

# School of Vocational Education & Training (SoVET)

## Diploma in Computer Science Engineering

2<sup>nd</sup> Year  
2017-20

Centurion University of Technology and Management (CUTM), Odisha School of Vocational Education and Training (SoVET)							
Teaching and Evaluation Scheme for (3 Year) Diploma in Computer Science Engineering							
3 <sup>rd</sup> Semester							
Sl. No	Subject Code	Subject	Credits		Evaluation		
			L	P	Internal	External	Total
1	DICS2301	Programming in C	4		30	70	100
2	DICS2302	Digital Electronic Circuit	4		30	70	100
3	DICS2303	Web Technology-I	4		30	70	100
4	DICS2304	Computer Organization	4		30	70	100
5	DICS2305	Programming in C Lab		4	50	50	100
6	DICS2306	Digital Electronic Circuit Lab		2	50	50	100
7	DICS2307	Web Technology-I Lab		2	50	50	100
8	DICS2308	Computer Hardware & Maintenance Lab		4	50	50	100
9	DICS2309	Project & Seminar		2			
10	DICS2310	Learning Reflections (Tutorial / Mentoring)					
		<b>TOTAL</b>	16	14	-	-	-
Abbreviations: <b>L- Learning Lab. , P-Practice</b>							
Minimum Pass mark in each theory and practical is 35% and 50% respectively							
Contact Hours /Week							
<ul style="list-style-type: none"> <li>➤ Theory-1 Period X Assigned Credit</li> <li>➤ Practical-1.5 Period X Assigned Credit</li> </ul>							

**Centurion University of Technology and Management (CUTM), Odisha  
School of Vocational Education and Training (SoVET)**

**Teaching and Evaluation Scheme  
for (3 Year) Diploma  
in Computer Science Engineering**

**4<sup>th</sup> Semester**

Sl. No	Subject Code	Subject	Credits		Evaluation		
			L	P	Internal	External	Total
1	DICS2401	Data Structure	4		30	70	100
2	DICS2402	Database Management System	4		30	70	100
3	DICS2403	Linux Operating System	4		30	70	100
4	DICS2404	Software Engineering	4		30	70	100
5	DICS2405	Data Structure Lab		2	50	50	100
6	DICS2406	Database Management System Lab		4	50	50	100
7	DICS2407	Linux Operating System Lab		2	50	50	100
8	DICS2408	Software Engineering Lab		2	50	50	100
	DICS2409	Project & Seminar		2	-	-	-
	DICS2410	Learning Reflections (Tutorial / Mentoring)					
		<b>TOTAL</b>	16	12	-	-	-

Abbreviations: **L- Learning Lab. , P-Practice**

Minimum Pass mark in each theory and practical is 35% and 50% respectively

Contact Hours /Week

- Theory-1 Period X Assigned Credit
- Practical-1.5 period X Assigned Credit

## Programming in C

Subject Name	Code	Type of course	T-P-P
Programming in C	DICS2301	Theory	4-0-0

### 1. Objective

- To introduce to students to the field of programming using C language
- To understand computer programming and its roles in problem solving
- To learn the basic data structures through implementing in C language

### 2. Learning outcome

- Problem solving through computer programming
- Familiarity of programming environment in Linux operating system
- Students will be able to develop logics which will help them to create programs, applications in C

### 3. Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Assignment	10	Report and Presentation
External Examination		70	Written examination
Total		100	

### 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Basics of C	6
2	Decision making	10
3	Arrays and Strings	8
4	Functions	8
5	Structure	4
6	Pointers	4
<b>Total</b>		<b>40</b>

### 5. Course Contents

#### Module I

##### Basics of C:-

History of C, where C stands, C character set, tokens, constants, variables, keywords, C operators (arithmetic, Logical, assignment, relational, increment, and decrement, conditional, bit wise, special, operator, precedence), C expressions data types, Formatted input, formatted output.

##### Decision making:-

Decision making and branching, if statement (if, if-else, else-if ladder, nested if-else), Switch case statement, break statement. Decision making and looping while, do, do-while statements for loop, continue statement.

## **Module II**

### **Arrays and Strings:-**

Declaration and initialization of one dimensional, two dimensional and character arrays, accessing array elements. Declaration and initialization of string variables, string handling functions from standard library (strlen (), strcpy (), strcat (), strcmp ()).

### **Functions:-**

Need of functions, scope and lifetime of variables, defining functions, function call (call by value, call by reference), return values, storage classes. Category of function (No argument No return value, No argument with return value, argument with return value), recursion

## **Module III**

### **Structure:-**

Defining structure, declaring and accessing structure members, initialization of structure, arrays of structure.

### **Pointers:-**

Understanding pointers, declaring and accessing pointers, Pointers arithmetic, pointers and arrays.

### **A. Reference**

Text Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall, India
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

Reference Books:

4. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill
5. Ellis Horowitz, SatrajSahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, W. H. Freeman and Company
6. R. G. Dromey, How to Solve it by Computer, Prentice-Hall of India

## Digital Electronics Circuit

Subject Name	Code	Type of course	T-P-P
Digital Electronics Circuit	DICS2302	Theory	4-0-0

### 1. Objective

<ul style="list-style-type: none"> <li>• Comprehend the systems and codes.</li> <li>• Familiar with logic gates.</li> <li>• Realize logic expressions using gates.</li> <li>• Construct and verify the operation of arithmetic &amp; logic circuits</li> <li>• Understand and appreciate the relevance of combinational circuits</li> </ul>
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### 2. Learning outcome

<ul style="list-style-type: none"> <li>• Knowledge of the current pattern of designing an Digital electronic application</li> <li>• Knowledge of the evolving areas and strategies in electronic applications</li> </ul>
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### 3. Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Assignment	10	Report and Presentation
External Examination		70	Written examination
Total		100	

### 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Number Systems And Codes	6
2	Logic Gates	6
3	Boolean Algebra	6
4	Combinational Circuits	8
5	Sequential Circuits	6
6	Logic Families	2
7	Counters	6
8	Registers	6
9	Digital To Analog Converters	5
10	Analog To Digital Converters	5
11	Display Devices	4
	<b>Total</b>	<b>60</b>

### 5. Course Contents

#### 1. NUMBER SYSTEMS AND CODES

1.1 List different number system & their relevance : binary, octal, decimal,

Hexadecimal

1.2 Study the Conversion from one number system to another.

1.3 Perform Arithmetic operations of binary number systems.

- 1.4 Represent the Concept of complementary numbers : 1's & 2's complement of Binary numbers.
- 1.5 Perform Subtraction of binary numbers using complementary numbers.
- 1.6 Perform multiplication and division of binary numbers.
- 1.7 Define concept of Digital Code & its application.
- 1.8 Distinguish between weighted & non-weight Code.
- 1.9 Study Codes : definition, relevance, types (BCD, Gray, Excess-3 and ASCII code and applications.
- 1.10 Generation of Error Detection & Correction Code using parity bit.

## **2. LOGIC GATES**

- 2.1 Illustrate the Different between analog signals & systems and digital signals & Systems.
- 2.2 Discuss the Basic Logic & representation using electric signals.
- 2.3 Learn the Basic Logic gates (NOT, OR, AND, NOR, NAND, EX-OR & EX- NOR) – Symbol, function, expression, truth table & example IC nos.
- 2.4 Define Universal Gates with examples & realization of other gates

## **3. BOOLEAN ALGEBRA**

- 3.1 Understand Boolean : constants, variables & functions.
- 3.2 Comprehend the Laws of Boolean algebra.
- 3.3 State and prove Demorgan's Theorems.
- 3.4 Represent Logic Expression : SOP & POS forms & conversion.
- 3.5 Simplify the Logic Expression/Functions (Maximum of 4 variables) : using Boolean algebra and Karnaugh's map methods.
- 3.6 What is don't care conditions ?
- 3.7 Realisation of simplified logic expression using gates.
- 3.8 Illustrate with examples the above.

## **4. COMBINATIONAL CIRCUITS**

- 4.1 Define a Combinational Circuit and explain with examples.
- 4.2 Arithmetic Circuits (Binary)
  - a) Realise function, functional expression, logic circuit, gate level circuit, truth table & applications of Half-adders, Full-adder & full-Subtractor.
  - b) Explain Serial & Parallel address : concept comparison & application.
  - c) Working of 2 bit Magnitude Comparator : logic expression, truth table, gate level circuit & examples IC
- 4.3 Discuss Decoders : definition, relevance, gate level of circuit of simple decoders, Logic circuit of high order encoders, truth table & example IC nos.

4.4 Explain the working of Binary-Decimal Encoder & Decoder.

4.5 Discuss Multiplexers : definition, relevance, gate level circuit of simple. Demultiplexers (1:4) logic circuit with truth Table & example IC nos

## **5. SEQUENTIAL CIRCUITS**

5.1 Define Sequential Circuit : Explain with examples.

5.2 Know the Clock-definition characteristics, types of triggering & waveform.

5.3 Define Flip-Flop

5.4 Study RS, Clocked RS, D, T, JK, MS-JK flip-flop with logic Circuit and truth tables.

5.5 Concept of Racing and how it can be avoided.

5.6 Applications of flip-flops & its conversion.

## **6. LOGIC FAMILIES**

6.1 List of various logic families & standard notations.

6.2 Explain propagation Delay, fan-out, fan-in, Power Dissipation & Speed with Reference to logic families.

## **7. COUNTERS**

7.1 List the different types of counters-Synchronous and Asynchronous.

7.2 Explain the modulus of a counter.

7.3 Compare Synchronous and Asynchronous counters and know their ICs nos.

7.4 Explain the working of 4 bit ripple counter with truth table and timing diagram.

7.5 Explain the Synchronous decade counter & binary counter.

## **8. REGISTERS**

8.1 Explain the working of buffer register.

8.2 Explain the working of various types of shift registers – ISO, SIPO, PISO, PIPO with truth table using flip flop.

## **9. DIGITAL TO ANALOG CONVERTERS**

9.1 Explain the performance parameters of ADC-Resolution, Accuracy and Conversion time.

9.2 Explain Binary Weighted resistor DAC.

9.3 Explain the Successive – Approximation type DAC

9.4 Explain R-2R Ladder type DAC.

## **10. ANALOG TO DIGITAL CONVERTERS**

10.1 Explain the performance parameters of ADC-Resolution, Quantization Error and conversion time.

10.2 Explain the Ramp type and Dual Slope ADC's

10.3 Explain the Successive – Approximation type ADC

11.1 Explain the operation of LED and concept of seven segment display.

- 11.2 Explain the LCD and its types.
- 11.3 Compare between LED's and LCD's.
- 11.4 Explain LED driver using IC 7447 decoder.
- 11.5 Explain 7 segment decoder/driver for LCD display.

## **B. Reference**

Text Books:

1. **Digital Design** M. Morris Mano, Michael D Ciletti Pearson
2. **Digital Circuits and Design** S Salivahanan, S Arivazhagan Vikas Publishing House Pvt Ltd.

Reference Books:

3. **Digital Fundamentals** : Thomas L. Floyd, R. P. Jain Pearson



## Web Technology -I

Subject Name	Code	Type of course	T-P-P
Web Technology -I	DICS2303	Theory	4-0-0

### 1. Objective

- To give students the basic understanding of how things work in the Web world from the technology point of view.
- To give the basic overview of the different technologies.
- To gain the skills and project - based experience needed for entry into web application and development careers.

### 2. Learning outcome

- Students will be able to write a well formed / valid XML/HTML document.
- Use fundamental skills to maintain web server services required to host a website
- Use scripting languages and web services to transfer data and add interactive components to web pages.

### 3. Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Assignment	10	Report and Presentation
External Examination		70	Written examination
Total		100	

### 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Internet Basics	8
2	Navigation Tools	6
3	Developing Portals Using HTML	12
4	Java Script	12
5	Concept of CSS	8
6	PHP	8
<b>Total</b>		<b>54</b>

### 5. Course Contents

#### Module I [14 hour]

**Internet Basics:** Concept, Application and use of internet in various fields of Science and Technology, Establishing Connectivity on Internet,

**Email:** SMTP, www, Telnet, IP Address, Brief overview of TCP/IP

**Navigation Tools:** Netscape and Internet Explorer to surf Internet, Uniform Resource Locator (URL) Hypertext, hyperlinks and hypermedia, its registration, browsers, search engines, proxy servers, Internet Applications: E-mail, Telnet, FTP, IRC, NNTP, Video conferencing, e-commerce.

## Module II [18 hour]

**Developing Portals Using HTML:-**Basic structure of HTML, designing a web page, inserting links images, horizontal rules, comments. Formatting text, title, headings, colors, fonts, sizes, simple tables and forms. Introduction WEB publishing, HTML tag concept, <head><body>, URL, hyperlinks <link>href, <A> tags. HTML tags, hyperlinks. Adding graphics and images, image maps, image files. Using tables, forms, style sheets and frames

**Java Script:** Java script in web pages, Advantages of JavaScript, Writing JavaScript into HTML, Programming- Data types and Literals, Type casting, Variables, Arrays, Operators and Expressions, Conditional and Iterative Loops, Functions, Dialog Boxes, Cookies

## Module III [16 hour]

**Concept of CSS:** Creating Style Sheet, types of style sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects Working with Lists and Tables, CSS Id and Class Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Color.

**PHP:** Introduction & Installation, PHP data types, Variables, Constants, String and Regular Expressions, Operators, Conditional Statements, Looping statements and Function.

## C. Reference

Text Books:

1. Internet 6-in-1 by Kraynak and Habraken, Prentice Hall of India Pvt. Ltd., New Delhi
2. Using the Internet IV edition by Kasser, Prentice Hall of India Pvt. Ltd., New Delhi
3. Using the World Wide Web, (IInd edition) by Wall, Prentice Hall of India Pvt. Ltd., New Delh

## Computer Organization

Subject Name	Code	Type of course	T-P-P
Computer Organization	DICS2304	Theory	4-0-0

### 1. Objective

- To have a thorough understanding of the basic structure and operation of a digital computer.
- Explain the instruction set architecture and its importance in the design of computer systems
- Explaining the computer-hardware subsystems

### 2. Learning outcome

- Distinguishing between different type of memory
- Solving different type of memory problem
- Understanding the Addressing concept of memory
- Explain the working of pipelining process



**Interconnection Networks** :time shared common bus, multi port memory, cross bar switch, multi stage switching networks and hyper cube structures

#### D. Reference

Text Books:

1. Computer Architecture and Organisation by Moris Mano
2. Computer Architecture by J.P.Hayes
3. Structured Computer Organisation ByTanenbaum Andrew S, Ph
4. Computer Organization: Carl Hamacher, Zvonkovranesic, SafwatZaky,McGraw Hill,5th Ed .

#### Programming in C Lab

Subject Name	Code	Type of course	T-P-P
Programming in C Lab	DICS2305	Practice	0-6-0

#### 1. Objective

- To provide students with understanding of code organization and functional hierarchical decomposition with using complex data types
- To understand and develop well-structured programs using C language

#### 2. Learning outcome

- Understanding a functional hierarchical code organization.
- Ability to define and manage data structures based on problem subject domain.
- To write diversified solutions using C language
- 

#### 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

#### 4. Course Contents

Sl. No	Topics	Periods
1	Programming Exercise on Executing and Editing a C Program.	3
2	Programming Exercise on defining Variable and assigning values to variables.	3
3	Programming Exercise on arithmetic's and relational operators.	3
4	Programming Exercise on arithmetic expression and their evaluation.	3
5	Programming Exercise on formatting input/output using printf and scanf	3
6	Programming Exercise using if-statement.	3

7	Programming Exercise using if-else statement.	3
8	Programming Exercise on switch statement	3
9	Programming Exercise on do-while statement.	3
10	Programming Exercise on for statement.	3
<b>Total</b>		<b>30</b>

### Digital Electronics Lab

Subject Name	Code	Type of course	T-P-P
Digital Electronics Lab	DISC2306	Practice	0-3-0

#### 1. Objective

- Familiarized with use of Digital ICs.
- Understand and comprehended the simple the Digital design Circuits.
- Know A/D & D/A conversions.

#### 2. Learning outcome

*Key points: State clearly what knowledge and skill a student is expected to learn at the end of the course.*

- Knowledge of the current pattern of designing an digital electronic application
- Skill on designing and testing of the digital electronic component and circuits

#### 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

#### 4. Course Contents

Sl. No	Topics	Periods
1	Familiarization of Digital Trainer, Kit, logic Pulse, Logic Probe & Digital ICs i.e., 7400, 7402, 7404, 7408, 7432 & 7486.	3
2	Verify truth tables of AND, OR, NOT, NOR, NAND, XOR, XNOR gates.	3
3	Implement various gates by using universal properties of NAND & NOR gates and verify truth table.	3
4	Implement half adder and Full adder using logic gates.	3
5	Implement half subtractor and Full subtractor using logic gates.	3
6	Implement a 4-bit Binary to Gray code converter.	3
7	Implement a Single bit digital comparator.	3
8	Study Multiplexer and demultiplexer.	3
9	Study of flip-flops. i) S-R flip flop ii) J-K flip flop iii) flip flop iv) T flip flop	3
10	Realize a 4-bit asynchronous UP/Down counter with a control for up/down counting.	3

11	Realize a 4-bit synchronous UP/Down counter with a control for up/down counting.	3
12	Implement Mode-10 asynchronous counters.	3
13.	Study shift registers	3
14	Study 8-bit D/A and A/D conversion.	3
15	Study display devices, LED, LCD, 7-segment displays.	3
<b>Total</b>		<b>45</b>

### Web Technology-I Lab

Subject Name	Code	Type of course	T-P-P
Web Technology-I Lab	DICS2307	Practice	0-3-0

#### 1. Objective

- Write syntactically correct HTTP messages and describe the semantics of common HTTP methods and header fields
- Select and apply markup languages for processing, identifying, and presenting of information in web pages.
- Incorporate aesthetics and formal concepts of layout and organization to design websites that effectively communicate using visual elements.

#### 2. Learning outcome

- Incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.
- Design websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations.
- Incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.

#### 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

#### 4. Course Contents

Sl. No	Topics	Periods
1	Configuring computer system to access internet	3
2	Using e-mail	3
3	Using WWW for accessing relevant information	3
4	Creating Web pages using HTML	3
5	Creating web pages using front page	3
6	Demonstration of audio-video conferencing	3
7	Demonstration of e-commerce transaction	3
8	Design of Forms using Java Script or Visual Basic Script	3
9	Validation of user queries and responses in the Forms using Java Script or VB script	3
10	Create a Homepage with frames, animation, background sound and hyperlinks .	3
11	Design fill-out form with text, check box, radio buttons etc and embed Java script or VB script to validate users input.	3
12	Develop interface with database (MS-Access etc) for online retrieval and storage of data through HTML form.	3
<b>Total</b>		<b>36</b>

#### Computer Hardware And Maintenance Lab

Subject Name	Code	Type of course	T-P-P
Computer Hardware And Maintenance Lab	DICS2308	Practice	0-6-0

#### 1. Objective

- Build an understanding of the fundamental concepts of computer hardware.
- Developing skills to become professional technician with capability to handle and maintenance of computer hardware and network.

## 2. Learning outcome

- Identify the different types of computer hardware and their use.
- An ability to use the techniques, skills, and modern engineering tools necessary for setting up a computer network.
- Understand and building the skills of assembling and disassembling computer system

## 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

## 4. Course Contents

Sl. No	Topics	Periods
1	Drawing the motherboard layout of Pentium IV and studying the chipset through data books or Internet.	3
2	Hard Disk Partitioning	6
3	Study of HDD: Identify various components of HDD and write their functions.	6
4	Study and installation of any one display cards: VGA or SVGA display cards.	3
5	Installation of Scanner, Printers and Modems.	6
6	Study of SMPS (ATX).	3
7	Study of Diagnostic Software's. (Any one)	3
8	Fault findings: Problems related to monitor. Problems related to CPU.	6
9	Assembling of PC and Installation of Operating System.	6
10	Configuration of Client and Server PC, Laptop and Network components.	6
11	RS232C communication between two computers	3
12	LAN wire setup.	6
	<b>Total</b>	<b>57</b>





## Data Structure

Subject Name	Code	Type of course	T-P-P
Data Structure	DICS2401	Theory	4-0-0

### 1. Objective

- Demonstrate familiarity with major algorithms and data structures and Analyze performance of algorithms
- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks, queues, lists, trees and graphs

### 2. Learning outcome

- Implement various data structures in different optimised manner in terms of time complexity and space complexity
- Write complex applications and sorting techniques using structured programming methods.
- Compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.

### 3. Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Assignment	10	Report and Presentation
External Examination		70	Written examination
Total		100	

### 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Introduction to data structure	2
2	Principles of programming and Analysis of Algorithms	4
3	Stacks	4
4	Linked List	8
5	Queues	8
6	Trees	8
7	Graphs	8
<b>Total</b>		<b>42</b>

### 5. Course Contents

#### Module I

#### Introduction to data structure:-

Data Representation, Abstract data Types, Data Structure and Structured Types, Difference between Abstract Data Types, Data Types And Data Structures. Data Types, Linear data type, Non- Linear data type, Primitive data type, Non primitive data type.

#### Principles of programming and Analysis of Algorithms:-

Algorithms, Different approaches for designing an algorithm, Complexity, Big 'O' Notation, Algorithm analysis.

## **Module II**

### **Stacks:-**

Introduction, Stacks as an Abstract Data Type, Primitive operations of stacks, Representation of Stacks through Arrays.

### **Linked List:-**

Introduction, Terminologies Node, Address, Pointer, Information, Next, Null pointer, Empty list etc. Operations on list Searching, Insertion and Deletion, Types of lists Linked list and Circular list, Array stacks, queues, implementation using list.

### **Queues:-**

Introduction, Queue as an Abstract Data Type, Representation of Queues, Operations on queue: Searching, Insertion, Deletion. Circular Queues, Application of Queues.

## **Module III**

### **Trees:-**

Introduction to Binary Trees, Basic Definition of Binary Trees, Operations on Binary Search Tree, Type of Binary tree, Height balanced and Weight, balanced tree, Operations on trees, Searching Depth-first search and Breadth - first search, Traversing Pre-order, In-order and Post-order, Insertion, Deletion.

### **Graphs:-**

Introduction to Graphs, Terms Associated with Graphs, Terminology graph, node (vertices), arcs (edge), directed graph, in-degree, out degree, adjacent, successor, predecessor, relation, Weight, path, length, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graph. Sorting Techniques: Selection, Bubble, Insertion, Merge, Heap, Quick, Radix and address calculation

## **E. Reference**

### **Text Books:**

1. "An introduction to data structures with Applications" by J. Tremblay, P. Soresan, Tata McGraw- Hill.
2. "Data Structures and Algorithms" by A. Aho, J. Hopcroft, J. Ulman, Pearson Education, 1998.

### **Reference Books:**

1. Data Structure Using C by ISRD Group New Dehli, Tata Magraw Hill

## Data Base Management System

Subject Name	Code	Type of course	T-P-P
Data Base Management System	DICS2402	Theory	4-0-0

### 1. Objective

- To understand the different issues involved in the design and implementation of a database system
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models

### 2. Learning outcome

- Understanding the fundamental elements of relational database management systems
- Understanding program-data independence, data models for database systems, database schema and database instances

### 3. Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Assignment	10	Report and Presentation
External Examination		70	Written examination
Total		100	

### 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Database System Concept & Data Modelling	6
2	Data Models	2
3	Relational Data Model and Security and Integrity Specification	8
4	SQL	8
5	Query Processing and Transaction Processing	8
6	Lock based protocols	4
	<b>Total</b>	<b>36</b>

### 5. Course Contents

#### Module I

#### Database System Concept & Data Modeling:-

Basic concepts, Advantages of a DBMS over file processing system, Data Abstraction, Database Languages, Data Independence, Components of a DBMS and overall structure of a DBMS.

#### Data Models:-

Network Model, Hierarchical Model, E-R Model, Client Server Architecture.

## Module II

### Relational Data Model and Security and Integrity Specification:-

Relational Model: Basic concepts, attributes and domains, Keys concept: Candidate and primary key, Integrity constraints: Domain, Entity Integrity constraints and On delete cascade. Security and Authorization. Query Languages, Relational Algebra.

**SQL:-** Introduction to SQL queries, Creating ,Inserting ,Updating and deleting tables and using constraints, Set operations & operators, Aggregate functions ,string functions and date ,time functions, Null values, Nested sub queries, Complex queries, Join concepts. E-R Model details.

## Module III

### Query Processing and Transaction Processing:-

General strategies for query processing, Equivalence expressions, Selection & join operation. Concept of transaction, States of transactions, Concurrent Executions, Serializability Recoverability, Transaction. Definition in SQL.

### Lock based protocols :

share& exclusive models, Protocols, 2 phase locking, Time-Stamp based, Validation based , Multiple granularity, Deadlock handling, Deadlock prevention, detection & recovery.

## F. Reference

Text Books:

1. Database system concepts by Abraham Silberschatz, Henry F.Kroth and S. Sudharshanth McGraw Hill Publishers, 5 Edition.
2. Fundamentals of Database Systems by Elmasri/Navathe/Adison Wesley
3. An introduction to database systems by Date C.J. Adison Wesley

Reference Books:

4. SQL Unleashed by Hans LadanyiTechmedia Publications, New Delhi
5. Database Management Systems by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., New Delhi
6. Fundamentals of Database Management Systems by Dr RenuVig and EktaWalia, - an ISTE, Publication, New Delhi

## LINUX Operating System

Subject Name	Code	Type of course	T-P-P
LINUX Operating System	DICS2403	Theory	4-0-0

### 1. Objective

- Introduces the Linux operating system, including: task scheduling and management, memory management, input/output processing, internal and external commands, shell configuration, and shell customization
- Explores the use of operating system utilities such as text editors, file management,

scripting, and C/C++ compilers.

- To Monitor system performance and network activities

## 2. Learning outcome

- Identify and use Linux utilities to create and simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks.
- Individual capability in problem solving using the tools presented within the class.

## 3. Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Assignment	10	Report and Presentation
External Examination		70	Written examination
Total		100	

## 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Introduction History of Linux and Unix	4
2	Shell	8
3	Linux file Structure	8
4	Vi Editor	4
5	System Administration	12
	<b>Total</b>	<b>36</b>

## 5. Course Contents

### Module I

**Introduction History of Linux and Unix**, Linux Overview, Linux releases, open linux ,Linux Commands and Filters Mkdir, CD, rmdir, pwd, ls, who, whoami, cat, more, fail, head, concept of, mv, chmod, grep, wc, 54omm..., split, sort, diff, kill, write, wall, merge, mail, news

**Shell:** The command line special characters and file arguments, standard input/output and redirection, pipes, redirecting and piping with standard errors, shell scripts, jobs.

### Module II

**Linux file Structure:-**Linux files, file structure, listing displaying and printing files, managing directories, file and directory operations.

**Vi Editor**, Vi editing commands, advanced Vi editing commands, line editing commands, options in Vi.

### Module III

**System Administration:-**System management, managing users, installing and managing devices, floppy disk management, file system administration, backups.

## G. Reference

Text Books:

1. Maurice J. Bach, "Design of the Unix Operating System", Pearson Education, 2008.
2. Sumitabha Das, "Unix : Concepts and Applications", Tata McGraw-Hill , 2008.
3. Sarwar, Koretsky, and Sarwar, "Unix , The Text Book", Pearson Education, 2007.

Reference Books:

2. ISRD Group, "Basics of OS, UNIX and SHELL Programming" , Tata McGraw-Hill, 2006.

### Software Engineering

Subject Name	Code	Type of course	T-P-P
Software Engineering	DICS2404	Theory	4-0-0

#### 1. Objective

- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes
- To make students to function on multi-disciplinary teams.
- Explaining the direction of software engineering and technologies of the future.

#### 2. Learning outcome

- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
- Demonstrate an ability to use the techniques and tools necessary for engineering practice
- Ability to analyse and resolve information technology problems through the application of systematic approaches and diagnostic tools.

#### 3. Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Assignment	10	Report and Presentation
External Examination		70	Written examination
Total		100	

#### 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Software Process Models:	6
2	Software Requirements Engineering:	6
3	Structured Analysis & Design	10

4	Coding and Software Testing Techniques	10
5	Software Reliability and Software Maintenance:	8
6	Emerging Topics	4
<b>Total</b>		<b>44</b>

## 5. Course Contents

### Module I

#### Software Process Models:

Software Product, Software crisis, Handling complexity through Abstraction and Decomposition, Overview of software development activities, Process Models, Classical waterfall model, iterative waterfall model, prototyping mode, evolutionary model, spiral model, RAD model, Agile models: Extreme Programming, and Scrum.

#### Software Requirements Engineering:

Requirement Gathering and Analysis, Functional and Non-functional requirements, Software Requirement Specification(SRS), IEEE 830 guidelines, Decision tables and trees.

### Module II

#### Structured Analysis & Design:

Overview of design process: High-level and detailed design, Cohesion and coupling, Modularity and layering, Function-Oriented software design: Structured Analysis using DFD Structured Design using Structure Chart, Basic concepts of Object Oriented Analysis & Design. User interface design, Command language, menu and iconic interfaces.,

#### Coding and Software Testing Techniques:

Coding, Code Review, documentation. Testing: - Unit testing, Black-box Testing, Whitebox testing, Cyclomatic complexity measure, coverage analysis, mutation testing, Debugging techniques, Integration testing, System testing, Regression testing.

### Module III

#### Software Reliability and Software Maintenance:

Basic concepts in software reliability, reliability measures, reliability growth modeling, Quality SEI CMM, Characteristics of software maintenance, software reverse engineering, software reengineering, software reuse.

#### Emerging Topics:

Client-Server Software Engineering, Service-oriented Architecture (SOA), Software as a Service (SaaS),

## H. Reference

Text Books:

1. Fundamentals of Software Engineering, Rajib Mall , PHI, 2014
2. Software Engineering: A Practitioner's Approach by Roger S. Pressman



## Data Structure lab

Subject Name	Code	Type of course	T-P-P
Data structure lab	DICS2405	Practice	0-3-0

### 1. Objective.

- Understanding basic data structures and algorithms.
- To understand concepts about searching and sorting techniques.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

### 2. Learning outcome

- Demonstrate advantages and disadvantages of specific algorithms and data structures.
- Ability to analyse algorithms and a algorithm correctness.
- Ability to summarize searching and sorting techniques

### 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

### 4. Course Contents

Sl. No	Topics	Periods
1	The addition of two matrices using functions	3
2	Inserting and deleting elements in array	3
3	Push and pop operation in stack	3
4	Conversion from in-fix notation	3
5	The factorial of a given number using recursion	3
6	Insertion and Deletion of elements in queue using pointers	3
7	Insertion and Deletion of elements in circular queue using pointers	3
8	Insertion and Deletion of elements in linked list	3
9	Insertion and Deletion of elements in doubly linked list	3
10	The linear search procedures to search an element in given list	3
11	The binary search procedures to search an element in a given list : The bubble sort technique	3
12	The selection sort techniques : Ascending and Descending	3
<b>Total</b>		<b>36</b>

## Data Base Management System Lab

Subject Name	Code	Type of course	T-P-P
Data Base Management System Lab	DICS2406	Practice	0-6-0

### 1. Objective

- To study the physical and logical database designs, database modelling, relational, hierarchical, and network models .
- Formulate, using SQL, solutions to a broad range of query and data update problems.

### 2. Learning outcome

- Identify Structure Query Language statements used in creation and manipulation of Database
- Identify the methodology of conceptual modelling through Entity Relationship model.
- Analyze database requirements and determine the entities involved in the system and their relationship to one another.

### 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

### 4. Course Contents

Sl. No	Topics	Periods
1	Study of DBMS, RDBMS.	3
2	To study Data Definition language Statements.	3
3	To study Data Manipulation Statements.	3
4	To Study of SELECT command with different clauses.	3
5	To Study of SINGLE ROW functions (character, numeric, Data functions).	3
6	To Study of GROUP functions (avg, count, max, min, Sum).	3
7	To Study of various type of SET OPERATORS (Union, Intersect, Minus).	3
8	To Study of various type of Integrity Constraints.	3
9	To Study of Various type of JOINS.	3
10	To study Views and Indices.	3
	<b>Total</b>	<b>30</b>

## Linux Lab

Subject Name	Code	Type of course	T-P-P
Linux Lab	DICS2407	Practice	0-3-0

### 1. Objective

- To Effectively use the Linux system to accomplish typical personal, office, technical, and software development tasks
- Identify and use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks.

### 2. Learning outcome

- Effectively use the Linux system to accomplish typical personal, technical, and software development tasks.
- Effectively use software development tools including libraries, pre-processor, compilers, linkers, and make files
- Getting confidence to navigate throughout the Unix command line environment and to find online solutions for handling basic bioinformatics problems

### 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

### 4. Topic Wise Distribution of Periods

Sl. No	Topics	Periods
1	Creating and managing user accounts Practice on Linux commands Practice on vi commands	6
2	Write a Program to find Factorial of numbers	3
3	Write a Program to find Even/odd numbers	3
4	Write a Program to find Fibonacci series	3
5	Write a Program to find Prime numbers	3
6	Write a Program to find Arrange of numbers	3
7	Write a Program to find Reverse of numbers	3
8	Write a Program to find Lower case to upper case	3
9	Write a Program to find Greatest of three numbers	3
10	Installing and configuring X-windows	3
11	Create file and folder Searching a file	3
12	Installation of device drivers Creating user accounts Customizing desktop	3

## Software Engineering Lab

Subject Name	Code	Type of course	T-P-P
Software Engineering Lab	DICS2408	Practice	0-3-0

### 1. Objective

<ul style="list-style-type: none"> <li>Gaining practical software engineering skills that give you a competitive edge in the job market.</li> <li>Identifying specific components of a software design that can be targeted for reuse.</li> </ul>
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### 2. Learning outcome

<ul style="list-style-type: none"> <li>Demonstrate proficiency in software development cost estimation</li> <li>An ability to design and conduct experiments, as well as to analyse and interpret data.</li> </ul>
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### 3. Evaluation Systems

<i>Internal Examination</i>	<i>Component</i>	<i>% of Marks</i>	<i>Method of Assessment</i>
	Experiments	40	Lab work, report
	Quiz (viva)	10	Surprise/preannounced ones
<i>External Examination</i>		50	Written examination
<i>Total</i>		100	

### 4. Course Contents

Sl. No	Topics	Periods
1	Develop requirements specification for a given problem (The requirements specification should include both functional and non-functional requirements. For a set of about 20 sample problems, see the questions section of Chap 6 of Software Engineering book of Rajib Mall)	3
2	Develop DFD Model (Level 0, Level 1 DFD and data dictionary) of the sample problem (Use of a CASE tool required)	3
3	Develop structured design for the DFD model developed	3
4	Develop UML Use case model for a problem (Use of a CASE tool any of Rational rose, Argo UML, or Visual Paradigm etc. is required)	3
5	Develop Sequence Diagrams.	3
6	Develop Class diagrams.	3
7	Develop code for the developed class model using Java.	3
8	Use testing tool such as Junit.	3
9	Use a configuration management tool.	3
10	Use any one project management tool such as Microsoft Project or Gantt Project	3
<b>Total</b>		<b>30</b>



