Integral University, Lucknow

Effective from Session: 2011-12							
Course Code	DMA-301	**Title of the Course**	APPLIED MATHEMATICS-II(A)	**L**	**T**	**P**	**C**
Year	2	**Semester**	3	3	1	0	NA
Pre-Requisite	DMA-301	**Co-requisite**	NA				
Course Objectives	To know the basic concepts of Mathematics with their Applications in Engineering.						

Course Outcomes	
CO1	The students learn about the application of Matrices in complex Engineering problems for recording Math reports.
CO2	The students gain the skill of applying the known results of Matrix algebra for the study of structural properties of graphs and applications of graph theory such as electrical network analysis and electronic circuits in expressing a problem.
CO3	The students use matrix transforms in computer graphics. Software and hardware graphics processor uses matrices for performing operations such as scaling, translation and rotation.
CO4	The students learn to form and solve problems using differential equations of Electrical circuits, decay of radioactive elements, Motion under gravity, Newton's law of cooling and simple Harmonic motion.
CO5	To motivate students on the relevance of differential equations in various engineering disciplines for example one-dimensional transient heat conduction.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1.	Matrix-I	Type of matrix: Null matrix, unit matrix, square matrix, symmetric and skew-symmetric matrix, orthogonal matrix, diagonal and triangular matrix, Hermitian and Skew-Hermitian matrix, unitary matrix. Algebra of Matrix: Addition, subtraction and multiplication. Determinant of matrix, cofactor of matrix, computing inverse through determinant and cofactor. Elementary row/column transformation: meaning and use in computing inverse of matrix.	10	CO1
2.	Matrix-II	Linear dependence/independence of vectors. Definition and computation of rank of matrix through determinants, elementary row and column transformation (Echelon and Normal form of matrix), consistency of equations.	8	CO2
3.	Eigen Values and Eigen Vectors, Cayley Hamiltom Theorem	Definition and evaluation of Eigen values and Eigen vectors of a matrix of order 2 and 3. Cayley Hamilton theorem (without proof) and its verification, use of Cayley-Hamilton theorem in finding inverse.	6	C03
4.	Ordinary Differential Equation	Introduction, formation, order, degree of ordinary differential equation. Formation of ordinary differential equations through physical, geometrical, mechanical, electrical consideration. Solution of differential equations of first order and first degree by variable separable, reducible to variable separable forms, linear and Bernoulli form and exact differential equation.	8	CO4
5.	Second Order Differential Equation Simple Application	Properties of solution, linear differential equation of second order with constant coefficients, complimentary function and particular integral, equation reducible to linear form with constant coefficients, LCR circuit, Motion under gravity, Newton's law of cooling, Radioactive decay, Population growth, Oscillations of a string, Equivalence of electrical mechanical system.	8	CO5

References Books:
1. Applied Mathematics: Kailash Sinha, Meerut publication
2. Applied Mathematics: P.K Gupta, Asian Publication
3. Applied Mathematics: H.R Luthra, Bharat Bharti Prakashan.
4. Applied Mathematics: H.K Das, C.B.S Publication.
5. Mathematics for Polytechnic: S.P Deshpande, Pune Vidyarthi Griha.

e-Learning Source:
https://youtu.be/rBNQ0r7CN2c?si=dWel4wkajbAzEvrt
https://youtu.be/syLIPtxjN0E?si=Gn9S_AjtmUriMP45

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	3	-	-	-	-	-	1	-	-	-
CO2	-	3	-	-	1	-	-	-	-	2	-
CO3	-	3	-	-	1	-	1	-	1	-	-
CO4	-	3	-	-	1	-	-	-	-	-	1
CO5	-	3	-	-	-	-	-	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Effective from Session: 2017-18								
Course Code	DCS-302	**Title of the Course**	OPERATING SYSTEM		**L**	**T**	**P**	**C**
Year	2ⁿᵈ	**Semester**	3ʳᵈ		3	1	0	
Pre-Requisite		**Co-requisite**						
Course Objectives	1. To make students familiar with program language and its related terminologies 2. Study of different types of programming module along with their functionality 3. To Understand the basic Concept of Programming Language							

Course Outcomes	
CO1	Students become familiar with Operating System, its evolution through different generations.
CO2	Knowledge of different types of OS and its various functionalities.
CO3	Students are familiarized with the concept of process and various CPU scheduling algorithms. Familiarized with the concept of paging and various Page replacement algorithms.
CO4	Develop understanding of memory management by OS and the concept of virtual memory. Knowledge of disk structure and various disk scheduling algorithms.
CO5	Develop the ability to compare between Linux, Unix and Windows OS.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Introduction	Evolution of Operating System, Computer system overview, characteristics of operating system, GUI, CUI, Single user, Multi-user operating system Time Sharing and Real Time System.	8	CO1
2	Management of Operating System	Process Management - Process concepts, Process scheduling, Process Synchronization, Inter process communication, CPU scheduling and dead lock.	8	CO2
3	Memory Management	Main memory, Contiguous memory allocation, Segmentation, Paging, Virtual memory, Demand paging, Page replacement, Allocation, Thrashing.	8	CO3
4	Input Output Management	Mass storage structure, Overview, Disk scheduling and Management. .	8	CO4
5	File Management	File concepts, File system and structure, Directory structure. Linux /UNIX and Windows basic concepts, system administration, requirement for Linux.	8	CO5

References Books:

1-Milenekovie - Operating System Concept- McGraw Hill

2-Petersons - Operating System - Addision Wesley

3-Dietal - An Introduction to Operating System- Addision Wesley

e-Learning Source:

1-https://www.geeksforgeeks.org/what-is-an-operating-system/

2-https://www.tutorialspoint.com/operating_system/os_memory_management.htm

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	-	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	2	-	1	1	-	-	-	1	-	-	-	1	-	-
CO3	-	2	-	3	-	-	-	-	1	1	-	-	-	2	-
CO4	-	2	2	-	-	-	-	-	1	-	-	-	-	2	-
CO5	-	2	-	3	-	-	-	-	-	-	-	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2017-18								
Course Code	DCS-303	**Title of the Course**	DATA STRUCTURE USING C		**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd		**3**	**1**	**0**	
Pre-Requisite		**Co-requisite**						
Course Objectives	1. To make students familiar with program language and its related terminologies 2. Study of different types of programming module along with their functionality 3. To Understand the basic Concept of Programming Language							

Course Outcomes	
CO1	To understand and analyze space and time complexity of various algorithms and implement various operations on arrays and linked list
CO2	Exhibit the skills of demonstrating use of linked list.
CO3	Illustrate the application of linear stack and queue.
CO4	Demonstrate various searching and sorting techniques and propose appropriate technique to solve programming problems.
CO5	Illustrate the application of tree and its types. Illustrate the application of graph and its types and its types.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Basic Concepts	Basic concepts and notation & Mathematical background.	8	CO1
2	Arrays	Concept of Arrays, Single dimensional array, two dimensional array, Storage strategy of multidimensional arrays, Operations on arrays with Algorithms (searching, traversing, inserting, deleting)	8	CO2
3	Stacks, Queues, Lists and Recursions:	Representation of stacks & queues, linked sequential. List representation techniques, multilinked structures, Dynamic storage allocation techniques, Recursion.	8	CO3
4	Sorting and Searching	Introduction, Search algorithm (Linear and Binary), Sorting algorithms (Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, heap sort).	8	CO4
5	Tree and Graph	Definitions and basic concepts, Linked tree representations, binary tree traversal algorithms-trees and their applications. Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs. Depths-first-Search	8	CO5

References Books:
1- Data Structure - Schaum's Outline Series - McGraw Hill
2- Data Structure - Schaum's Series - McGraw Hill Publications
3- Horwitz and Sartaj Sahni - Data Structure
4- Kanekar Yashwant - Data Structure through C, BPB Publication

e-Learning Source:
1-https://www.geeksforgeeks.org/data-structures/
2-https://www.w3schools.com/dsa/dsa_intro.php

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	-	-	-	-	-	-	-	2	1	-	1	-	-
CO2	2	1	-	-	-	-	-	-	-	3	-	-	1	-	-
CO3	2	1	-	-	-	-	-	-	-	3	-	-	-	2	-
CO4	1	2	1	-	-	-	-	-	-	3	1	-	-	2	-
CO5	3	1	-	-	-	-	-	-	-	2	1	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	DCS-304	**Title of the Course**	COMPUTER HARDWARE AND MAINTENANCE	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd	3	1	0	
Pre-Requisite		**Co-requisite**					
Course Objectives		1. To make students familiar with program language and its related terminologies 2. Study of different types of programming module along with their functionality 3. To Understand the basic Concept of Programming Language					

	Course Outcomes
CO1	Introduction of physical components of computer like mother board, Bus and other peripheral devices.
CO2	Illustrate the basic information of Mouse, types of mouse and troubleshooting of mouse with knowledge of HDD encoding, recording and troubleshooting.
CO3	Identify the peripheral devices of memory like CD, DVD, Blue Ray Disk and Printer, Types of printer with troubleshooting.
CO4	Illustrate the Network devices and provide the basic concept or information of the network components.
CO5	Illustrate the external optical devices of computer memory with the characteristics of power supply and maintenance.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Component and peripheral devices	Mother Board: BUS, Mother board components, Battery, Connections on the Mother Board, Keeping CPU cool, Mother board trouble shooting. Key Board: Switches, Keyboard organization, trouble shooting.	8	CO1
2	Mouse and HDD	Mouse type, Connecting Mouse, Trouble shooting Mouse. HDD: Magnetic recording, Data Encoding Method, HDD feature, Head barking, HDD trouble shooting.	8	CO2
3	Compact Disk Drive and Printers	CD-R, CD-W, CD-RW, DVD-R, DVD-RW, Blue Ray. Working and Maintenance. Image formation method, Printing mechanism, DMP, Ink Jet, Laser Printer,Multi functional printer. How printer works and Trouble Shooting	8	CO3
4	Networking Devices	Hub, Switch, Router, Bridge, Gateway Ethernet Card. Scanner- Flat Bed.	8	C04
5	External Devices	Pen Drive, Flash Drive, External Hard Disk. Power Supply: Operating characteristics, Types and maintenance.	8	CO5

References Books:

1- Computer Hardware and maintenance by Butterwoth-Heinemann Newton

2- Computer Peripherals and Interfacing by Er. Neha Dutta -S.K. Kataria & Sons

e-Learning Source:

1-https://www.geeksforgeeks.org/computer-hardware/

2-https://www.geeksforgeeks.org/network-devices-hub-repeater-bridge-switch-router-gateways/

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	2	-	-	3	-	-	-	2	-	-	-	1	-	-
CO2	-	2	-	-	3	-	-	1	2	-	-	-	1	-	-
CO3	-	2	-	-	3	2	-	-	2	-	-	-	-	2	-
CO4	-	3	-	-	1	1	-	3	-	-	-	-	-	2	-
CO5	-	2	-	-	3	1	-	-	2	-	-	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2017-18								
Course Code	DCS-305	**Title of the Course**	PRINCIPLE OF PROGRAMMING LANGUAGE		**L**	**T**	**P**	**C**
Year	2^N	**Semester**	3RD		3	1	0	
Pre-Requisite		**Co-requisite**						
Course Objectives	1. To make students familiar with program language and its related terminologies 2. Study of different types of programming module along with their functionality 3. To Understand the basic Concept of Programming Language							

	Course Outcomes
CO1	Analyze the designing criteria of different programming languages to choose appropriate language for implementation of real time applications
CO2	This course focuses on high-level programming languages and their formal semantics
CO3	Apply sub program concepts to improve the readability of the program.
CO4	Analyze different object oriented programming features and to apply in developing efficient web programs with concurrent ability
CO5	Apply exception handling techniques to develop robust programs to sustain against all runtime exceptions

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Introduction	The Role of Programming Languages: Why Study Programming Languages, Towards Higher- Level languages, Programming paradigms, Programming environments.	8	CO1
2	Language Description	Syntactic structure, language Translation Issues: Programming language Syntax, Stages in translation, Formal translation Models	8	CO2
3	Language Properties	Modeling Language Properties, Elementary Data Types, Encapsulation, Inheritance, Sequence Control, Subprogram Control	8	CO3
4	Programming Paradigms	Imperative Programming: Statements, Types, Procedure Activations Object-Oriented Programming: Grouping of Data and Operations, object orientedprogramming Functional Programming: Elements, Programming in a typed language, Programming with lists	8	CO4
5	Other Programming Paradigms	Logic Programming, Concurrent Programming, Network Programming, Language Description: Semantic Methods	8	CO5

References Books:

1- "Programming Languages: Design and Implementations", Terrance W.Pratt,

2- Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication

e-Learning Source:

1-https://cvr.ac.in/cse/stud/NOTES/PPL/PPL.pdf

2-https://www.tutorialstonight.com/programming-paradigm

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	-	-	-	-	-	-	1	-	-	1	-	-
CO2	2	1	1	-	-	-	2	-	-	3	1	-	1	-	-
CO3	1	1	-	2	-	-	-	-	-	3	1	-	-	2	-
CO4	1	1	-	-	-	2	-	-	1	3	1	-	-	2	-
CO5	1	1	-	1	3	1	-	-	-	2	1	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session:2017-18								
Course Code	DEC-301	**Title of the Course**	PRINCIPAL OF DIGITAL ELECTRONICS	**L**	**T**	**P**	**C**	
Year	2nd	**Semester**	3rd	3	1	0		
Pre-Requisite	None	**Co-requisite**	None					
Course Objectives	1. To acquire the basic knowledge of digital logic levels. 2. Application of knowledge to understand digital electronics circuits. 3. To prepare students to perform the analysis and design of various digital electronic circuits. 4. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics							

Course Outcomes	
CO1	Convert different type of codes and number systems which are used in digital communication and computer systems.
CO2	Employ the codes and number systems converting circuits and compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency
CO3	Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
CO4	Assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application.
CO5	To develop skills to build and troubleshoot counter circuits and programmable logic devices.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Introduction to digital electronics	Basic difference between analog and digital signal. Number system: Binary number system, Decimal number system, octal number system, Hexadecimal number system. Conversion of bases: conversion from Decimal, Octal & Hexadecimal to Binary and vice-versa. Binary addition, subtraction, multiplication and division including binary points. Binary Codes: BCD, 8421 code, Gray code, Binary to Gray code conversion and Gray to Binary code conversion. Complements: Signed numbers, Signed magnitude representation, 1's and 2's complement representation. Addition and subtraction of numbers in 2's complement representation.	8	CO1
2	Logic gates	Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, Exclusive OR Exclusive NOR gates. Logic simplification: Boolean algebra, Boolean theorems, karnaugh mapping upto 4 variables, Implementation of logic equations with gates.	8	CO2
3	Combinational Logic Circuits	Introduction to combinational and sequential logic circuits. Arithmetic circuits: half adder, full adder, half subtractor, full subtractor. Multiplexer: 2:1, 4:1. Demultiplexer: 1:2, 1:4. Decoder: 3 to 8 Decoder, Encoder.	8	CO3
4	Flip Flops	Introduction, Latches and flip flop, SR, T, D, JK and master slave JK flip flop. Counter: Introduction, counter classification, 2-bit, 3-bit ripple counter, MOD-5 counter.	8	CO4
5	Shift Registers:	Introduction, serial in serial out, shift left, serial in parallel out, parallel in serial out, and parallel in parallel out shift registers. Memory and Programmable logic: volatile and non-volatile, RAM, ROM, PLA, PAL.	8	CO5

References Books:

1. Digital Principles & Application: Malvino & Leach, Mcgraw Hill-5th Edition.
2. Digital logic & Computer Design: Mano, M. Morris, PHI publication.
3. Digital Electronics: D.A. Godse and A.P. Godse: Technical Publication.
4. Digital Electronics Circuits & System: Puri, V: TMH

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3			3								1		2	3	2
CO2	-	2		2					1								2
CO3	-	2		2							1						2
CO4	1	2		3													2
CO5	-	2							2		1						2

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	DCS-353	**Title of the Course**	DATA STRUCTURE USING C LAB	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd	**0**	**0**	**2**	
Pre-Requisite		**Co-requisite**					
Course Objectives	1. To make students familiar with program language and its related terminologies 2. Study of different types of programming module along with their functionality 3. To Understand the basic Concept of Programming Language						

Course Outcomes	
CO1	To understand and analyze space and time complexity of various algorithms and implement various operations on arrays and linked list
CO2	Exhibit the skills of demonstrating use of linked list.
CO3	Illustrate the application of linear stack and queue.
CO4	Demonstrate various searching and sorting techniques and propose appropriate technique to solve programming problems.
CO5	Illustrate the application of tree and its types. Illustrate the application of graph and its types and its types.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	EXPERIMENT 1	WAP to calculate Sum & average of N numbers.	2	CO1
2	EXPERIMENT 2	WAP using switch case to find maximum and minimum out of 3 numbers a, b & c.	2	CO1
3	EXPERIMENT 3	WAP to print all the number between 1 to 100 which are dividing by 9.	2	CO2
4	EXPERIMENT 4	WAP to find addition of two matrix of n*n order.	2	CO2
5	EXPERIMENT 5	Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort.	2	CO4
6	EXPERIMENT 6	Searching programs: Linear Search, Binary Search.	2	CO4
7	EXPERIMENT 7	Array implementation of Stack, Queue, and Circular Queue.	2	CO3
8	EXPERIMENT 8	Implementation of Stack, Queue.	2	CO3
9	EXPERIMENT 9	WAP to Tree Traversals.	2	CO5

References Books:

1- Data Structure - Schaum's Outline Series - McGraw Hill

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	-	-	-	3	2	-	1	-	-
CO2	3	2	-	-	1	-	-	-	-	2	2	-	1	-	-
CO3	3	2	-	-	1	-	-	-	-	2	2	-	-	2	-
CO4	3	2	1	-	1	-	-	-	-	2	2	-	-	2	-
CO5	3	2	1	-	-	-	-	-	-	1	2	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2017-18								
Course Code	DCS-352	**Title of the Course**	OPERATING SYSTEM LAB		**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd		**0**	**0**	**2**	
Pre-Requisite		**Co-requisite**						
Course Objectives	1. To make students familiar with program language and its related terminologies 2. Study of different types of programming module along with their functionality 3. To Understand the basic Concept of Programming Language							

Course Outcomes	
CO1	Students become familiar with Operating System, its main components and its functionalities.
CO2	Students will learn the complete process involved in installation of an OS
CO3	Students are familiarized with the concept of process and various CPU scheduling algorithms. Familiarized with the concept of paging and various Page replacement algorithms.
CO4	Learn the concept of disk scheduling and its various algorithms.
CO5	Develop the ability to compare between Linux, Unix and Windows OS.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	EXPERIMENT 1	Installation of operating system	2	CO1
2	EXPERIMENT 2	Repairing and Removal of operating system	2	CO2
3	EXPERIMENT 3	Exercise on Windows Latest Version.	2	CO3

References Books:

1-Milenekovie - Operating System Concept- McGraw Hill

2-Petersons - Operating System - Addision Wesley

3-Dietal - An Introduction to Operating System- Addision Wesley

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	-	2	-	1	1	-	-	-	-	-	-	-	1	-	-
CO2	-	2	-	-	1	-	-	-	-	1	-	-	1	-	-
CO3	-	1	-	3	-	-	-	-	1	-	-	-	-	2	-
CO4	-	1	-	3	-	-	-	-	1	-	-	-	-	2	-
CO5	-	2	-	3	-	-	-	-	1	-	-	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	DCS-354	**Title of the Course**	COMPUTER HARDWARE AND MAINTENANCE LAB	**L**	**T**	**P**	**C**
Year	2nd	**Semester**	3rd	0	0	2	
Pre-Requisite		**Co-requisite**					
Course Objectives	1. To make students familiar with program language and its related terminologies 2. Study of different types of programming module along with their functionality 3. To Understand the basic Concept of Programming Language						

Course Outcomes	
CO1	Introduction of physical components of computer like mother board, Bus and other peripheral devices.
CO2	Illustrate the basic information of Mouse, types of mouse and troubleshooting of mouse with knowledge of HDD encoding, recording and troubleshooting.
CO3	Identify the peripheral devices of memory like CD, DVD, Blue Ray Disk and Printer, Types of printer with troubleshooting.
CO4	Illustrate the Network devices and provide the basic concept or information of the network components.
CO5	Illustrate the external optical devices of computer memory with the characteristics of power supply and maintenance.

UnitNo.	Title of the Unit		ContactHrs.	MappedCO
1	EXPERIMENT 1	Study of devices on motherboard	2	CO1
2	EXPERIMENT 2	Study of Key board & Keyboard decoder	2	CO1
3	EXPERIMENT 3	Study of Video Adopter & display controllers	2	CO3
4	EXPERIMENT 4	Study of Floppy Drive, CD Drive and Hard Disk.	2	CO3
5	EXPERIMENT 5	Study of Multifunction Input/output controllers	2	CO2
6	EXPERIMENT 6	Troubleshooting & repair of following equipment	2	CO5
7	EXPERIMENT 7	Dot Matrix Printer, Laser, Inkjet Printer.	2	CO3
8	EXPERIMENT 8	Digital Plotter	2	CO4
9	EXPERIMENT 9	C. P. U.	2	CO4
10	EXPERIMENT 10	Disk Drive	2	CO3
11	EXPERIMENT 11	Study and Trouble Shooting of (I) Network (II) Power Supplies.	2	CO5

References Books:

1- Computer Hardware and maintenance by Butterwoth-Heinemann Newton

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	3	-	-	-	2	-	-	-	1	-	-
CO2	-	1	-	-	3	-	-	1	2	-	-	-	1	-	-
CO3	-	2	-	-	3	-	-	-	2	-	-	-	-	2	-
CO4	-	1	-	-	1	2	-	3	-	-	-	-	-	2	-
CO5	-	2	-	-	3	2	-	-	2	-	-	-	-	2	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session:2017-18								
Course Code	DEC-351	**Title of the Course**	PRINCIPAL OF DIGITAL ELECTRONICS LAB	**L**	**T**	**P**	**C**	
Year	2nd	**Semester**	3rd	**0**	**0**	**3**		
Pre-Requisite	None	**Co-requisite**	None					
Course Objectives	1. Students will learn and understand the Basics of digital electronics and able to design basic logic circuits, combinational and sequential circuits. 2. Learn and understand the basics of Boolean algebra, and test/verify the functionality of the logic circuits.							

Course Outcomes	
CO1	Identify the various digital ICs and understand their operation.
CO2	Designing from simple to complex logic circuits.
CO3	Construct basic combinational circuits and verify their functionalities
CO4	Describe the operation and timing constraints for latches and registers

Experiment No.	Title of the Experiment	Content of the Unit	Contact Hrs.	Mapped CO
1	IC Identification	Identification of IC no's, Pin no's and IC types.	3	CO1
2	Gate IC verification	Verification of truth table for 2 Input NOT, AND, OR, NAND, NOR, XOR gates.	3	CO1
3	Basic gates using NAND	Realization of NOT, OR, AND, NOR, EX-OR and EX-NOR gates using NAND gate.	3	CO1
4	Basic gates using NOR	Realization of NOT, OR, AND, NOR, EX-OR and EX-NOR gates using NOR gate.	3	CO1
5	Design using Logic gates	Design and Implementation of Simple Logic Circuits.	3	CO2
6	Design Combinational circuit	To construct half adder and half subtractor using XOR and NAND gates verification of their truth tables	3	CO3
7	Design Combinational circuit	Implementation of full adder and full subtractor using logic gates.	3	CO3
8	Design Combinational circuit	Implementation of 4x1 multiplexer using logic gates.	3	CO3
9	Simplification of large circuits	To construct a full adder circuit with XOR and NAND gates.	3	CO3
10	Four Adder Circuit	To verify the truth table of 4 bit adder IC chip 7483	3	CO4

References Books:

1. The 8051 Microcontroller and Embedded Systems: Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, "Pearson Prentice Hall"
2. Microprocessor & Application: B. Ram, TMH Publication.
3. Microprocessor and Interference: D V Hall, TMH Publication.

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	3									1	1				3	2
CO2		1	3							1		2				2	2
CO3	1	2	3									2				2	2
CO4		2	1								2	1				2	2

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**