DETAIL SYLLABI OF THE DIFFERENT COURSES OFFER IN INFORMATION TECHNOLOGY, PART –II, FIRST SEMISTER

PROPOSED CURRICULAR STRUCTURE FOR PART – 2 (2ND YEAR) OF THE FULL- TIME DIPLOMA COURSE IN INFORMATION TECHNOLOGY											
WEST BENGAL STATE COUNCIL OF ECHNICAL EDUCATION											
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES											
SEMISTER:THIRD											BRANCH:IT
SL.No.	SUBJECT	CREDITS	PERIODS			Evaluation Scheme					
			L	TU	PR	INTERNAL SCHEME			ESE	PR	TOTAL MARKS
						TA	CT	Total			
1	Discrete Mathematics	3	3			10	20	30	70		100
2	C Programming	3+2	3		4	10	20	30	70	100	200
3	Digital Techniques	3+1	3		2	10	20	30	70	50	150
4	Data Structure	3+2	3		3	10	20	30	70	50	150
5	Computer System and Architecture	3	3			10	20	30	70		100
6	Electronics Device & Circuits	3+1	3		2	10	20	30	70	50	150
7	Professional Practice-I (PC Maintenance)	1			2					50	50
Total		25	18		13	60	120	180	420	300	900
STUDENT CONTACT HOURS PER WEEK: 31 HRS.											
Theory and Practical Periods of 60 minutes each.											
L-Lecture, TU-Tutorials, PR-Practical, TA-Teachers Assessment, CT-Class Test, ESE-End Semester Examination.											

Name of the Course: Discrete Mathematics			
Course Code: DM		**Semester: Third**	
Duration: Six Months		**Maximum Marks: 100**	
Teaching Scheme:		**Examination Scheme:**	
Theory: 03 hrs./week		**Class Test : 20 Marks**	
Tutorial: 00 hrs./week		**Teachers Assessment: 10 Marks**	
Practical: 00 hrs./week		**End Semester Exam. : 70 Marks**	
Credit : 3		**Practical / Sessional : 00 (Internal) + 00 (External)**	
Aim:			
Sl. No.			
1.	**To learn basic concept of Discrete Mathematics.**		
Objective:			
Sl. No.	**Students will able to:**		
1.	➢ **Understand relation between Mathematics and applications in Computer Science & Engineering**		
2.	➢ **Acquire sufficient Mathematical techniques necessary for practical problems used in computer science.**		
3.	➢ **Acquire knowledge of Mathematical term, concept, principals, and different methods.**		
4.	➢ **Develop ability to apply Mathematical methods to solve technical.**		
Pre-Requisite:			
Sl. No.			
1.	**Basic Concept of Math's**		
2.	**Calculation of Numbers**		
3.	**Introduction to Formula**		
Unit No.	**Contents**	**Hrs/Unit**	**Marks**
Unit:1	**Mathematical Logic** **1.1 Statement and Notation** **1.2 Connectives – Negation, Conjunction, Disjunction, Statement Formulas and truth Tables, Conditional and Biconditional, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications** **1.3 Normal Forms – Disjunctive and Conjunctive Normal Forms.** **1.4 The Theory of Inference for the Statement Calculus – validity using Truth Table, Rules of Inference, Consistency of Premises and Indirect method of proof** **1.5 Predicate Calculus**	**06**	
Unit: 2	**SET THEORY** **2.1 CONCEPT OF SETS: Notation – Subset – Superset – Empty set – Universal set – Examples.** **OPERATION ON SETS: Union – Intersection –**	**07**	

	Complementation – Difference – Symmetric difference – Problems relating simple set identities – Definition of power set – Cartesian product of finite number of sets – Simple problems – Cardinality of a set – Finite and infinite sets **2.2 RELATION BETWEEN TWO SETS: Binary relation as a subset of Cartesian product – Reflexive, symmetric & transitive relations – Examples — Equivalence relation – Examples – Partition – problems** **2.3 FUNCTIONS: Definition of function – Domain, Co-domain & Range of a function – Injective, Surjective and Bijective functions – Related problems**		
Unit: 3	**MATRIX THEORY** **3.1 ELEMENTARY TRANSFORMATION ON A MATRIX: Equivalent matrices – Definition of sub-matrix of a matrix Rank of a matrix (definition) – Echelon form of a matrix – Theorems on rank (statement only) – Evaluation of rank of a matrix – Problems** **3.2 System of SIMULTANEOUS LINEAR EQUATIONS – Test of consistency – Solution of system of simultaneous linear equations by matrix method – Problems.** **3.3 Definition of eigenvalues and eigenvectors – Characteristic equation – Theorems on eigenvalues and eigenvectors – Related problems**	**08**	
Unit: 4	**COUNTING TECHNIQUES** **4.1 PRINCIPLE OF INCLUSION AND EXCLUSION: Statement of the principle – Set theoretic problems relating to principles of inclusion and exclusion.** **4.2 MATHEMATICAL INDUCTION: Concept of Induction – Statement of the principle of Mathematical Induction – Application of the principle of Induction in various problems.** **4.3 RECURRENCE RELATION: Definition – Examples (Fibonacci series etc.) – Linear recurrence relations with constants coefficients – Homogeneous solutions – Particular solutions – Total solutions – Problems.**	**06**	
Unit: 5	**GRAPH THEORY** **5.1 Introduction – Definition of a graph – Sub graph – Isomorphism – Walk, Paths and Circuits – Connectedness and components – Euler graphs – Hamiltonian paths and Circuits – Problems.** **5.2 TREE: Definition & properties of trees – Distance & centre in a tree – Rooted & binary trees –Spanning tree – Spanning tree in a weighted graph – Problems.** **5.3 Graph theoretic algorithms – Minimal Spanning tree algorithm – Shorted path algorithm. Travelling salesman problem.**	**10**	
Unit: 6	**TRANSFORM**	**08**	

	6.1 Laplace Transforms: Definition- Transform of elementary functions-Properties of Laplace Transforms of Derivatives- Inverse transforms-Partial fractions- Unit step function-Unit impulse function-Periodic functions.		
Total		**45**	

Text Books:			
Name of Authors	**Title of the Book**	**Edition**	**Name of the Publisher**
J.P Tremblay R. Manohar	**Discrete Mathematical Structures with Applications to Computer Science**		**McGraw Hill**
Swapan Kumar Chakraborty&BikashKanti Sarkar	**Discrete Mathematics**		**OXFORD**
T. Sengadir	**Discrete Mathematics and Combinatorics**		**PEARSON**
Purna Chandra Biswal	**Discrete Mathematics and Graph Theory**		**PHI**
Lipschutz& Lipson	**Discrete Mathematics**		**McGraw Hill**
Reference Books:			
Name of Authors	**Title of the Book**	**Edition**	**Name of the Publisher**
Lipschutz& Lipson	**Discrete Mathematics (Solved Problems Series)**		**McGraw Hill**
G.Suresh Singh	**Graph Theory**		**PHI**
R Akerkar& R Akerkar	**Discrete Mathematics**		**PEARSON**

Suggested list of Assignments / Tutorial:	
Sl. No.	**Topic on which tutorial is to be conducted**
1.	**Analyze designed algorithm**
2.	**Study of dynamic & static Memory allocation**
3.	**Explain linear, non-linear data structure**
Note:	
Sl. No.	
1.	**Maximum 5 questions are to be given in each tutorial, in which two 2 marks questions (based on basic concept and formulae with one/two step calculations) and three 4 marks questions are expected.**
2.	**Question Paper setting tips**

Name of the Course: C Programming

Course Code: C	**Semester: Third**
Duration: Six Months	**Maximum Marks: 200**
Teaching Scheme:	**Examination Scheme:**
Theory: 03 hrs./week	**Class Test : 20 Marks**
Tutorial: 00 hrs./week	**Teachers Assessment: 10 Marks**
Practical: 04 hrs./week	**End Semester Exam. : 70 Marks**
Credit : 3+2	**Practical / Sessional : 50 (Internal) + 50 (External)**

Aim:

S. No	Aims about
1.	To study the structure programming concept.
2.	To study Linear Data Structure.
3.	To study Looping and Branching.
4.	To study subscripted variables and user defined data types.
5.	To study user defined functions.
6.	To study pointers in depth.
7.	To study formatted and unformatted files.

Objective:

S. No	The students will be able to -
1.	Describe the concepts of constants, variables, data types and operators.
2.	Develop programs using input and output operations.
3.	Write programs using different looping and branching statements.
4.	Write programs based on arrays and strings handling functions.
5.	Write programs using user-defined functions, structures and union.
6.	Write programs using C pointers.
7.	Use formatted and unformatted files to store and access data.

Pre-Requisites -

S. No	
1.	Interaction with DOS / Windows Operating System.
2.	Ability to develop logic / flow of simple problem.

Unit No.	Contents	Hrs/Unit	Marks
1	**Basics of C:** 1.1 **Introduction of C language, History of C language, Merits &Demerits of C Language, Working steps of C Compiler (source, header, object, and binary executable code).** 1.2 **C character set, Tokens, Constants, Variables, Key words and Identifiers, Data types used in C & their size.** 1.3 **Various C operators, Operator precedence, Associativity of operators, Type conversion, Typecasting.** 1.4 **Formatted input/ output statements.**	4	
2	**Decision Control and Looping Statements:** 2.1 **Decision making and branching statements, if statement (if, if-else, else-if ladder, nested if-else), Switch case statement.** 2.2 **Iterative/Loop statement, Entry controlled & exit controlled loop structure & differences, while, do-while, and for loop structure, Break and continue statement, Conditional and unconditional Goto statement, nested loop structure**	4	
3	**Arrays and Strings:** 3.1. **Advantages of subscripted variables/ arrays, Declaration and initialization of one dimensional, two dimensional and character arrays, Accessing array elements.**	6	

	3.2. **Declaration and initialization of string variables, String handling functions from standard library (strlen (), strcpy (), strcat (), strcmp ()), String operations to extract substring from left, right, middle of a string, Replacement of string characters, Concatenation of two strings.**		
4	**Functions:** 4.1 **Functions, Need of functions, Difference between library function and user defined Function, Prototype declaration, Defining functions, Passing parameter types, Function call, Return values, Category of function (No argument No return value, No argument with return value, Argument with return value), Recursion and use of memory stack, Types of recursion, Advantages and disadvantages of recursive function.** 4.2 **Scope and lifetime of variables in functions. Local Variable, Global Variable.**	**09**	
5	**Pointers:** 5.1. **Understanding pointers, Declaring and accessing pointers, Null Pointers, Generic Pointers, Pointers arithmetic and expressions.** 5.2. **Passing arguments to function using pointers, Pointers and arrays, passing an array to a function, Array name and Pointer.** 5.3. **Pointers and Strings, Array of pointers, Function pointers, Pointers to pointers.** **5.4 Memory usage, Dynamic memory allocation, Drawbacks of pointer.**	**09**	
6	**Structures, Union and Enumerated Data types:** **6.1 Structures, Defining structure, Declaring and accessing structure members, Typedef declaration, Initialization of structure, Arrays of structure, Nested structure, Structures and functions, Pointer to a structure, Self-referential structure.** **6.2 Unions, Defining union, Declaring and accessing union members, Initialization of union, Arrays of union variables, Nested union, Union under structure, Differences between structure and union.** **6.3 Enumerated data, Assigning and accessing enumerated variables, Enumeration type conversion, comparing and I/O operations on enumerated types.**	**7**	
7	**Pre-processor Directives:** **Introduction, Types of pre-processor directives, Macros, Rules for using macros, Distinction between functions and macros.**	**2**	
8	**User defined Files:** **Introduction to files, Different modes for opening files, Using formatted and unformatted files in C, Read data from files, Writing data to files, Different functions for random selection of records.**	**4**	
Total		**45**	

Practical/sessional works
Skills to be developed: **Intellectual skills:** ➢ **Use of programming language constructs in program implementation.** ➢ **Apply different logics to solve given problem.** ➢ **Write program using different implementations for the same problem.** ➢ **Identify different types of errors as syntax, semantic, fatal, linker & logical.** ➢ **Debugging of programs.** ➢ **Understanding different steps and stages to develop complex program.** **Motor Skills:** ➢ **Proper handling of Computer System.**

A sample List of Practical / Sessional works to be done (Leading '*' denotes the harder problems)

Sl. No.	Specific problem(s) related with practical / sessional work	Skill area
01	i) Displaying hexadecimal, decimal, octal number format of the entered numbers. ii) Displaying entered number with leading zeros and trailing zeros. iii) Displaying entered number with right and left justification. iv) Displaying with different formatting specifiers.	Formatted output. (Any two)
02	v) To find greatest / smallest of three numbers. vi) To display pass class, second-class, distinction according to the marks entered from the keyboard. vii) To find even or odd numbers. viii) To display spellings of number 1-10 on entry. ix) Implementation and displaying the menu to execute 1. ADD, 2. SUBTRACT 3. MULTIPLICATION, 4. DIVISION using switch case. x) To check whether there exist real roots of a quadratic equation and if exist find them.	Two way and multiway Branching. (Any four)
03	xi) To display our College name twenty times on screen. xii) To demonstrate Continue and Break statements within loop structure. xiii) To add first 'n' natural, even, odd numbers using different loop structures. xiv) To find GCD, LCM of two integral numbers. xv) To generate simple number triangle for n rows. xvi) To generate Pascal triangle for n rows. xvii) To add the series 1 + (1 + 2) + (1 + 2 + 3) + …+ (1 +2 +3 + …+n) xviii) To generate all prime numbers within the given range. xix) To find all the Armstrong numbers within 100 to 1000.	Loop structure and nested loop structure. (Any six)
04	xx) To find the largest and smallest numbers from array elements. xxi) *To sort array elements in ascending / descending order. xxii) To enter elements for 3X3 matrix and display them. xxiii) To calculate addition / subtraction of 2 dimensional matrix. xxiv) *To calculate multiplication of 2 dimensional matrix. xxv) To find the number of vowels and consonants in a string. xxvi) Implementation of strlen(), strcpy(), strcat() and strcmp() functions. xxvii) To check whether a string is palindrome or not. xxviii) *To replace a specific character/string by another	Arrays and Strings (Any six)

	character/string in a multiword string. xxix) *To make the abbreviated form of a multiword string.	
05	xxx) To calculate the value of ${}^{n}C_{r}$, n≥r using function xxxi) *To find the sum of the series $1+\frac{x}{1!}+\frac{x^2}{2!}+\cdots\frac{x^n}{n!}$ for n ≥ 1, x ≥ 0 using functions. xxxii) To interchange the biggest and smallest number in to calculate factorial a one dimensional array using function. xxxiii) To calculate factorial of any given number using recursion. xxxiv) To demonstrate call by reference, call by value. xxxv) To read and display an integer array using pointer. xxxvi) To read and display a text using a character pointer to a string. Also count the number of characters, words and lines in the text. xxxvii) *To read, display, add and subtract of two times defined using hour, minutes and values of seconds. xxxviii) *To read and display the contents of a structure variable using pointer to a structure.	User defined functions, structures and pointers. (Any five)
06	xxxix) Handling with unformatted, formatted files in different operational mode. xl) To count the number characters and number of lines in a file. xli) To copy one file into another by copying one character at a time / multiple characters simultaneously (using fgets() and fputs()). xlii) To write records of student to a file using array of structure and display them accordingly. xliii) *A text menu driven program to append a record, to edit a particular record, to display a predefined record, to delete a particular record from a previously created student file.	Formatted and unformatted files. (Any two)

Text Books:

Name of the Authors	Titles of the Book	Edition	Name of the Publisher
ReemaThareja	Programming in C	Second	OXFORD University Press
E. Balgurusamy	Programming in C	Fourth	Tata Mc-Graw Hill
E.Karthikeyan	A Textbook on C		PHI
Srivastava	C in Depth		BPB

Reference Book:

Kanetkar	Let Us C		BPB
Kamthane	C programming: Test your skills		Pearson

Name of the Course: Digital Techniques	
Course Code: DT	**Semester: Third**
Duration: Six Months	**Maximum Marks: 150**
Teaching Scheme:	**Examination Scheme:**
Theory: 03 hrs./week	**Class Test : 20 Marks**
Tutorial: 00 hrs./week	**Teachers Assessment: 10 Marks**
Practical: 02 hrs./week	**End Semester Exam. : 70 Marks**
Credit : 3+1	**Practical / Sessional : 25 (Internal) + 25 (External)**

Aim:			
Sl. No.			
1.	To study different logic families and number system.		
2.	To introduce different logic gates, their Boolean algebra and combinational logic design using those gates.		
3.	To learn how to design sequential logic using flip flop. To study different A/D and D/A converters		
Objective: Student will be able to			
Sl. No.			
1.	Design simple logic circuits.		
2.	Assemble logic circuits.		
3.	Test the logic circuits.		
4.	Observe outputs of logic circuits		
5.	Troubleshoot digital circuits.		
6.	Use A/D and D/A converters.		
7.	Design and verify Sequential circuit.		
Pre-Requisite:			
Sl. No.			
1.	Basic Electronics Engineering.		
2.			
3.			
Unit No.	Contents	Hrs/Unit	Marks
Unit: 1	Introduction to digital electronics: 1.1 Comparative view of Digital and Analog circuit. 1.2 Application area of digital circuit. 1.3 Logic families comparison of TTL, CMOS and ECL logic families. 1.4 Number system – Binary, Octal, Decimal, Hexadecimal and conversion of number system. 1.5 Binary arithmetic with 1's complement and 2's complement. Different binary codes- weighted and non-weighted.	04	
Unit: 2	Logic Gates And Boolean Algebra: 2.1 LOGIC SYMBOL AND EXPRESSION AND,OR,NOT,EX-OR,EX-NOR GATES 2.2 UNIVERSAL GATES – NAND AND NOR. REPRESENTATION OF BASIC GATES USING UNIVERSAL GATES. 2.3 BASIC LAWS AND THEOREMS OF BOOLEAN ALGEBRA 2.4 DE MORGAN'S THEOREMS. 2.5 SIMPLIFICATION OF BOOLEAN EXPRESSION USING BOOLEAN ALGEBRA. 2.6 CONSTRUCTION OF LOGICAL CIRCUIT FROM BOOLEAN EXPRESSION. 2.7 MINTERMS AND MAXTERMS 2.8 REPRESENTATION OF BOOLEAN EXPRESSION IN SUM OF MINTERM AND PRODUCT OF MAXTERM FORM AND CONVERSION.	11	
Unit: 3	Combinational Logic Design / Circuits	11	

	3.1 Adder – Half adder and full adder, representation of full adder using half adders. **3.2 subtractor– Half subtractor and full subtractor, representation of full subtractor using halfsubtractors.** **3.3 Design of Binary parraleladder.** **3.4 Decoder, representation of larger decoder using smaller decoder, realization of Boolean expression using Decoders.** **3.5 Design of Encoder.** **3.6 Multiplexer, Representation of larger Multiplexer using smaller Multiplexer, representation of Boolean expression using suitable Multiplexer.** **3.7 Demultiplexer, design of demultiplexer using decoder.** **3.8 code converter – BCD to Exces- 3 BCD , Binary to gray and vice-versa.** **3.9 Parity generator and checker circuit.** **3.10 Design of comparator circuit.** **3.11 Design of any combinational circuit using Universal gates.**		
Unit: 4	**Design of Sequential Logic circuit :** **4.1 One bit memory cell, clock signal, synchronous and asynchronous sequential circuit.** **4.2 Design of basic S-R flip- flop using NOR and NAND gates, Race condition and disadvantage, Design of clocked S-R flip-flop.** **4.2 Design of J-K flip-flop, Race around condition, master slave flip-flop.** **4.3 Design of D flip-flop.** **4.4 Design of T flip-flop.** **4.5 Realization of one flip-flop using other.** **4.6 Application of flip-flops – Excitation table,** **4.7 Counters – Design of Modulus, synchronous and asynchronous counters.**	**11**	
Unit: 5	**Memories :** **5.1 Classification of memories** **5.2 RAM, ROM, PROM, EPROM, and EEPROM.** **5.3 Circuit diagram using CMOS transistors and working of Static and Dynamic RAM.**	**4**	
Unit: 6	**A-D And D-A Converters** **DAC and ADC:** **5.1 Design of weighted resistor and R-2R ladder DAC method.** **5.2 Design of successive approximation, single slope and dual slope ADC method.**	**4**	
Total		**45**	
Contents (Practical)			
Sl. No.	**Skills to be developed**		
1.	**Intellectual Skills: Able to design, test and debug any digital circuit.**		
2.	**Motor Skills: Exposer to Digital world through studying this.**		
Suggested list of Laboratory Experiments:			

Practical/Sessional Works	
Sl. No.	**Laboratory Experiments**
1.	**Study of Digital IC datasheets and noting down the characteristics for TTL & CMOS logic families. Pin Diagram**
2.	**Verification of truth table of logic gates.**
3.	**Implementation of different gates by using Universal gates.**
4.	**Formation of more than 2 inputs gate by using 2 input gates only.**
5.	**Construction of Half adder and Full adder.**
6.	**Construction of Multiplexers.**
7.	**Construction of code converters/ decoder drivers.**
8.	**Verification of truth table of Flip flops by using ICs.**
9.	**Up-down counters by using JK or T flip flops (IC)**
10.	**Design of registers by using Flip flops.**
11.	**Use of A to D Converter (by using IC).**
**** Any Digital Techniques oriented Laboratory experiment can also be done by using PSpice simulation software like Electronics Workbench.**	
Suggested list of Assignments / Tutorial:	

Text Books:			
Name of Authors	**Title of the Book**	**Edition**	**Name of the Publisher**
Mano, Ciletti	**Degital Design**	**5th**	**Pearson**
Kharate	**Digital Electronics**		**Oxford**
Salivahanan&Arivazhagan	**Digital Electronics**		**Vikas**
R P Jain	**Modern Digital Electronics**		**TMH**
A.K.Maini	**Digital Electronics**		**Wiley**
Reference Books:			
Name of Authors	**Title of the Book**	**Edition**	**Name of the Publisher**
S P Bali	**2000 solved problems in Digital Electronics – Sigma series**		**TMH**
Floyd	**Digital Fundamentals**	**10th**	**Pearson**

Note:	
Sl. No.	
1.	Question Paper setting tips: **End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences. Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks**

Name of the Course: Computer System and Architecture			
Course Code: CSA		**Semester: Third**	
Duration: Six Months		**Maximum Marks: 100**	
Teaching Scheme:		**Examination Scheme:**	
Theory: 03 hrs./week		**Class Test : 20 Marks**	
Tutorial: 00 hrs./week		**Teachers Assessment: 10 Marks**	
Practical: 00 hrs./week		**End Semester Exam. : 70 Marks**	
Credit : 3		**Practical / Sessional : 00 (Internal) + 00 (External)**	
Aim:			
Sl. No.			
1.	**To understand the structure and operational concept of computer system.**		
2.	**To learn the how numbers represented in computers and process them.**		
3.	**To understand memory system and access mechanism of IO devices.**		
4.	**To learn pipelining and parallel processing.**		
Objective: Student will be able to			
Sl. No.			
1.	**Understand a computer system that has hardware and software components, which controls and makes them useful.**		
2.	**Understand the fixed and floating point number representation in computer.**		
3.	**Understand how arithmetic operation will be performed in computer system.**		
4.	**Gain knowledge on Cache and virtual memory.**		
5.	**To understand Interrupt and DMA access.**		
6.	**Gain knowledge on RISC and CISC architecture.**		
7.	**Understand how pipelining and parallel processing improves the performance of computer system.**		
Pre-Requisite:			
Sl. No.			
1.	**Basic knowledge of computer is helpful.**		
2.	**Basic knowledge of number system is helpful**		
3.			
Unit No.	**Contents**	**Hrs/Unit**	**Marks**
Unit: 1	**Basics of Computer system:** **1.1 Introduction to Computer, Different generation of Computer system.** **1.2 Stored program concept, Von Neumann Architecture and its features.** **1.3 Various components of Computer system – Bus Structure, Components of CPU, Memory unit and IO unit.** **1.4 Concept of PC, Laptop, workstation, Server, Super Computer.**	**3**	
Unit: 2	**Instruction structure and addressing modes, Number Representation:** **2.1 Instruction, Instruction Format, 0,1,2,3 address instruction.** **2.2 Different addressing modes with example.** **2.3 Instruction cycle.** **2.4 Representation of Fixed point & Floating Point number in Computer system.** **2.5 Biased exponent, IEEE format for single and double precision numbers.**	**5**	
Unit: 3	**Arithmetic operation** **3.1 Addition/Subtraction unit block diagram and function.**	**8**	

	3.2 Multiplication circuit diagram and multiplication of positive numbers. **3.3 Multiplication of negative numbers and Booths algorithm and its flowchart with example.** **3.4 Restoring and non-restoring division process with flowchart and example.** **3.5 Floating point addition/subtraction algorithm and flowchart (no example).**		
Unit: 4	**Memory and IO devices** **4.1 Memory Hierarchy model and comparison on cost, speed and size.** **4.2 Cache memory, Cache writing policy, Mapping technique, Hit ratio, Replacement algorithm.** **4.3 Concept of virtual memory technique, address translation method, TLB.** **4.4 Different methods of IO access mechanism (Programmed IO, Interrupt Mechanism, DMA data transfer, IO processor.).** **4.5 Interrupt, Different types of interrupt, Priority interrupt, Simultaneous interrupt.** **4.6 DMA transfer modes – Burst mode, Cycle stealing mode.**	**8**	
Unit: 5	**Control unit design issue** **5.1 Hardwired Control unit design.** **5.2 Microprogrammed Control unit design.** **5.3 Concept of Horizontal and vertical microprogramming.** **5.4 Comparison between hardwired Control unit and microprogrammed control unit.**	**5**	
Unit: 6	**RISC, CISC architecture and Pipelining** **6.1 Characteristic features of RISC architecture& CISC architecture.** **6.2 Comparison between RISC and CISC.** **6.3 Concept of parallel processing and Flynn's Classification** **6.4 Pipelining, Space-time diagram, Speed-up due to pipelining.** **6.5 Concept of instruction pipelining & arithmetic pipelining.** **6.6 Different pipeline hazards and their detection and minimization.** **6.7 RISC pipelining.**	**12**	
Unit: 7	**Vector Processing and Array Processor** **7.1 Concept of vector processing, Techniques used in vector processing** **7.2 Speed advantage of vector processing, Vector processing instruction format.** **7.3 Concept of array processor.** **7.4 Different types of array processors.**	**4**	
	Total	**45**	

Text Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher
Hamacher, Vranesic, Zaky	Computer Organization	5th	TMH
Stallings	Computer Organization and Architecture		Pearson
Rao	Computer System Architecture		PHI
Goyel&Sindwani	Computer Organization with Architecture		Katson

Reference Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher

Rajaraman&Radhakrishnan	**Computer Organization and Architecture**		**PHI**
Mano	**Digital Logic an Computer Design**		**Pearson**
Parhami	**Computer Architecture**		**Oxford**

Note:	
Sl. No.	
1.	Question Paper setting tips: **End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences. Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks**

Name of the Course: Data structure	
Course Code: DS	**Semester: Third**
Duration: Six Months	**Maximum Marks: 150**
Teaching Scheme:	**Examination Scheme:**
Theory: 03 hrs./week	**Class Test : 20 Marks**
Tutorial: 00 hrs./week	**Teachers Assessment: 10 Marks**
Practical: 03 hrs./week	**End Semester Exam. : 70 Marks**
Credit : 3+2	**Practical / Sessional : 25 (Internal) + 25 (External)**

Aim:	
Sl. No.	
1.	**To develop skills in selecting or designing and implementing appropriate data structures in developing software to solve problems**
2.	**To acquaint students with principles of algorithms**
3.	**To familiarize with control and data structures of C programming language, and abstract data types**
Objective:	
Sl. No.	**Students will able to:**
1.	**Write complex applications using structured programming methods.**
2.	**Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, and trees.**
3.	**Use various data structures effectively in application programs.**
4.	**Implement various data structures in more than one manner.**
5.	**Compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.**
6.	**Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick-sort. C**
7.	**Compare the efficiency of various sorting algorithms in terms of both time and space.**
8.	**Program multiple file programs in a manner that allows for reusability of code.**
9.	**Trace and code recursive functions.**
Pre-Requisite:	
Sl. No.	
1.	**Fundamentals of Programming Languages**

Unit No.	Contents (Theory)	Hrs./Unit	Marks
Unit:1	Introduction to Data Structure: 1.1 Data Representation 1.2 Abstract data Types 1.3 Data Structure and Structured Types 1.4 Atomic Type 1.5 Difference between Abstract Data Types, Data Types And Data Structures 1.6 Data Types 1.7 Linear data type 1.8 Non- Linear data type 1.9 Primitive data type 1.10 Non primitive data type 1.11 Refinement Stages	03	
Unit: 2	Principles of programming and Analysis of Algorithms: 2.1 Algorithms 2.2 Different approaches for designing an algorithm 2.3 Complexity 2.4 Big 'O' Notation 2.5 Algorithm analysis	02	
Unit: 3	Stacks: 3.1 Introduction to Stacks 3.2 Stacks as an Abstract Data Type 3.3 Primitive operations of stacks 3.3 Representation of Stacks through Arrays 3.4 Representation of Stacks through Linked List 3.5 Application of Stacks 2.6 Stack and Recursion	04	
Unit: 4	Queues: 4.1 Introduction 4.2 Queue as an Abstract Data Type 4.3 Representation of Queues 4.4 Operations on queue: Searching, Insertion, Deletion. 4.5 Circular Queues 4.6 Priority Queue 4.7 Application of Queues	04	
Unit: 5	Linked List: 5.1 Introduction, 5.2 Terminologies Node, Address, Pointer, Information, Next, Null pointer, Empty list etc. 5.3 Operations on list Searching, Insertion and Deletion 5.4 Types of lists Linked list and Circular list 5.5 Reverse and Merging Linked list 5.6 Array stacks, queues, implementation using list.	08	
Unit: 6	Trees: 6.1 Introduction to Binary Trees 6.2 Types of Trees 6.3 Basic Definition of Binary Trees 6.4 Operations on Binary Search Tree 6.5 Type of tree Binary, Height balanced and Weight balanced tree	08	

	6.6 Operations on trees, **6.7 Searching Depth-first search and Breadth-first search** **6.8 Traversing Pre-order, In-order and Post-order** **6.9 Insertion,** **6.10 Deletion,**		
Unit: 7	**Graphs:** **7.1 Introduction to Graphs** **7.2 Terms Associated with Graphs** **6.3 Terminology graph, node (vertices), arcs (edge), directed graph,** **in-degree, out-degree, adjacent, successor, predecessor, relation, Weight, path, length** **7.4 Sequential Representation of Graphs** **7.5 Linked Representation of Graphs** **7.6 Traversal of Graphs** **7.7 Spanning Trees** **7.8 Shortest Path** **7.9 Application of Graph**	**06**	
Unit: 8	**Searching & Sorting:** **8.1 Sorting-An Introduction** **8.2 Efficiency of Sorting Algorithms** **8.3 Bubble Sort** **8.4 Selection Sort** **8.5 Quick Sort** **8.6 Insertion Sort** **8.7 Merge Sort** **8.8 Binary Tree Sort** **8.9 Radix Sort** **8.10 Shell Sort** **8.11 Heap Sort** **8.12 Searching-An Introduction, Binary Search.**	**08**	
Unit: 9	**Hashing** **9.1 Hash functions** **9.2 Deleting items from hash tables**	**02**	
Total		**45**	

Practical/Sessional Works	
Sl. No.	**Skills to be developed**
1.	**Intellectual Skills:** • Use of programming language constructs in program implementation. • To be able to apply different logics to solve given problem. • To be able to write program using different implementations for the same problem • Study different types of errors as syntax semantic, fatal, linker & logical • Debugging of programs • Understanding different steps to develop program such as • Problem definition • Analysis • Design of logic • Coding • Testing • Maintenance (Modifications, error corrections, making changes etc.)

2.	**Motor Skills:** • Proper handling of Computer System.

List of Practical:

Sl.No.	Practical
1	**Programs based on:** **Array operations, insertion, deletion**
2	**Programs based on Stacks** **Implementation of PUSH & POP operations, Evaluate postfix expressions, Infix to postfix conversions.**
3	**Recursive programs: Factorial, Fibonacci, Ackerman function, and Tower of Hanoi.**
4	**Programs for demonstrating queue operations.** **one recursive program converted to non-recursive ones**
5	**Programs based on Linked lists**
6	**Programs based on trees** **Creating a binary tree, in order, pre order and post order traversal of binary tree, deleting a node from binary tree.**
7	**Programs for implementing various sorting techniques.** **(Minimum three sorting techniques from topics mentioned in the syllabus))**
8	**Programs for implementing various sorting and searching techniques.** **(Minimum two searching techniques from topics mentioned in the syllabus.)**
9	**Assignments based on graph theory.**
10	**Program based on hashing.**

LIST OF SAMPLE PROBLEMS FOR DATA STRUCTURE LAB(for example)

1. **To write a program to check whether a word is palindrome or not.**
2. **To create a two dimensional array of numbers and calculate & display the row & column sum and the grand total.**
3. **To write a program of matrix multiplication.**
4. **To write a program to insert (Push) an element into the sack and delete (Pop) an element from the stack using pointer.**
5. **To write a program to convert an infix expression to a postfix expression.**
6. **To evaluate a postfix expression.**
7. **To write a program to insert an element in the queue and delete an element from the queue using pointer.**
8. **To create a circular queue and add an element and delete an element from a circular queue.**
9. **To write a program of a structure containing an item name along with the unit price. The user enters the item name and quantity to be purchased. Program print outs total price of item with name using pointer in a structure or array in a structure.**
10. **To create a single linked list and — (a) insert a node in the list (before header node, in between two nodes, end of the list); (b0 delete a node from the list (1st node, last node, in between two nodes); (c) Concatenate two lists.**
11. **To create a doubly linked list and — (a) insert a node in the list (before header node, in between two nodes, end of the list); (b) delete a node from the list (1st node, last node, in between two nodes); (c) Concatenate two lists.**

12. **To create a circular linked list and insert & delete an element from the list.**
13. **Write a program to merge two shorted linked list.**
14. **Write a program to reverse a linked list.**
15. **To write a program to calculate the binomial co-efficient of $_nC^r$ of two numbers using recursive function. Also write the same program using function in non-recursive way.**
16. **To write a program to generate Fibonacci Series using recursive function. Also write the same program using function in non-recursive way.**
17. **To write a program to sort a list of numbers using — (i) Heap Sort, (b) Quick Sort, (c) Bubble Sort.**
18. **To write a program to sort a list of numbers using — (i) Insertion Sort, (b) Merge Sort, (c) Radix Sort.**
19. **To write a program to create a binary tree and traverse it in pre-order and post-order form.**
20. **To write a program to create a binary search tree and — (a) insert a new node in the BST, (b) search a node in the BST, (c) delete a node from the BST.**

Text Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher
ReemaThareja	Data Structures Using C		OXFORD
DebasisSamanta	Classic Data Structures	2nd	PHI
Prof. P.S Deshpande Prof. O.G. Kakde	C & Data Structures		Dreamtech PRESS
A.K.Sharma	Data Structures Using C		PEARSON

Reference Books:

Name of Authors	Title of the Book	Edition	Name of the Publisher
Tremblie and Sorrenson	An Introduction To Data Structure With Application		TMH Publications
Tenenbaum, Langsam & Augenstein	Data Structures Using C		PEARSON

Suggested list of Assignments / Tutorial:

Sl. No.	Topic on which tutorial is to be conducted
1.	Analyze designed algorithm
2.	Study of dynamic & static Memory allocation
3.	Explain linear, non-linear data structure

Note:

Sl. No.	
1.	Question Paper setting tips: **End Semester Examination: Question should be made as per class weight and must cover whole syllabus. Objective Type: 20 marks (answered in one or two sentences. Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks**

Name of the Course: Electronics Devices & Circuits	
Course Code: EDC	**Semester: Third**
Duration: Six Months	**Maximum Marks: 150**

Teaching Scheme:	Examination Scheme:
Theory: 03 hrs./week	Class Test : 20 Marks
Tutorial: 00 hrs./week	Teachers Assessment: 10 Marks
Practical: 02 hrs./week	End Semester Exam. : 70 Marks
Credit : 3+1	Practical / Sessional : 25 (Internal) + 25 (External)

Aim:

This subject will enable the students to comprehend the concepts and working principle of electronics devices and circuits and their application in electronic system. The knowledge acquired by student will help them to troubleshoot and repair electronic circuits and devices.

Sl. No.	
1.	To study Different Diode and transistor with their Characteristics.
2.	To Rectifier and Power supply.
3.	To learn about OPAMP, timer, SCR, UJT etc.
4.	To know the basics of LED, LCD, photodiode, phototransistor and solar cell.
5.	To understand the basics of ICs.

Objective: Student will be able to

Sl. No.	
1.	Identify the electronics circuit element.
2.	Know the characteristics of different semiconductor devices.
3.	To make simple semiconductor circuit and to test them.
4.	Observe outputs of the circuits
5.	To make rectifier circuits.

Pre-Requisite:

Sl. No.	
1.	Knowledge of Physics (especially semiconductor) is helpful.

Unit No.	Contents (Theory)	Hrs./ Unit	Marks
Unit: 1	**DIODE** 1.1 Elementary idea of ordinary diode, Forward biased and Reverse biased condition, VI characteristics of ordinary diode 1.2 BREAKDOWN: Zener and avalanche – Construction of and operation of Zener diode in reverse biased condition. 1.3 Characteristics and equivalent circuits, specifications – Simple voltage regulator circuit	4	
Unit: 2	**Bipolar Transistor:** 2.1 Construction and operation of NPN and PNP transistors- V-I characteristics, transistor in active, saturation and cut-off-CE, CB, CC configuration and their differences, 2.2 Definitions of current gains and their relationship. I. Concept of Q-point – AC and DC load line – Stabilization and stability factor II. TYPES OF BIASING: (a) Base Bias, (b) Collector Feedback Bias, (c) Emitter Feedback Bias, (d) Potential Divider Bias. 2.3 Transistor as simple small signal amplifier & oscillator and their simple applications	7	

Unit: 3	**FIELD EFFECT TRANSISTOR:** **3.1 Construction, operation and VI characteristics of JFET, pinch-off voltage, drain résistance, transconductance, amplification factor and their relationship** **3.2 Enhancement and depletion type MOSFET- concepts of CMOS** **3.3 Differences between BJT and JFET**	**4**	
Unit: 4	**RECTIFIER & POWER SUPPLY:** **4.1 Half-wave and full-wave rectifier, average voltage, rms voltage, efficiency and ripple factor, percentage voltage regulation,** **4.2 Function of filter circuits: Capacitor input filter, inductive filter, Π type filter – Calculation of ripple factor and average output voltage** **4.3 Series and shunt regulator using transistor, IC regulator** **4.4 Concept of switch mode power supply** **4.5 Block schematic description of uninterrupted power supply.**	**12**	
Unit: 5	**OPERATIONAL AMPLIFIER:** **5.1 Circuit operation of differential amplifier.** **5.2 Introduction to operational amplifier – Inverting and non- inverting mode and their gain calculation – Common mode rejection ratio – Bias current – Offset voltage and current – Slew rate, open loop and closed loop gain – Input and output impedance – Frequency response and virtual ground** **5.2 Applications of OPAMP as: Adder, Subtractor, Voltage Follower, Integrator, Differentiator, Comparator, Schmitt Trigger**	**7**	
Unit: 6	**TIMER CIRCUITS:** **6.1 Principle of operation of electronic timer** **6.2 Functional description of internal blocks of timer IC555** **6.3 Use of 555 timers in monostable and astable mode** **6.4 Principle of operation of digital timer**	**4**	
Unit: 7	**ELEMENTARY IDEA OF UJT & SCR:** **7.1 Basic construction and operation of UJT and SCR**	**2**	
Unit: 8	**OPTOELECTRONICS:** **8.1 Elementary ideas of LED, LCD,** **8.2 Photodiode, Phototransistor and Solar cell and their applications**	**3**	
Unit: 9	**INTEGRATED CIRCUITS:** **9.1 Basic idea of ICs – Classifications: linear and digital ICs.** **9.2 SSI, MSI, LSI and VLSI – field of applications**	**2**	
Total		**45**	

Contents (Practical)

Sl. No.	**Skills to be developed**
1.	**Intellectual Skills: Able to design, test and debug SEMICONDUCTOR CIRCUIT.**
2.	**Motor Skills: Can able to design better semiconductor circuit.**

Suggested list of Laboratory Experiments:

Practical	
Sl. No.	**Laboratory Experiments**
1.	**To be familiar with the common assembly tools.**
2.	**To be able to identify the following passive and active circuit elements: — diode, transistors, SCR, DIAC, TRIAC, LED, LCD, photodiode, phototransistors, ICs etc.**
3.	**To be familiar with the following basic instruments: — Multimeter, oscilloscope, power supply and function generator.**
4.	**To study the VI characteristics of an ordinary diode and reverse biased Zener diode.**
5.	**To study the rectifier with and without capacitor filter for: (a) Half-wave rectifier ;(b) full-wave rectifier; (c) bridge rectifier.**
6.	**Determination of frequency response characteristics of RC coupled amplifier circuit and calculation of bandwidth, midband gain, input impedance and out-put impedance for: (a)single stage amplifier; (b) double stage amplifier**
7.	**To study the following applications of op-amp using IC741: (a) Adder; (b) subtractor; (c) differentiator (d) integrator; and, (e) voltage follower.**
8.	**To study the characteristics of IC555 timer connected as: (a) astablemulti-vibrator; (b) monostablemulti-vibrator.**

**** Any Electronics oriented Laboratory experiment can also be done by using PSpice simulation software like Electronics Workbench or Open Source software.**

Text Books:			
Name of Authors	**Title of the Book**	**Edition**	**Name of the Publisher**
Boylestad&Nashalsky	**Electronic Devices and Circuit Theory**	**10th**	**Pearson**
Floyd	**Electronic Devices**	**7th**	**Pearson**
Malvino	**Electronic Principles**		**TMH**
Bogart, Beasley & Rico	**Electronic Devices and Circuits**	**6th**	**Pearson**
Floyd &Buchla	**Fundamentals of Analog Circuit**	**2nd**	**Pearson**
Salivanan	**Electronic Devices and Circuits**		**TMH**
Reference Books:			
Name of Authors	**Title of the Book**	**Edition**	**Name of the Publisher**
Singh & Singh	**Electronic Devices and Circuits**	**2nd**	**Pearson**
Chattopadhayay	**Analog Electronics**		**Knowledge Kit Publication**

Note:	
Sl. No.	
1.	**This subject will enable the students to comprehend the concepts and working principle of electronics devices and circuits and their application in electronic system. The knowledge acquired by student will help them to troubleshoot and repair electronic circuits and devices.**
2.	Question Paper setting tips: **End Semester Examination: Question should be made as per class weight and must cover whole syllabus.** **Objective Type: 20 marks (answered in one or two sentences.**

	Subjective type: 50 marks. To be set at least 8 question and to be answered 5 questions each carrying 10 marks

Name of the Course: Professional Practice-I (PC Maintenance)		
Course Code: PC-I		**Semester: Third**
Duration: Six Months		**Maximum Marks: 50**
Teaching Scheme:		**Examination Scheme:**
Theory: 00 hrs./week		**Class Test : 00 Marks**
Tutorial: 00 hrs./week		**Teachers Assessment: 00 Marks**
Practical: 02 hrs./week		**End Semester Exam. : 00 Marks**
Credit : 1		**Practical / Sessional : 50 (Internal) + 00(External)**
Aim of the Course:		
S. No.	**Aims about**	
1.	**To do the maintenance of the Computer, peripherals and its add-on cards.**	
2.	**To understand basic working of the computer motherboard, peripherals and add-on cards**	
3.	**To select the proper peripheral as per their specification and requirement.**	
Objective of the course:		
S. No.	**The students will be able to -**	
1.	**Debug and repair the faults in system.**	
2.	**Assemble the system.**	
3.	**Load the operating system and device drivers in the system.**	
Pre-Requisites -		
S. No.		
1.	**Computer software and elementary hardware knowledge.**	
2.	**PC configuration and setup, quality requirement**	
3.	**Personal computer hardware troubleshooting.**	

Practical / Sessional Works

Skills to be developed:

Intellectual skills:

- **Understanding basic hardware of computer.**
- **Fault finding of input/output devices.**
- **Troubleshooting of input/output devices.**
- **Proper connection of input / output devices.**

Motor Skills:

- **Proper handling of Computer System hardware.**

A sample List of Practical / Sessional works to be done)

Sl. No.	Specific problem(s) related with practical / Sessional work	Skill area
01	Drawing the motherboard layout of Pentium IV and studying the chipset through data books or Internet.	Perception
02	CMOS setup of Pentium.	BIOS
03	Hard Disk Partitioning.	Logical Storage
04	Study of HDD: Identify various components of HDD and write their functions.	Storage Devices
05	Study and installation of any one display cards: VGA or SVGA display cards.	Display devices & Driver
06	Installation of Scanner, Printers and Modems.	Different accessories
07	Study of SMPS (ATX)	Power Supply
08	Assembling and disassembling of Personal Computer	Operational ability

09	Study of Diagnostic Software's. (Any one)	Applications
10	Fault findings: (a) Problems related to monitor. (b) Problems related to CPU.	Fault detection and correction
11	Installation of Operating System.	Installation
12	Configuration of Client and Server PC, Laptop and Network components.	Execution
13	RS232C communication between two computers.	Networking

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mike Meyers, Scott Jernigan	Managing & Troubleshooting PCs		Tata McGraw Hill
Bigelow	Bigelow's Troubleshooting, Maintaining & Repairing PCs		Tata McGraw Hill
Mark Minasi	The Complete PC Upgrade & Maintenance Guide		Willey
Scott Muller	Upgrading & Repairing PC		Techmedia

** For All Theoretical Subject Marks of End Semester Examination will be distributed as – 20 (Objectives- Answer should be given with explanation and avoid fill in the blank type questions) + 50 (Subjective – covering whole syllabus properly). **

** For All theoretical Subject two weeks of 17 weeks are allotted for class test or any surprise test conducted by the class teacher **