**

Objective:
Unit 1 provides an extended exposure to an axiomatic treatment of mathematics. Unit 2 comprises the different methods of solving first order differential equations. The student is also introduced to Laplace Transforms and Fourier series.

UNIT 1: Rings, Integral Domains, Fields   20 hrs
Rings- types of rings, properties of rings of integers modulo n, sub rings, ideal, principal and maximal ideal in a commutative ring-examples and standard properties, homomorphism and isomorphism, properties of homomorphism, quotient rings, integral domains, fields, properties following the definition, field is an integral domain-finite integral domain is a field.

UNIT 2: Differential Equations –II   18 hrs
Second and higher order ordinary linear differential equations with constant coefficients-complementary function, particular integrals (standard types); Cauchy-Euler differential equation, simultaneous linear equations (two variables) with constant coefficients; solutions of second order ordinary linear differential equations with variable coefficients by the following methods:
  i)   When a part of the complementary function is given.
  ii)   Changing the independent variables.
  iii) Changing the dependent variables.
  iv) Variation of parameters.
  v)   When the equation is exact.

UNIT 3: Laplace Transforms   12 hrs
Definition and basic properties, Laplace transform of some common functions and standard results, Laplace transform of periodic functions, Laplace transforms of derivatives and integrals of a function, Laplace transform the Heaviside function and Dirac delta function, convolution theorem, inverse Laplace transforms, Laplace transform method of solving ordinary linear differential equations of first and second order with constant coefficients.

UNIT 4: Fourier Series   10 hrs
Periodic functions, Trigonometric Series, Fourier series of functions with period 2π and period 2L – Fourier Series of even and odd functions, Half-range cosine and sine series.

Text Books:
Herstein, I.N.(1991). *Topics in Algebra*, (4th ed.). New Delhi, Vikas Publishing House.
Bronson, Richard and Costa, Gabriel. *Schaum's Outline of Differential Equations,* (3rd ed.). Mc Graw Hill.
 Spiegel, Murray. R. (1974). *Schaum's Outline of Advanced Calculus*, Mc Graw Hill.

References:

Fraleigh.J.B. *A First Course in Abstract Algebra*. Addison-Wesley.
Simmons, George.F. *Differential Equations with Applications and Historical Notes*, McGraw-Hill International Edition.
Brown J.W, Churchill R.V. *Fourier Series and Boundary value problems*. (Mc Graw Hill).

Note: Scientific calculator is allowed.

SEMESTER IV

13ENG4201 ENGLISH IV

Credits: 3   **Total: 60 Hours**

Objectives:
- To develop student's proficiency in the language and develop their communication skills
- To equip learners with skills for self-learning.

UNIT 1: Prose & Poetry   24 hrs
I Have a Dream-Martin Luther King Jr.; Song of the Rain-Khalil Gibran; The Moustache - Guy de Maupassant; India's Heroes -Anonymous; Nightingale and the Rose-Oscar Wilde; Diary of Anne Frank-An Autobiographical Extract.

UNIT 2: Novel   16 hrs
 Bachelor of Arts - R K Narayan.

UNIT 3: Word Power & Writing Skills   10 hrs
 Exercise & Worksheets.

UNIT 4: Functional English   10 hrs
Curriculum Vitae and Cover Letters-Precise writing-Facing an Interview-Kinds of Paragraph Writing.

References:
Bushrui, Suheil B.; Jenkins, Joe (1998). *Kahlil Gibran, Man and Poet: a New Biography*. Oneworld Publications. p.55. ISBN 978-1851682676.
Mendelsohn, Daniel.(2008). "The two Oscar Wildes". *How Beautiful It Is and How Easily It Can Be Broken: Essays By Daniel Mendelsohn*. New York: HarperCollins. p. 218. ISBN 978-0-06-145644-2.
Murphy, Raymond.(1998).*Intermediate English Grammar*.New Delhi: CUP.
Sales-Pontes, A Hilda (1983). *R.K. Narayan*. Atlantic Highlands. ISBN 978-0-391-02962-0.OCLC 10625411.
Wren &Martin (2001).*English Grammar & Composition*. S.Chand & Company Ltd.

13CSC4201 COMPUTER SCIENCE IV: DBMS & VISUAL PROGRAMMING

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the students should have gained knowledge on data base designing and concepts of Data Base Management System and fundamentals of Visual Programming.

Database Management Systems
UNIT 1: Introduction and Data Models   08 hrs
Introduction: Basic Concepts, Data, Database, DBMS; Disadvantages of File Oriented Systems; Advantages of DBMS; Database Users; Database Languages; Characteristics Of Database; Role of DBA.
Data Models: Schemas and Instances; DBMS Architecture and Data Independence; Data Modeling Using the ER Model ,ER Model Concepts; Notation for ER Diagrams; Proper Naming of Schema Constructs; Relationship Types ; Degree of relationship; Introduction to Relational Model, Network Model and Hierarchical Model.

UNIT 2: RDBMS and SQL   12 hrs
RDBMS Concepts: Attributes, Tuple, Keys, Relationships; Relational Algebra Operations-Union, Intersection, Difference, Cartesian Product, Selection, Projection, Join, Division; Relational Calculus- Domain, Domain Integrity, Integrity Rules; Normalization And Its Properties -1NF,2NF,3NF.
DDL, DML and TCL Commands- Create Table/ Views/Index, Drop, Alter, Select,
Insert, Delete, Update, Grant, Revoke, Commit; SQL Query – Sub Query, Nested Query; Joins- Natural, Inner, Outer Join.
MS-Access- Create Database; Creating Relationships; Create Query; Create Form; Create Report.

UNIT 3: Transaction Processing Concepts   10 hrs
Transaction Processing - Introduction; Transaction and System Concepts; Desirable Properties of Transactions; Schedules and Recoverability; Serializability of schedules; Transaction Support in SQL; Concurrency control techniques **-** Locking techniques for concurrency control.

Visual Programming
UNIT 4: Basic Programming Concepts   15 hrs
Introduction: Features of Visual Basic; IDE; Writing Small Programs. Program Constructs: Variables, Constants, Operators, User Defined Data Types, Arrays, Functions, Control Statements, Input Box, MsgBox.
Controls: Intrinsic Controls; Common Properties & Importance; Common Dialog Controls; Windows Common Controls; Advanced Controls.

UNIT 5: Procedures and Data Access   15 hrs
Control Arrays and User Defined Procedures: Creation; General Procedures and Event Procedure; Creating and Calling Functions; Scope of Procedures.
Handling Data Access- Visual Data Manager; Creating a Database; Data Control; Data Access Objects; RDO; ActiveX Objects. ODBC Connectivity; Data Reports.

Text Books: DBMS.
Elmasri & Navathe.(2003) .*Fundamentals of Database Systems*, Pearson Education.
Scott Ulman. *Oracle9i PL/SQL programming,*Tata McGraw-Hill.

References : DBMS
Date. C.J. *Introduction to database systems*. (6th ed.). Addision Wesley.
Ivan Bayross. (2008). *The Programming Languages of Oracle*.(3rd ed.). BPB
Publications.
Patrick O'Neil.(2002). *Data Base Principles; Programming & Performance,*(2nd ed.).
Academic Press.
Silberschataz , Korth, Sudarshan. *Database System Concepts*, McGraw Hill.
Sundarraman. *Oracle 9i programming A Primer*,(1st ed.). Pearson Education.

Text Books: Visual Programming.
Evangelus Petroutsos . *Mastering Visual Basic 6* ,Bpb Puhlnata.
Gurumit Singh. *Visual Basic 6.0,* Firewall Media.

References: Visual Programming.
Charles Petzold. *Windows Programming*, Microsoft Press.
Deitel. *Visual Basics 6: How To Program*, Pearson Education.
Garry Cornell. *Visual Basic 6*, Tmh.
Peter Norton's & Michael Groh.(1998). *Guide To Visual Basic 6*, Techmedia.
Paul Sheriff.(1999). *Visual Basic*, Phi.
Yashavant Kanetkar. *Visual C++ Programming*.

13CSC42L1 COMPUTER SCIENCE PRACTICAL IV: DBMS PRACTICAL

Credit: 1   **Total: 30 Hours**

Part A
1. STUDENT DETAILS DATABASE
The student details database has a table with the following attributes.
STUDENT (RegNo : number; Name : text; DOB : date ; Marks : number)
a) Remove the existing attribute marks from the table
b) Change the data type of regno from integer to string.
c) Add a new attribute PhoneNo to the existing table.
d) Enter 5 tuples into the table.
e) Display all the tuples in student table.
f) Display all the students who were born in 1980s.
g)Display all the students in alphabetical order of their names.

2. LIBRARY DATABASE
A library database has a table with the following attributes:
LIBRARY (BookId: number; Title : text; Author : text; Publisher : text; Year_Pub : number; Price: number (6,2))
a) Enter 5 tuples into the table.
b) Display the different publishers from the list.
c) Arrange the tuples in the alphabetical order of book titles.
d) List details of all the books whose price ranges between Rs. 100.00 and Rs.300.00
e) Display all the authors under a specific publisher.

3. EMPLOYEE SALARY DATABASE
The salary database of an organization has a table with the following attributes :
EMPSALARY (EmpCode : number; EmpName : text; DOB : date; Dept : text; Salary number(10,2))
a) Enter 5 tuples into the table.
b) Display the number of employees working in each department.
c) Find the sum of the salaries of all employees.
d) Find the sum and average of the salaries of employees of a particular department.
e) Find the highest salary that an employee draws.
f) Find the least salary that an employee draws.
g) Find the total salary for each department.
h) Increase the salary of those employees working for the computer department by Rs. 1000.
i)Display all employees increasing order of their age for a specific department.

Part B
4. INVENTORY DATABASE
An inventory database has the following tables
ITEM (ItemCode : number; ItemName : text; Price : number(10,2))
PURCHASE (ItemCode : number; Quantity : number)
a) Create the tables with the above attributes.
b) Enter 5 – 7 tuples into the tables.
c) List the items purchased
d) Display the total items purchased (listing must have the columns : ItemCode

ItemName,Total,Quantity)
e) List the items which are not purchased by anyone.

5. BANK CUSTOMER DATABASE
A bank customer database has two tables CUSTOMER and ACCOUNT.
CUSTOMER (CustNo: number; CustName : text; City : text; AccNo : number ;
Balance : number(10,2))
ACCOUNT (AccNo: number; AccType: text; Branch : text; AccStatus : text;
ChequeFacility : text)
a) Create the above tables and specify the primary and foreign keys
b) Enter 5 – 8 tuples for each relation
c) List the customers from "Bangalore" who have cheque facility.
d) List all the customers whose balance is greater than 30000.00 and have an active
   account.
e) Find the current outstanding balance amount of branch "Malleswaram"

6. INSURANCE DATABASE
Consider the Insurance database given below. The primary keys are underlined and the
data types are specified.
PERSON (DriverId: text; Name : text; Address : text)
CAR (RegNo: text; Model: text; Year: number)
OWNS (DriverId : text; RegNo: text)
ACCIDENT (ReportNo: number; AccDate: Date; Location: text)
PARTICIPATED (DriverId: text; RegNo: text; ReportNo: number; Dmg_Amt:
number(10,2))
a) Create the above tables by specifying the primary and foreign keys.
b) Enter atleast five tuples for each relation
c) Update the damage amount for each car accident.
d) Add a new accident to the database.
e) Find the total number of people who owned cars that were involved in accidents in the
   year 2002.
 f) Find the number of accidents in which cars belonging to a specific model were
involved.
 g) Display the owners and their car details.

7. ORDER PROCESSING DATABASE
Consider the following relations for an order processing database application in a
company.
CUSTOMER(CustId: number; CustName: text; City: text)
CUSTORDER(OrderNo: number; OrderDate: date; CustId: number; OrderAmount:
number)
ITEM (ItemNo : number; ItemName: text; UnitPrice number(10,2));
ORDER_ITEM(OrderNo: number; ItemNo: number; OrdItemQty : number)
WAREHOUSE(WarehouseNo: number; City: text)
SHIPMENT(OrderNo: number; WarehouseNo: number; ShipDate: date)
a) Create the above tables by properly specifying the primary keys and the foreign keys.
b) Enter atleast five tuples for each relation.
c) Produce a listing: CustName; no_of_orders;avg_order_amt; where the middle
   attribute is the total average order amount for that customer.
d) List the order_no for orders that were shipped from all the warehouses that the
   company has in a specific way.

e) Demonstrate the delete of itemno 10 from the ITEM table and make that field null in the ORDER_ITEM table.
f) List all the items ordered by a particular customer.

Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total Marks	30

13ELE4201 ELECTRONICS IV: COMMUNICATION SYSTEMS

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the student are enabling to understand the basic communication system and its applications.

UNIT 1: Noise in communication system   08 hrs
Introduction -Spectrum; Propagation of EM waves.
Noise -Definition, classification (Internal and external), Definition of signal to noise ratio and noise figure.

UNIT 2: Modulation   14 hrs
Introduction - Need for modulation, Types of modulation; AM, FM and PM.
AM - Definition, representation, modulation index, Expression for instantaneous voltage.
AM modulator- Collector modulator.
FM- Definition, modulation index, expression for FM Frequency spectrum (qualitative), Block diagram of AM and FM Transmitter. Comparison of AM and FM.
Receivers - characteristics of Radio receivers; AM super Heterodyne receiver, Diode detector, Principle of AGC, FM Super Heterodyne Receiver, FM Detector. Pre emphasis and De-emphasis with circuits.

UNIT 3: Antennas   14 hrs
Radiation mechanism, wire radiators in space, Resonant antennas, radiation pattern and current distribution for different lengths, Non Resonant Antenna; Antenna parameters- Gain, directive gain, Power gain, Bandwidth, Beam width, polarization, Efficiency, Radiation Resistance, Total effective resistance. Derivation for the Expression of radiation resistance and power radiated by Antenna; Ungrounded and Grounded antennas, Effect of antenna height. Antenna Couplers, Dipole arrays, Folded dipole, Yagi Antenna, designing (5 elements), Numerical examples wherever applicable.
Qualitative study - helical antenna, loop antenna, parabolic reflector, Horn Antenna and Micro strip antenna.

UNIT 4: Transmission Lines and Television communication   14 hrs
Typical transmission lines- types, equivalent of T line, primary and secondary constants, reflection coefficient, expression for K for a loaded line, SWR.
Television-Introduction, scanning-interlaced scanning, TV camera tube (Vidicon). Composite Video signal-blanking and synchronizing pulses. Vestigial sideband transmission, block diagrams of monochrome TV transmitter and receiver.
Tv systems and standards - comparison between American and European systems. Basic principles of colour TV-primary and secondary colours, colour combinations. Simplified block diagram of PAL colour TV receiver.

UNIT 5: Microwaves   10 hrs
Microwaves-frequency spectrum, microwave bands, characteristic features of microwaves, applications of microwaves.
Microwave devices - klystron amplifier, reflex klystron , magnetron -construction, working and working. Gunn effect and Gunn diode-working and applications.

Text Books:

Kennedy George .(1999). *Electronic Communication,* (3rd ed.). TMH Publishing Company Limited.
Roddy and Coolen. (1995). *Electronic Communication* ,(4th ed.). PHI.

References:

Deshpandae, Shashi. (2001). *Communication Electronics*, TMH.
Frenzel. (1999). *Communications Electronics* (3rd ed.). TMH.

Note: Scientific calculator is allowed.

13ELE42L1 ELECTRONICS PRACTICAL IV: COMMUNICATION I PRACTICAL

Credit: 1   **Total: 30 Hours**

1. Band elimination filter (Notch filter)
2. Pre Emphasis and De Emphasis
3. Amplitude modulator and Amplitude demodulator
4. Study of sensitivity of an AM radio receiver
5. Study of selectivity and fidelity of an AM radio receiver.
6. Balanced slope detector
7. Three way Audio cross over network
8. Balance modulator
9. Frequency mixer
10. FM modulator using IC 8038
11. AGC
12. Frequency Multiplier.

Minimum of 10 experiments to be performed.

Reference:

Poornachandra Rao.S and Sasikala.B.(2004). *Hand book of experiments in electronics and communication engineering*, VIKAS Publishing House.

Evaluation Criteria

Criteria	Marks
Principle, Circuit diagram, Formulas, Brief procedure	10
Setting/Circuit connections, taking reading and tabulation	10
Calculation and graph	5
Viva	5
Total	30

Note: Scientific calculator is allowed.

13MAT4201 MATHEMATICS V: REAL AND COMPLEX ANALYSIS

Credits: 4   **Total: 60 Hours**

Objective:
The course aims at familiarizing students with the basic theorems and techniques of real and complex analysis. This includes understanding the concept of convergence and its mathematical formalisms and acquiring knowledge of the special character and properties of functions of a complex variable.

UNIT 1: Sequences of Real Numbers   **12 hrs**
Definition of a sequence, bounded sequences, limit of a sequence, convergent, divergent and oscillatory sequence, monotone sequences and their properties, Cauchy's criterion.

UNIT 2: Series of Real Numbers   **18 hrs**
Definition of convergence, divergence and oscillation of series; properties of series of positive terms, geometric series, p-series, tests for convergence of series- comparison test, Cauchy's root test, D'Alembert test, Raabe's test; absolute and conditional convergence, D'Alembert test for absolute convergence, alternating series- Leibnitz test; summation of binomial, exponential and logarithmic series.

UNIT 3: Complex Analysis-I   **18 hrs**
Complex number, the complex plane, conjugate and modulus of a complex number, polar form, geometrical representation, Euler's formula $e^{i\theta} = \cos\theta + i\sin\theta$, functions of a complex variable, limit, continuity and differentiability, analytic functions, Cauchy – Riemann equations in Cartesian and polar forms, sufficient condition for analytic functions (in Cartesian form), standard properties of analytical functions, construction of analytical functions given real or imaginary parts-Milne-Thomson method; the complex line integral, examples and properties, Cauchy's integral theorem (proof using Green's theorem) and its direct consequences, Cauchy's integral formula for the function and the derivatives, application to evaluation of simple line integrals, Cauchy's inequality, Liouville's theorem, fundamental theorem of algebra.

UNIT 4: Complex Analysis-II   **12 hrs**
Transformations-definition of a conformal transformation, examples, discussion of the transformations $w=z^2$, $w = \sin z$, $w = \cos z$, $w = e^x$, $w = \cosh z$, the bilinear transformation, cross ratio property, bilinear transformation of circles and lines, problems.

Text Books:
Narayan, Shanti and Raisinghania, M. D. (1965).*Elements of Real Analysis,* (8th ed.). New Delhi, S Chand& Co. Ltd
Churchill, R. V. and Brown, J W. (2003).*Complex Variables and Applications*. (7th ed.). McGraw Hill Education

References:

Malik, S.C. and Arora, Savita.(1992). *Mathematical Analysis,* (2nd ed.), New Delhi, New Age   International.
Rudin, Walter. (2006). *Real and Complex Analysis,*(3rd ed.), New Delhi, Tata McGraw Hill.
Ahlfors, L.V. (1979). *Complex Analysis*. (3rd ed.). New York, McGraw Hill.

Note: Scientific calculator is allowed.

13MAT4202 MATHEMATICS VI: TOTAL AND PARTIAL DIFFERENTIAL EQUATIONS, PARTICLE DYNAMICS AND NUMERICAL ANALYSIS

Credits: 4   **Total: 60 Hours**

Objective:
The paper aims at developing a sound knowledge of the techniques of solution as well as application of partial differential equations and understanding and applying principles of particle dynamics to problem solving. An introductory module on Numerical analysis is also included.

UNIT 1: Total and simultaneous differential equations, Partial differential equations   20 hrs
Total differential equations, necessary condition for the equation $Pdx + Qdy + Rdz = 0$ to be integrable, simultaneous equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$.

Formation of partial differential equations; solution of equations of first order-Lagrange's linear equation, standard types of first order non-linear partial differential equations, Charpit's method; solution of second order linear partial differential equations in two variables with constant coefficient by finding complementary function and particular integral.

UNIT 2: Particle Dynamics-I   15 hrs
Newton's Laws of motion, conservative forces and potential energy, definitions of work, kinetic energy and power; motion of a particle in a uniform force field-simple harmonic motion, two dimensional motion of projectiles.

UNIT 3: Particle Dynamics-II   15 hrs
Tangential and normal components of velocity and acceleration, radial and transverse components of velocity and acceleration, constrained motion of a particle under gravity along inside and outside of a circle; motion of a particle in a central force field - determination of orbit from central forces and vice versa.

UNIT 4: Numerical Analysis   10 hrs
Solution of algebraic and transcendental equations-bisection method, Newton Raphson method, Secant method, method of false position.
Numerical Solutions of non-homogeneous system of equations- Jacobi's and Gauss Seidel Methods.

Text Books:
Sneddon, I. N. *Elements of Partial Differential Equations*. New York, McGraw Hill.
Singh, Kaushal Kumar. (2011). *Text Book of Dynamics*, New Delhi: Phi Learning Pvt. Ltd
Sastry, S.S. (2005) .*Introductory Methods of Numerical Analysis*.(4th ed.). Phi Learning Pvt. Ltd.

References:

Ross, Shepley L. (1984).*Differential Equations*. (3rd ed.), Wiley India.
Chorlton, F. (1963). *Text Book of Dynamics*. London, Van Nostrand.
Jain M.K, Iyengar, S.R.K and. Jain R. K. *Numerical Methods for Scientific and Engineering Computation*, Wiley Eastern.

Note: Scientific calculator is allowed.

SEMESTER V

13CSC5201 COMPUTER SCIENCE V: SOFTWARE ENGINEERING

Credits: 4   **Total: 60 Hours**

Objective:
Software requirement capturing and developing; coding; testing and debugging applications; identifying testing technologies for project implementation and maintenance.

UNIT 1: The Product   04 hrs
Evolution of software; Characteristics of software; Software applications; Components of software; Software myths; Software problems; Software reuse; Overview of risk management; Process visibility; Professional responsibility.

UNIT 2: The Process   05 hrs
Definition of software engineering; Software engineering models-Waterfall model, Prototyping model, Spiral model.

UNIT 3: Project Management and Planning   20 hrs
Management spectrum – people, product, process ,project; Metrics-Measures; Metrics and indicators; Types of metrics-Size oriented, Function-Oriented metrics, Metrics for software quality; Resources-human, hardware ,software resources; Software project estimation-Decomposition technique, LOC based estimation, Empirical estimation; COCOMO model; Risk management: Risk identification, Risk analysis, Risk projection, Risk assessment, Risk prioritization, Risk resolution, Risk monitoring and control; Project scheduling - Work tasks, Time line charts and CPM; Software quality assurance; Quality; Formal technical review and software reliability.

UNIT 4: Analysis Principles and Design Concepts   20 hrs
Analysis Principles - Prototyping; Software requirement specification(SRS).
Analysis Modeling – Data modeling; Data flow diagram(DFD); Structured analysis.
Design Concepts and Principles – Design process; Design principles; Design concepts and effective modular design; Design steps; Data design; Object oriented design; Function oriented design; Interface design and procedural design.

UNIT 5: Software Testing and Maintenance   11 hrs
Software Testing - The testing process; Test planning & strategies; Types of testing: Unit testing; Integration testing; System testing; Acceptance testing; Black box and White box testing and static verification.
Maintenance - Types of maintenance; Enhancing maintainability during development.

Text Books:
Roger S Pressman. *Software Engineering – A practitioner's Approach*. (5th ed.).Mc Graw – Hill International Edition.

References:
Ian Sommerville.(2002). *Software Engineering*.(6th ed.). Pearson Education Asia.
Pankaj Jalote.(1995). *An Integrated Approach to Software Engineering*, Narosa Publications.
Carlo Ghezzi, Mehdi Jazeryeri and Dino Mandrioli.(2002). *Fundamentals of Software*

Engineering, (2nd ed.). PHI Learning Private Limited.

James F Peters and Witold Pedryez.(2000). *Software Engineering – An Engineering Approach*. New Delhi, John Wiley and Sons.

Stephen R Schach. *Object-Oriented and Classical Software Engineering*.(5th ed.). McGraw-Hill.

Richard Fairley.(2001). *Software Engineering Concepts,* (6th ed.). Tata McGraw Hill edition.

Jon Fairclough.(1996). *Software Engineering,* Prentice Hall Press.

Peter A. Darnell and Philip E. Margolis.(1996). *A Software Engineering Approach,* Springer Verlag.

13CSC5202 COMPUTER SCIENCE VI: OPERATING SYSTEM CONCEPTS AND UNIX/LINUX

Credits: 4   **Total: 60 Hours**

Objective:
A general idea about Operating Systems and an in-depth knowledge of the Unix/Linux Operating System.

Operating System
UNIT 1: Introduction to Operating Systems   08 hrs
What is an operating system(OS)?; History of OS; Simple Batch Systems; Multi programmed Batched Systems; Time-Sharing Systems; Personal Computer Systems; Distributed Systems and Real –Time Systems; Operating System Structures- Command Interpreter System; Operating System Services; System Calls; System Programs.

UNIT 2: Process Management   16 hrs
Process Management: Process Concept; Process control Block; Process Scheduling; CPU Scheduling – Basic Concepts; Scheduling Algorithms – FIFO; RR; SJF; Multi-level; Multi-level feedback. Process Synchronization and deadlocks**:** The Critical Section Problem; Synchronization hardware; Semaphores; Classical problems; Critical Regions; Monitors; Deadlock: System model; Characterization; Dead lock prevention; Avoidance and Detection; Recovery from dead lock; combined approach to deadlock handling.

UNIT 3: Storage Management   10 hrs
Storage Management : Basic Concepts; Logical and Physical Address Space ; Swapping; Contiguous Allocation; Paging; Segmentation; Virtual Memory – Demand Paging; Page Replacement; Page Replacement Algorithms; Allocation of Frames; Thrashing and Demand Segmentation.

Unix / Linux Operating System
UNIT 4: Unix File System, Special Tools and Utilities and Process Management   13 hrs
History; Features; Architecture; File system: Boot Block; super block; Inode table; data block; storing and accessing files; directory and file related commands.
Special Tools and Utilities: Filters process; pipe and pipeline; process control; FORK; EXIT; WAIT & EXEC system call; Unix system calls and Library functions.
Process Management : Process state; data structure of a process; user v/s kernel mode; context of a process; background processes; process scheduling; process terminating and examining commands.

UNIT 5: System Administration and Shell Programming   13 hrs
User & supervisor privileges & facilities; accessing the file system; security issues
Secondary storage management
Shell Programming : C Shells; shell variables; parameter shell commands; if; while; until; for; break; continue and simple programs. Unix System Communication
Introduction: write; read; wall; mail commands.

Text Books:
Sumitabha Das. *UNIX Concepts and Applications*. (4th ed.), Tata McGraw-Hill Education.
Stallings Williams.(2005). *Operating Systems*, (2nd ed.), Prentice Hall.
Silberschartz Abraham, Galvin Baer Peter.(2000).*Operating System Concepts*. (5th & 6th ed.), John Wiley & Sons.

References:
Forouzan Behrouz, A. and Gilberg Richard, F. (2003). *UNIX and Shell Programming*, Brooks/Cole-Thomson Learning.
Sobell Mark, G. (1994). *UNIX System V: Practical Guide. Addison*-Wesley Professional.
Godbole Achyut, S .(2005). *Operating Systems with case studies in UNIX, (2nd ed.),* Tata McGraw-Hill Education.
Srimani, P. K. and Nasir, S. F. B. *Introduction to Unix Operating System*, Cambridge University Press India Pvt. Ltd.
Raymond Eric, S. (2009). *The art of UNIX programming,* Pearson Education.
Kernighan, B. W. and Robert, B. (1984). *The UNIX Programming Environment*. Prentice Hall.
Gandhi Meeta ,Shetty Tilak and Shah Rajiv. (1992). *Vijay Mukhi's the 'C' Odyssey: UNIX - the Open-boundless C",* Tech Publications.
Milenkovic Milan. (2001). *Operating Systems Concepts and Design*. (2nd ed.), Tata McGraw Hill Education.

13CSC52L1 COMPUTER SCIENCE PRACTICAL VI: UNIX/LINUX PRACTICAL

Credit: 1   **Total: 30 Hours**

Part A
1. Write a shell program to count the number of characters in a given string.
2. Write a shell program to count the number of vowels.
3. Write a shell program to find whether the given year is leap year or not.
4. Write a shell program to check whether given string is palindrome or not.
5. Write a shell program to display all the files in a current directory.
6. Write a shell program to find the factorial of a given number.
7. Write a shell program to print a string in a reverse order.
8. Write a Shell Script to print the multiplication table.
9. Write a menu based program to permit or remove read/write/execute permission of a file.
10. Write a shell program to compare two strings given by the user.

Part B
11. Write a menu driven shell script to implement the following UNIX commands:
    a) rm -r   b) uniq   c) tail   d) cmp
12. Write a shell script to create a file and compress it using
    a) compress   b) pack
13. Write a shell script to find a given pattern in a list of files of current directory using grep Command.
14. Write a shell script to generate the prime numbers between a lower and upper limit.
15. Write a shell script for sending and handling mail using write command.
16. Write a shell script to create two directories and store five files in one directory using the related commands and to transfer all the files to another directory.

Evaluation Criteria.

Criteria	Marks
Writing any two programs from the given three questions. (The questions will be one from part – A and two from part B).	5 x 2 = 10
Executing the written two programs.	7.5 x 2 = 15
Viva Voce	5
Total Marks	30

13ELE5201 ELECTRONICS V: ADVANCED COMMUNICATION SYSTEMS

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the student are enabling to understand the basic communication system and its applications.

UNIT 1: Pulse and Digital Modulation   14 hrs
Pulse modulation – Types-PAM, PWM, PPM. Sampling theorem.
Digital communication systems-pulse code modulation (PCM), differential pulse code modulation (DPCM), Delta Modulation.
Digital communication systems-Introduction, block diagram, Advantage and disadvantages, Applications.
Characteristics of data transmission circuits **-** Shannon limit information capacity, Bandwidth requirements, Data transmission speed, Noise, Cross talk, Echo Suppressors, Distortion and Equalizer.
Digital modulations (ASK,FSK,PSK QPSK).

UNIT 2: RADAR systems   14 hrs
Introduction - RADAR principles, frequencies and powers used in RADAR, maximum unambiguous range, detailed block diagram of pulsed RADAR system, RADAR range equation, derivation, factors influencing maximum range, effect of ground on RADAR , antenna characteristics, Doppler effect, MTI RADAR, Block diagram, CW RADAR, Block diagram, advantages, applications and limitations, FM CW RADAR, block diagram, Numerical examples where ever applicable.

UNIT 4: Satellite communication   10 hrs
Introduction - satellite orbits, Satellite system; Block diagram, satellite sub systems, up link, down link, cross link, transponders (C, band) (Space content), ground station (simplified Block diagram of earth station). Multiple access methods -TDMA, FDMA, CDMA; GPS services like SPS and PPS.

UNIT 5: Optical Fiber Communication   08 hrs
Introduction; Need for OFC, Block diagram of OFC, Fiber optic cables, Light propagation through fiber, Expression for NA (no derivation), Types of Light sources and Detectors, Losses in OFC, Advantages and disadvantages of OFC over metallic cables.

UNIT 5: Cellular Communication and wireless LANs   14 hrs
Cellular communication **-** Concept of cellular, mobile communication, cell and cell splitting, frequency bands used in cellular communication, Absolute RF channel Numbers(ARFCN), frequency reuse, roaming and hand off, Authentication of the SIM card of the subscribers, IMEI number, concept of data encryption, Architecture (block diagram) of cellular mobile communication network, qualitative study of GSM and CDMA systems, CDMA technology, CDMA overview; simplified block diagram of cellular phone hand set, comparative study of GSM and CDMA.

Wireless LANs **-** major components of local area network, primary characteristics of Ethernet, mobile IP, OSI model, wireless LAN requirements, concept of Bluetooth, Wi-Fi and WIMAX,LTE

Text Books:
George Kennedy. (1999). *Electronic Communication,* (3rd ed.). TMH Publishing Company Limited.
Roddy and Coolen .(1995). *Electronic Communication,* (4th ed.). PHI.

References:
Deshpandae, Shashi .(2001). *Communication Electronics*, TMH.
Frenzel (1999), *Communications Electronics,* (3rd ed.). TMH.
Umesh sinha.(2009). *Principles of Communication engineering*, Satya Prakashan.
Wayne Thomasi. (2005). *Electronic Communications Systems, (*5th ed.). Pearson Education.

Note: Scientific calculator is allowed.

13ELE52L1 ELECTRONICS PRACTICAL V: COMMUNICATION II PRACTICAL

Credit: 1   **Total: 30 Hours**

1. ASK modulation and demodulation
2. FSK modulation
3. PWM and PPM
4. PAM modulator and demodulator.
5. Two stage Rc coupled amplifier
6. IF amplifier
7. Class C tuned amplifier
8. Study of SMPS
9. Characteristics of OFC
10. PLL using IC 565

Minimum of 8 experiments to be performed.

References
Poornachandra Rao.S and B Sasikala. (2004). *Hand book of experiments in electronics and communication engineering,* VIKAS Publishing House.

Evaluation Criteria

Criteria	Marks
Principle, Circuit diagram, Formulas, Brief procedure	10
Setting/Circuit connections, taking reading and tabulation	10
Calculation and graph	5
Viva Voce	5
Total	30

Note: Scientific calculator is allowed.

13ELE5202 ELECTRONICS VI: MICROPROCESSOR AND MICROCONTROLLER

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the student should have understood the working of basic microprocessor and microcontroller. Student should be in a position to understand assembly language programming concepts

UNIT 1: Introduction to Microprocessor and Architecture   12 hrs
Introduction - Basic block diagram, speed, word size, memory capacity, classification. Basic operations, instruction fetch, memory read, memory write, I/O read, I/O write. Basic parts of a microprocessor based system.
Internal Architecture - Features of 8085, Architecture of 8085, Block diagram, internal registers, Register pairs, Flags, Stack pointer, Program counter, Types of Buses. Clock circuit, Pin diagram of 8085.Instruction, Operation code, Operand, Mnemonics. Instruction set, Instruction classification, Addressing modes.

UNIT 2: 8085 Instruction set   12 hrs
Instruction set - Data transfer and Memory operations, Arithmetic operations, Increment & Decrement operations, Logical operations, Branch operations, Stack operations, I/O and Machine control operations, Interrupts. Delay loops, use of counters, Timing diagrams- T, states, Instruction cycle, Machine cycle, Opcode fetch, I/O read, I/O write, memory read, Memory write.

UNIT 3: Introduction to 8051 microcontroller   12 hrs
Introduction- Comparison between micro controller and general purpose microprocessor, different types of microcontrollers, Comparison of 8 bit, 16 bit and 32 bit microcontrollers, Overview of 8051 series.
Internal Architecture - key features of 8051, I/O ports, memory organization, counters and timers, serial I/O ports, interrupts of 8051.

UNIT 4: 8051 - Instruction Set & Assembly Language programming   12 hrs
Instruction Set - Addressing modes of 8051, instruction set, data transfer , arithmetic, logical, jump and call, Instructions, Program for data transfer. Memory operations, arithmetic, logical, sorting.

UNIT 5: External Peripheral Interfacing   12 hrs
Interfacing-Interfacing switches, LEDs, Matrix Keyboard, Seven Segment Displays, 16 x 2 LCD, pulse measurement, analog to digital and digital to analog converters, interrupt programming, UART Interface**.**

Text Books:
Ramesh S Gaonkar.(2003). *Microprocessor Architecture Programming and Applications with 8085,*(4th ed.). Wiley Eastern Limited.
Kenneth J Ayala. (2005). *The 8051 microcontroller Architecture programming and Applications* ,(2nd ed.). Pen ram International Publishing PVT. Ltd.

Muhammad Ali Mazidi and J G Mazidi & R.D McKinlay.(2006). *The 8051 microcontroller and embedded system,* (2nd ed.).Prentice hall.

References:

B.Ram. (2000). *Fundamentals of Microprocessor & Microcomputer,* Danpat Rai Publication.
Raj Kamal.(2005). *Microcontroller Architecture programming Interfacing and system design,* (2nd ed.). Pearson Education.
Douglas V Hall. (2000). *Microprocessor and Interfacing,* (3rd ed.).Tata Mc Graw Hill.

Note: Scientific calculator is allowed.

13ELE52L2 ELECTRONICS PRACTICAL VI: MICROCONTROLLER AND INTERFACING PRACTICAL

Credit: 1   **Total: 30 Hours**

PART-A

1. Program to add & subtract two 8 bit numbers.
2. Program to find 2's compliment of a 16 bit number.
3. Program to find largest/smallest of N numbers.
4. Program to find the sum of N 8 bit number.
5. Program to find whether the given data is palindrome or not.
6. Program to find the ascending /descending order of the numbers given in an array.
7. Program to multiply& divide two 8 bit numbers.
8. Program to interchange 2 one Byte number.

PART-B

1. Interfacing with keyboard
2. Interfacing with DAC.
3. Interfacing with Seven segments Display.
4. Interfacing with ADC.

Any 6 Experiments from Part-A and 2 Experiments from Part-B to be performed.

Evaluation Criteria

Criteria	Marks
Writing program.	10
Executing program.	10
Formatting Input Procedures and Output Screens	5
Viva Voce	5
Total	30

Note: Scientific calculator is allowed.

13MAT5201 MATHEMATICS VII: GEOMETRY OF SPACE CURVES & VECTOR CALCULUS

Credits: 4   **Total: 60 Hours**

Objective:
This course is designed to develop the intuitive understanding, theoretical knowledge, and computational skills necessary for the concepts of calculus of functions of several variables by combining vector differential calculus and vector integral calculus. The student is also introduced to calculus of variations.

UNIT 1: Integral Calculus II   **10 hrs**
Applications of integral calculus: computation of lengths of arcs, plane areas and surface area and volume of revolution for standard curves in Cartesian and polar forms.

UNIT 2: Geometry of Space Curves   **15 hrs**
Vector function of a single scalar variable, its interpretation as a space curve, derivative, tangent, normal and binormal vectors to a space curve, Serret-Frenet formula, simple geometric applications, finding curvature and torsion; vector function of two scalar variables, its interpretation as a surface, tangent plane and normal to a surface, normal line; parametric curves on the surface of cylinder and sphere, conversion to cylindrical and spherical polar coordinates.

UNIT 3: Vector Differential Calculus   **15 hrs**
Scalar field, gradient of a scalar field -geometrical meaning, directional derivatives, vector field, divergence and curl of a vector field, solenoidal and irrotational fields, scalar and vector potentials, Laplacian of a scalar field, vector identities, expressions for div f and curl f in orthogonal curvilinear coordinates and specialization to Cartesian, cylindrical and spherical polar coordinates.

UNIT 4: Line and Multiple Integrals & Integral Theorems   **20 hrs**
Definition of a line integral and basic properties, examples on evaluation of line integrals; definition of a double integral, evaluation of double integrals by change of order of integration and by change of variables, computation of plane and surface areas, volume underneath a surface and volume of revolution using double integral; definition of a triple integral and evaluation, change of variables, volume as a triple integral.
Green's theorem (without proof) in the plane -direct consequences of the theorem; Divergence theorem (without proof) - direct consequences of the theorem; Stokes theorem (without proof) - direct consequences of the theorem.

Text Books:
Shantinarayan, S. *Integral Calculus,* New Delhi,S. Chand.
Shantinarayan.S. and Mittal, P.K,(2011).*A Text Book on Vector Calculus*, New
Delhi, S. Chand.
Spiegel, Murray. R. (1974). *Schaum's Outline of Advanced Calculus*, Mc Graw Hill.
References:
Sokolnikoff, I.S. *Advanced Calculus*, Mc Graw Hill.
Spiegel, Murray. R. *Schaum's Outline of Vector Analysis,* Mc Graw Hill.
Maurice D Weir, Joel Hass, Frank R Giordano Thomas' *Calculus,* (11th ed.). Pearson.
Note : Scientific calculator is allowed.

SEMESTER VI

13CSC6201 COMPUTER SCIENCE VII: INTERNET TECHNOLOGY

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course, the student should be able to master the concepts of Internet technology and services.

UNIT 1: Fundamentals of Internet   **10hrs**
History; Internet addressing; Protocols: TCP/IP, HTTP; Domain name system; Intranet; URL; E-Mail; Directory services; News groups; Search engines.

UNIT 2: HTML   **15 hrs**
Introduction to Hypertext markup language; Structure of HTML document; Head elements; Basic text formatting; Presentational elements; Phrase elements; Lists; Nested Lists; Tables; Hyperlinks; Images; Image maps; Forms; Frames.

UNIT 3: Cascading Style Sheets (CSS)   **15hrs**
Introduction; Internal style sheet; External style sheet; Controlling text; Text formatting; Selectors; Box Model; Backgrounds; Tables; Lists.

UNIT 4: Java Script   **15 hrs**
Browser and document object; Scripts and HTML document.
Programming Fundamentals: Variables, Expressions and evaluation, Operators, Data type conversion; Conditional statements; Loops; Functions.
Built-in Objects: String, Date, Math, Array, Window; Events; Window and Document objects; Image object: Precaching images, Image rollovers; Forms and form elements; Form validation; Form enhancements.

UNIT 5: Introduction to XML   **05 hrs**
Introduction to XML; XML Syntax; Working with document type definitions; Introducing XML schemas.

Text Books:
Danny Goodman, Brendan Eich. (2007), *JavaScript Bible* ,(6th ed.),Wiley Publications.
DuckettJon.(2011).*HTML,XHTML,CSS and JavaScript*.NewDelhi:Wiley India,
Steven M.Schafer. (2010).*HTML, XHTML, and CSS Bible*(5th ed.).Wiley-Eastern Publishing Inc.

References:
Alexis Leon and Matews Leon, *Internet for Everyone*.NewDelhi:Vikas Publishing house Pvt.Ltd.
Elizabeth Castro.(2006).*HTML, XHTML, and CSS: Visual QuickStart Guide* (6th ed.).
Harley Hahn.*Internet Complete Reference*.
Krayank ,Habraken.*Internet 6 in 1*.NewDelhi :Prentice Hall of India Pvt.Ltd.
Pfaffenberger, Bryan.(2000).*HTML 4/4.01 Bible - with DHTML/XHTML and JavaScript*, India IDG .

13CSC62P1 COMPUTER SCIENCE PRACTICAL VIII: ENTERPRISE COMPUTING PROJECT USING .NET TECHNOLOGY

Credits: 3   **Total: 60 Hours**

Guidelines:

* Students have to develop a project using any advanced technology.
* Project can be implemented live but need to be demonstrated at the time of examination.
* The Internal Assessment (IA) marks can be awarded by the guide by evaluating the performance of the student during the course of the project work.
* The students can do the project in a group (team) consisting of not more than 2.
* Each team must submit a project report.
* A report of each individual phase has to be submitted within the stipulated time to the concerned faculty.
* The individual report for each phase has to be submitted as mentioned below with time lengths.

1. Initialization phase: The initialization phase is the beginning of the project. In this phase, the idea for the project is explored and elaborated. The goal of this phase is to examine the feasibility of the project. Questions to be answered in the initiation phase include the following:

o Why this project?
o Is it feasible?
o What should the results be?
o What are the boundaries of this project (what is outside the scope of the project)?

   Time Length: 5 hours of project lab.

2. Definition phase: After the project plan (which was developed in the initialization phase) has been approved, the project enters the second phase: the definition phase. In this phase, the requirements that are associated with a project result are specified as clearly as possible.

   It is important to identify the requirements as early in the process as possible. The several categories of project requirements are:

o Preconditions
o Functional requirements
o Operational requirements
o Design limitations
   Time Length: 10 hours of project lab.

3. Design phase: The list of requirements that is developed in the definition phase can be used to make design choices. In the design phase, one or more designs are developed, with which the project result can apparently be achieved.
   Time Length: 10 hours of project lab.

4. Development phase: During the development phase, everything that will be needed to implement the project is arranged. The development phase is complete when implementation is ready to start.

Time Length: 25 hours of project lab.

5. Implementation phase: The project takes shape during the implementation phase. This phase involves the construction of the actual project result.
Time Length: 5 hours of project lab.

6. Follow-up phase: Although it is extremely important, the follow-up phase is often neglected. During this phase, everything is arranged that is necessary to bring the project to a successful completion.
Time Length: 5 hours of project lab.

- Marks allotment for project :
Total (IA+EA) = 40+60
Internal Assessment (Record + Attendance + Preparatory): 10+5+25.
External Assessment (Viva + Demonstration): 20+40.

13ELE6201 ELECTRONICS VII: DIGITAL SIGNAL PROCESSING

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the student should have understood basic digital processing concepts and Student should be in a position to design digital filters using MATLAB.

UNIT 1: Discrete-time Signals and Systems   **12 hrs**
Discrete time signals, basic sequences and sequence operations, DT systems, moving average, time-invariance, linearity, causality, stability criterion, properties of linear time-invariant systems; Linear convolution, linear constant-coefficient difference equations.

UNIT 2: Frequency Domain Analysis   **12 hrs**
Fourier transform of sequences, properties, Inverse FT sampling of continuous time signal, Nyquist rate and aliasing problem, interpolation formula, frequency response of rectangular window, recovery of analog signal.

UNIT 3: Discrete Fourier Transform   **12 hrs**
DFT and its computation, properties, circular and linear convolution, FFT, Time and frequency decimination, IDFT, Interpretation of DFT results, DFT-FT relationship.

UNIT 4: The Z-transform   **12 hrs**
Definition, region of convergence (RoC), pole zero plot and region of convergence, properties of region of convergence, the inverse z-transform, power series expansion, z-transform properties.

UNIT 5: Digital Filter Design   **12 hrs**
Design of D-T IIR filters from continuous time filters, frequency transformations of low pass IIR filters; Design of FIR filters by windowing technique, the Kaiser Window filter design method, design procedure using frequency sampling method.

Text Books:
Proakis and Monalakis.(2007). *Digital Signal Processing-principles Algorithms & applications,* (4th ed.). Pearson education.
Sanjit K. Mitra.(2005). *Digital Signal Processing*, (3rd ed.). TMH, New Delhi.

References:
Oppenheim and Schaffer.(2003).*Discrete Digital Signal Processing*, PHI.
Mitra. S. K.(2010). *Discrete Digital Signal Processing*, (3rd ed.). Tata Mc-Graw Hill.
Lee Tan.(2007). *Discrete Digital Signal Processing*, Elsivier publications.

Note: Scientific calculator is allowed.

13ELE62L1 ELECTRONICS PRACTICAL VII: MATLAB PRACTICAL

Credit: 1   **Total: 30 Hours**

1. Introduction to DSP and MATLAB.
2. Signal sequence and operations
   a. a.unit sample sequence.
   b. unit step sequence.
   c. sinusoidal sequence.
2. Operation on signals-addition & multiplication of two signals.
3. Operation on signals- holding & shifting of a sequence.
4. Operation on signals- linear convolution & correlation.
5. DTFT of finite duration sequence.
6. DTFT of infinite duration sequence.
7. Verification of DTFT properties-conjugate symmetric, sequencing shifting, Periodicity of DTFT.
8. Verification of DTFT properties- time shifting, Linearity property of DTFT.
9. Verification of DTFT properties- circular holding & circular shifting property.
10. Z-transforms-
    a. To find the Z-transform using filter functions.
    b. To find convolution using Z-transform using convu functions.
11. Design of Butterworth filters
    a. Butterworth low pass filter.
    b. Butterworth high pass filter.
    c. Butterworth band pass filter.

Minimum of 8 experiments to be performed.

Evaluation Criteria

Criteria	Marks
Writing two programs.	5 x 2 = 10
Executing two programs.	5 x 2 = 10
Formatting Input Procedures and Output Screens	5
Viva Voce	5
Total	30

Note: Scientific calculator is allowed.

13ELE6202 ELECTRONICS VIII: BIOMEDICAL ELECTRONICS

Credits: 4   **Total: 60 Hours**

Objective:
On successful completion of the course the student should have understood the working of various biomedical instruments used in medical field

UNIT 1: Anatomy and physiology   05 hrs
Introduction-Elementary ideas of cell structure and electrical system , Heart circulatory system and electrical activity , Central nervous system , Muscle action and potentials , Body temperature.

UNIT 2: Introduction to Medical Electronics   10 hrs
Clinical Equipment's - Overview, Classification, application and Specifications of diagnostic, therapeutic and clinical laboratory equipment, Block diagram description and application of following instruments, ECG Machine, EEG Machine, EMG Machine.

UNIT 3: Electrodes and Transducers   10 hrs
Electrodes-Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface, contact impedance, Types of Electrodes, Electrodes used for ECG, EEG, Bio transducers- Typical signals from physiological parameters, pressure transducer, flow transducer, temperature transducer, pulse sensor, respiration sensor.

UNIT 4: Instrumentation and Measurements   20 hrs
Application-Importance of measurement, Basic measuring systems, advantages and limitations of each measuring systems, generalized measurement system, signal conditioning and display device electrical pressure pickups and their principle, construction application and use of pressure cells. Basic principles of magnetic and ultrasonic flow meters, Measurement of other non electrical quantities such as humidity, pH level.

UNIT 5: Patient Monitoring Systems   15 hrs
Monitoring system-Heart rate measurement monitor , Pulse rate monitoring , Blood pressure measurement and monitoring, Principle of defibrillator and pace mark , Use of Microprocessor and microcontroller in patent monitoring, Elements of telemetry and data acquisition system

Text Books:
R S Khandpur. (2003). *Handbook of biomedical Instrumentation*,(2nd ed.). TMH.

References:
Barry Jones.(2008). *Instrumentation Measurement & feedback* ,(1st ed.). PHI.
Cromwell, Fred J Weibell, Erich A Pfeiffer .(1994). *Biomedical Instrumentation and Measurements*, (1st ed.). PHI.
Khandpur.R.S.(2005). *Modern Electronics Equipment*, TMH, New Delhi.

Note : Scientific calculator is allowed.

13ELE62L2 ELECTRONICS PRACTICAL VIII: ELECTRONICS PROJECT WORK

Credit: 1   **Total: 30 Hours**

- Students in group, not exceeding THREE, should design, fabricate and assemble ONE electronic project. The Department faculty is required to guide the project work.

- Each student should prepare a report and submit at the time of practical examination viva voce duly certified by the concerned faculty & HOD.

- Department faculty shall ensure that the entire project work is carried out by utilizing the practical classes assigned to practical VIII and the students shall be required to give the seminar on the project.

Evaluation Criteria

Criteria	Marks
Soldered project exhibition	13
Presentation and viva voce	12
Project report	05
Total	30

Note: Scientific calculator is allowed.

13MAT6201 MATHEMATICS VIII: MATRICES, LINEAR ALGEBRA, CALCULUS OF VARIATIONS AND FOURIER TRANSFORMS

Credits: 4   **Total: 60 Hours**

Objective:
To understand several important concepts in matrix and linear algebra, a branch of mathematics that has wide-ranging applications in other disciplines To develop a basic understanding of Legendre's and Bessel's functions and Fourier transforms.

UNIT 1: Matrices   17 hrs
Elementary row and column transformations, equivalent matrices, finding the inverse of a non-singular matrix by elementary operations, rank of a matrix, invariance of rank under elementary transformations, determination of rank of a matrix by reducing it to the echelon and normal forms, homogeneous systems of m linear equations in n unknowns-consistency criterion, solution by elimination method; eigen values and eigen vectors of a square matrix-standard properties, Cayley-Hamiton theorem and applications.

UNIT 2: Linear Algebra   18 hrs
Vector space- examples, properties; subspaces, criterion for a subset to be a subspace; linear combination, linear independent and dependent subsets; basis and dimension-standard results, examples illustrating concepts and results; linear transformation, properties, matrix of a linear transformation, change of basis, range and kernel, rank nullity theorem, non-singular linear transformation, eigen values and eigenvectors of a linear transformation, interpretation in terms of matrices-examples illustrating the concepts.

UNIT 3: Calculus of Variations   12 hrs
Variation of a function $f = f(x, y, y')$, variation of the corresponding functional, extremal of a functional, variational problem, Euler's equation and its particular forms, examples, standard problems like geodesics, minimal surface of revolution, hanging chain, Brachistochrone problem.

UNIT 4: Fourier Transforms   13 hrs
The Fourier integral, complex Fourier transform, inverse transform-basic properties; transforms of derivative and the derivative of the transform; Fourier sine and cosine transforms and inverse transforms.

Text Books:
Narayan, Shanti. and Mittal P.K.(2005). *Text book of Matrices*. (11th ed.), New Delhi, S Chand and Co.

Krishnamurthy, V. K., Mainra, V. P. and Arora J. L.(2011).*An Introduction to Linear Algebra,* New Delhi, Oscar Publications.

Fox. C. *An Introduction to the Calculus of Variations,* Oxford University Press.

Bracewell, R.N. (1999).*The Fourier Transform and its Applications*, (3rd ed.).Mc Graw Hill.

References:

Vatssa, B. S. (2005). *Theory of Matrices*. (reprint), New Delhi, New Age International Publishers.

Saikia, Promode Kumar. (2009). *Linear Algebra*, Pearson Education.

Kreyszig, Erwin.(2011). *Advanced Engineering Mathematics*. (9th ed.), Wiley India Pvt. Ltd.

Note: Scientific calculator is allowed.

NON CORE COURSES

13NHU0102 INDIAN CONSTITUTION

1 Credit   **TOTAL: 30 Hours**

Objectives:
- Enables the citizens to know their rights and duties
- Makes them an ideal citizen of India
- Helps them for their valuable contribution of nation building

UNIT 1: Introduction   06 hrs
Constituent assembly, preamble, features of Indian constitution, fundamental duties, fundamental rights, methods of constitutional amendment, directive principles of state policy.

UNIT 2: Union Parliament   07 hrs
Rajya Sabha- powers and functions, Loka Sabha- powers and functions, committees of the parliament, speaker. State legislature- Legislative council and legislative assembly – powers and functions

UNIT 3: Union Executive   07 hrs
President, Prime Minister Powers and functions. Governor, Chief Minister- powers and functions. Union and state council of ministers. Coalition government

UNIT 4: Judiciary   05 hrs
Features of Indian judiciary. Supreme court- powers and functions. High court- powers and functions. Public interest litigation

UNIT 5: Issues   05 hrs
Indian federation- Centre and state powers, Indian secularism. Reservations in India, Social justice, Environmental protection, Human rights

References:
Austin, Granville (1999), *Indian constitution: cornerstone of a nation* New Delhi
Bakshi, P.M (2002), The Constitution of India – Universal Law publishers.
Basu, Durga Das (1995), *Introduction to the constitution of India* New Delhi: Prentice – hall of India Pvt.
Basu, Durga Das (2002), *Introduction to the Constitution of India* New Delhi: Wadhwa and   Company Law Publishers.
Kabburi, S.K (2006), *Indian constitution-institutions and process.*
Kagzi, M.C. (2001), *The Constitutional of India Vol.1 & 2.*New Delhi: India law house.
Pylee, M.V (2002), C*onstitution Government and Politics* New Delhi: Universal Law publishing Co.Pvt.Ltd.
Raj, Hans (1998), *The Constitution of India*: New Delhi: Surjeet Publications.

13NCS0101 COMPUTER FUNDAMENTALS

1 Credit   **Total: 30 Hours**

Objectives:

- To provide basic knowledge of Computer and its Usage.

UNIT 1: Introduction to Computers   05 hrs
General features of a Computer – Generation of Computers - Personal Computer – Workstation – Mainframe Computer and Super Computers. Computer Applications – Data Processing – Information Processing – Commercial – Office Automation – Industry and Engineering – Healthcare – Education – Graphics and Multimedia.

UNIT 2: Computer Organization   05 hrs
Central Processing Unit – Computer Memory – Primary Memory – Secondary Memory – Secondary Storage Devices – Magnetic and Optical Media – Input and Output Units – OMR – OCR – MICR – Scanner – Mouse - Modem.

UNIT 3: Computer Hardware and Software   10 hrs
Machine language and high level language. Application software. Computer program. Operating system. Computer virus, antivirus and Computer security. Elements of MS DOS and Windows OS. Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications

UNIT 4: Microsoft Office   05 hrs
Word processing and electronic spread sheet. An overview of MS WORD, MS EXCEL and MS POWERPOINT. Elements of BASIC programming. Simple illustrations

UNIT 5: Computer Networks   05 hrs
Types of networks.LAN, Intranet and Internet.Internet applications. World wide web. E-mail, browsing and searching. Search engines. Multimedia applications

LIST OF PRACTICAL ASSIGNMENTS: (12 Sessions of 2 hours each)

System use, keyboard, mouse operations. Word pad and paint brush.
Creating a folder and saving a document – 2 sessions.
Simple MS. DOS commands – 1 Session
Windows operating system – icons, menus and submenus, my computer – 2 sessions
Desktop publishing – preparation of a document using MS.WORD – 2 sessions
Installation of a software, virus scanning – illustrations – 1 session.
Spreadsheet calculations using MS.EXCEL – 1 session.
BASIC programming – illustrations – 1 session.
Internet use.Surfing, browsing, search engines, E-mail. – 2 sessions.

References:
Alexis Leon and Mathews Leon (1999): *Fundamentals of information technology*, Leon Techworld Pub.

Archanakumar – *Computer Basics with office automation*, I.K. International Publishers.
Jain, S.K. (1999): *Information Technology* "O" level made simple, BPB Pub.
Jain, V.K. (2000): "O" Level Personal Computer Software, BPB Pub.
Rajaraman, V. (1999): *Fundamentals of Computers*, Prentice Hall India.
Sinha, *Computer Fundamentals*, BPB Pub.

13NHU0101 ENVIRONMENTAL STUDIES AND CIVIC SENSE

1 Credit   **Total: 30 Hours**

Objectives:
- Understand the various aspects of Environment
- To harness the concern for the environment and its resources
- Comprehend the correlation between human population, social issues with that of environment

UNIT 1: Nature of Environmental Studies: 03 hrs
Definition, scope and importance, Multi - disciplinary nature of environmental studies, need for public awareness. Natural resources and associated problems: (a) Forest resources: Use and over-exploitation, deforestation timber extraction, mining, dams and their effects on forests 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. (d) Food resources: World food problems, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems. (e) Energy resources: Growing energy needs, renewable and non -renewable energy sources, use of alternate energy sources. (f) Land resources: land as resources, and 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.

UNIT 2: Ecosystems   03 hrs
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 the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT 3: Biodiversity and its Conservation   03 hrs
Introduction-Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option value, Biodiversity at global, national and local levels, India as a mega-diversity nation, Western ghat as a bio-diversity, Hot-spots 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.

UNIT 4: Environmental Pollution   05 hrs
Definition, causes, 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 urban and industrial wastes, Role of an individual in prevention of pollution, Disaster management: folds, earthquake, cyclone and landslides, Tsunami.

UNIT 5: Social Issues, Human Population and Environment 06 hrs

From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, 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. Population growth, variation among nations, Population explosion, Family welfare programme, Environment and human health, Value Education, Women and Child Welfare, Role of information technology in Environmental and human health.

CIVIC SENSE

Objectives:
- To sensitize students to the concept and practice of civic sense
- Understanding the pivotal role in the transformation of urban attitudes along with the local government for sustainable change
- Fortifying experiential understanding of initiating and sustaining good civic sense in the community

UNIT I: Introduction to Civic Sense / Social Ethics 03 hrs

Concept nature and scope of civic sense, need and importance of civic sense, inter-relation between civic sense, citizenship and community.

UNIT II: Issues of Promoting Civic Sense 03 hrs

Spitting, urinating and defecating in public, lettering, shop lifting, consuming alcohol in public, smoking in public, consuming drugs, mugging, vandalizing public property, vulgar graffiti on public spaces, loud and rude behavior, argumentativeness, lack of humility and conduct, general disregard to the law of the land, disrespect to elders, ragging, eve teasing, women subjugation, stalking, lack of traffic discipline, jay walking, honking without reason, willful noise pollution, road rage, use of cell phones while driving. Reporting Instances of Poor Civic Sense: Highlighting the manifestations and ramifications including the moral and the legal consequences of the victims and the accused. Preventive / precautionary measures for the innocent victims who are soft targets.

UNIT III: Promotion of Civic Sense 02 hrs

Role of educational institutions and media; the role of family / teachers, local self-Government and non-Government organization –

UNIT IV: Success stories signifying good Civic Sense within India and Foreign Countries 01 hr

UNIT V: Group Project   01 hr

Sensitizing students to the practice and inculcation of civic sense.

References:

Agarwal, K.C., (2001) *Environmental Biology*, Nidi Publ. Ltd. Bikaner

Bharucha Erach, *The Biodiversity of India*, Mapin publishing Pvt. Ltd. Ahmedabad-

Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. (2001) Environmental Chemistry, Wiley Eastern Ltd.,

Heywood, Vh & Watson R.T. 1995 Global biodiversity Assement Cambridge Univ.

Jadhav H & Bhosle V.M. 1995 Environmental Protection and laws. Himalayas Pub. House Delhi, 284p

Mckinney M.L. & Schocl R.M. 1996 Environmental Science systems & Solutions Web.Enhanced edition 639p.