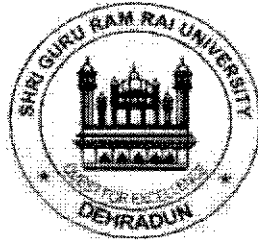


SHRI GURU RAM RAI UNIVERSITY

[Estd. by Govt. of Uttarakhand, vide Shri Guru Ram Rai University Act no. 03 of 2017 & recognized by
UGC u/s (2f) of UGC Act 1956]



SYLLABUS FOR

Certificate in Information Technology – 1 Year

Diploma in Information Technology – 2 Years

Bachelor of Science in Information Technology – 3 Years

**Bachelor of Science in Information Technology (Honors with
Research/ Academic Project/ Entrepreneurship – 4 Years**

As per NEP 2020

**School of Computer Application &
Information Technology**

(w.e.f. 2023-2024)

[Signature]
03/07/2023
Randeep Samra
Asso Prof
HOD, Dept of IT

SCAIT

[Signature]
Haish Shams
Associate Professor,
SCAIT,

[Signature]
Arshad S.H.S

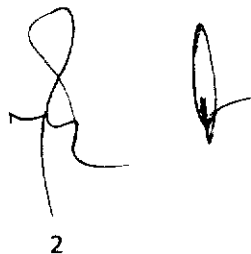
[Signature]
Vaibhav Sharma
Associate Prof.
SCAIT

Ordinance of Bachelor of Science in Information Technology

Bachelor of Science in Information Technology is an undergraduate degree program of either 3 or 4-year duration, with multiple entry and exit points and re-entry options, with appropriate certifications such as:

S. No.	Name of Program	Duration of the program	Remarks
1	Certificate in Information Technology after completing 1 year (2 semesters) of study	1 Year	Students who opt to exit after completion of the first year and have secured 44 credits will be awarded a UG certificate if, in addition, they complete one vocational course/Internship of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree program within three years and complete the degree program within the stipulated maximum period of seven years
2	Diploma in Information Technology after 2 years (4 semesters) of study	2 Years	Students who opt to exit after completion of the second year and have secured 88 credits will be awarded the UG diploma if, in addition, they complete one vocational course/Internship of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree program within the maximum period of seven years.
3	Bachelor of Science in Information Technology after 3-year (6 semesters) program of study	3 Years	Students who wish to undergo a 3-year UG program will be awarded UG Degree, Bachelor of Science in Information Technology in the Major discipline after successful completion of three years, securing 132 credits .
4	Bachelor of Science in Information Technology (Honor's with Research/ Academic Project/ Entrepreneurship) after 4 years (8 semester) program of study	4 Years	A four-year UG honors degree (Bachelor of Science in Information Technology (Honors) with Machine Learning) in the major discipline will be awarded to those who complete a four-year degree program with 176 credits. Students who secure 75% marks and above in the first six semesters can opt for the Honors in Research.







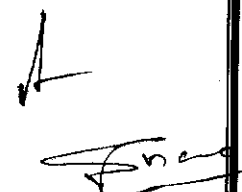
Eligibility for admission:

Intermediate (10+2) or equivalent in any discipline from any recognized board with minimum 45%

Duration of the Program: 3/4 years

Examination Scheme:

Components	Internal Assessment		External Assessment (ESE)
	Internal Exam	Assignment & Teacher Assessment	
Weightage (%)	15	15	70

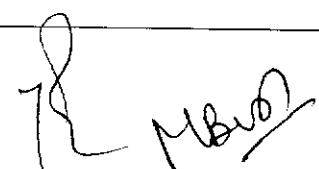

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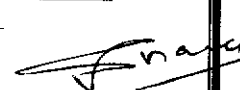
Program outcome (POs)

Students will be able to

PO1	Computational knowledge	Acquire knowledge of Computing (algorithm and Coding) & Computing Specialization and Domain Knowledge of proper computing models for defined problems.
PO2	Problem analysis	Identify, formulate and analyze complex computational problems using mathematics, computer science concepts and relevant domains.
PO3	Design/development of solutions	Ability to design efficient solution for complex, real-life problem, system software or Application Software as per needs and specifications of customers.
PO4	Conduct investigations of complex computing problems	Use research-based knowledge and research methods including design of experiments, analysis & interpretation of data & synthesis of information to reach valid conclusions.
PO5	Modern Tool Usage	Ability to demonstrate skills to use modern technologies and tools to analyze and solve the software development problems.
PO6	Professional Ethics	Ability to perform professional practices in an ethical way, keeping in the mind cyber regulations, laws, Intellectual Property Right and norms of professional computing practices.
PO7	Life-Long Learning	Ability to develop confidence and ability for self-education and life-long learning in the broadest context of technological change. Ability to adapt or change the acquired knowledge with change in the technology.
PO8	Project management and finance	Ability to demonstrate knowledge & understanding the Software engineering management principles and apply them as a member & as a leader in a team to manage multidisciplinary projects. Ability to make budget, make estimates of time, effort, time and analyze risk and reschedule the projects accordingly.





PO9	Communication Efficacy	Ability to effectively communicate with the technical community and with the society about complex computing activities in both verbal and written form, design documents, letters, make effective presentations.
PO10	Societal and Environmental Concern	Ability to understand the impact of IT solutions in a global and societal context. Ability to apply all concepts of green computing to preserve environment and use IT resources in an effective and optimized way.
PO11	Individual and Team Work	Ability to work multi-disciplinary team both as a member and leader, as per need. To develop the leadership and managerial skills in the student.
PO12	Innovations and entrepreneurship	Ability to apply innovation and promote innovative ideas to a suitable opportunity to create value and wealth for the betterment of the individual and society at large.

CS HS ML 5 YL MB 1 A

**STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)**

Certificate in Information Technology

FIRST SEMESTER:

S. No.	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BITDSC101	Fundamental of Computer & Information Technology	3	-	-	3	30	70	100
2	Discipline Specific Core	BITDSC102	Programming in 'C'	3	-	-	3	30	70	100
3	Discipline Specific Core	BITDSC103	Basic Mathematics.	3	1	-	4	30	70	100
4	General Elective	BITGE101	e- Governance	3	1	-	4	30	70	100
5	Skill Enhancement Course	BITSC101	Programming Paradigm and Internet Technology	2	-	-	2	30	70	100
6	Ability Enhancement Course	AEC1	Environmental studies -I	2	-	-	2	30	70	100
7.	Value Addition Course	CITVC101	Computers and Ethics	2	-	-	2	30	70	100
Practical										
8	Discipline Specific Core	BITP11	Lab- Fundamental of Computers	-	-	2	1	30	70	100
9	Discipline Specific Core	BITP12	Lab- Programming in C	-	-	2	1	30	70	100
Total				18	2	4	22	270	630	900

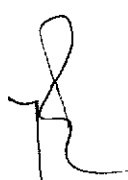
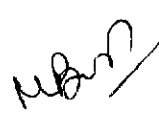
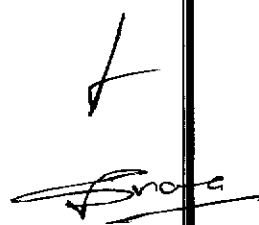
**STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)**

Certificate in Information Technology

SECOND SEMESTER:

S. No	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BITDSC201	Operating System	3	-	-	3	30	70	100
2	Discipline Specific Core	BITDSC202	Data Structure using C	3	-	-	3	30	70	100
3	Discipline Specific Core	BITDSC203	Digital Electronics	3	1	-	4	30	70	100
4	General Elective	BITGE201	Cyber Security and law	3	1		4	30	70	100
5	Skill Enhancement Course	BITSC201	Health Awareness & Hygiene	2	-	-	2	30	70	100
6	Ability Enhancement Course	AEC2	Communication Skill: listening and speaking skills	2	-	-	2	30	70	100
7.	Value Addition Course	CITVC201	The Art of Clean Code	2	-	-	2	30	70	100
Practical										
8	Discipline Specific Core	BITP21	Lab-UNIX	-	-	2	1	30	70	100
9	Discipline Specific Core	BITP22	Lab-Data Structure	-	-	2	1	30	70	100
Total				18	2	4	22	270	630	900
Exit option with Certificate in Information Technology (with the completion of courses) equivalent to a minimum of 44 credits + 4 credits through summer internship /Apprentice				Total Credits (I st & II nd Semester)			44	Total Marks (I st & II nd Semester)		1800



**STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)**

Diploma in Information Technology

THIRD SEMESTER:

S. No.	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BITDSC301	DBMS	3	-	-	3	30	70	100
2	Discipline Specific Core	BITDSC302	Web Designing using HTML, CSS and Java Script	3	-	-	3	30	70	100
3	Discipline Specific Core	BITDSC303	Computer Network	3	1	-	4	30	70	100
4	General Elective	BITGE301	Digital Marketing	3	1	-	4	30	70	100
5	Skill Enhancement Course	BITSC301	Numerical Aptitude	2	-	-	2	30	70	100
6	Ability Enhancement Course	AEC3	Environmental studies -II	2	-	-	2	30	70	100
7	Value Addition Course	CITVC301	Digital Empowerment	2	-	-	2	30	70	100
Practical										
8	Discipline Specific Core	BITP31	Lab- DBMS	-	-	2	1	30	70	100
9	Discipline Specific Core	BITP32	Lab- Web Designing	-	-	2	1	30	70	100
Total				18	2	4	22	270	630	900

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STUDY & EVALUATION SCHEME CHOICE BASED CREDIT SYSTEM (CBCS)

Diploma in Information Technology

FOURTH SEMESTER:

S. No.	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Sessional (Internal)	External (ESE)	
Theory										
1	Discipline Specific Core	BITDSC401	JAVA Programming	3	-	-	3	30	70	100
2	Discipline Specific Core	BITDSC402	PHP Programming	3	-	-	3	30	70	100
3	Discipline Specific Core	BITDSC403	Introduction to IoT	3	1	-	4	30	70	100
4	General Elective	BITGE401	e Commerce	3	1	-	4	30	70	100
5	Skill Enhancement Course	BITSC401	Reasoning Aptitude	2	-	-	2	30	70	100
6	Ability Enhancement Course	AEC4	Communication Skill: Reading and writing Skill	2	-	-	2	30	70	100
7	Value Addition Course	CITVC401	Challenges in Programming	2	-	-	2	30	70	100
Practical										
8	Discipline Specific Core	BITP41	Lab- JAVA Programming	-	-	2	1	30	70	100
9	Discipline Specific Core	BITP42	Lab- PHP Programming	-	-	2	1	30	70	100
Total				18	2	4	22	270	630	900
Exit option with Diploma in Information Technology (with the completion of courses) equivalent to a minimum of 8credits+ 4 credits through summer internship /Apprentice				Total Credits (I st to IV th Semester)		88	Total Marks (I st to IV th Semester)		3600	

**STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)**

Bachelor of Science in Information Technology

FIFTH SEMESTER:

S. No.	Course Category	Couse Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BITDSC501	Android Programming	3	-	-	3	30	70	100
2	Discipline Specific Core	BITDSC502	Python Programming	3	-	-	3	30	70	100
3	Discipline Specific Core	BITDSC503	Statistics	3	1	-	4	30	70	100
4	General Elective	BITGE504	Enterprise Resource planning	3	1	-	4	30	70	100
5	Discipline Specific Elective	BITDSE505A	Mobile Computing/ MOOC	3	1	-	4	30	70	100
		BITDSE505B	Cloud Computing/MOOC							
		BITDSE505C	Computer Graphics/MOOC							
Practical										
6	Seminar	BITSM5	Seminar	-	-	4	2	30	70	100
7	Discipline Specific Core	BITP51	Lab- Android Programming	-	-	2	1	30	70	100
8	Discipline Specific Core	BITP52	Lab- Python Programming	-	-	2	1	30	70	100
Total				15	3	4	22	240	560	800

**STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)**

Bachelor of Science in Information Technology

SIXTH SEMESTER:

S. No	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BITDSC601	C# and .NET Programming	3	-	-	3	30	70	100
2	Discipline Specific Core	BITDSC602	Software Engineering	3	1	-	4	30	70	100
3	Discipline Specific Core	BITDSC603	Big Data Analytics	3	1	-	4	30	70	100
4	General Elective	BITGE604	Management Information System	3	1	-	4	30	70	100
5	Discipline Specific Elective	BITDSE605A	Operation Research/MOOC	3	1	-	4	30	70	100
		BITDSE605B	Graph Theory/MOOC							
		BITDSE605C	Introduction to logic/MOOC							
Practical										
6	Discipline Specific Core	BITP61	Lab-C# and .NET Programming	-	-	2	1	30	70	100
6	(Internship/Apprenticeship /Project/Community Outreach) (IAPC)	BITPR606	Project and Dissertation	-	-	4	2	30	70	100
Total				15	4	4	22	240	560	800
Exit option with Bachelor Degree in Information Technology (with the completion of courses) equivalent to a minimum of 132 credits				Total Credits (I st to VI th Semester)		132	Total Marks I st to VI th Semester))		5200	

**STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)**

B.Sc. (IT) Honors in (Research/Entrepreneurship/ Academic Project)

SEVENTH SEMESTER:

S. No.	Course Category	Couse Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Sessional (Internal)	External (ESE)	
Theory										
1	Discipline Specific Core	BITDSC701	UNIX and Shell Programming	3	-	-	3	30	70	100
2	Discipline Specific Elective	BITDSE702A	Research methodology	3	1	-	4	30	70	100
		BITDSE702B	Software Project management -I							
		BITDSE 702C	Entrepreneurship Management -I							
3	Discipline Specific Elective	BITDSE703A	Network Security and Cryptography/MOOC	3	1	-	4	30	70	100
		BITDSE703B	Multimedia system/MOOC							
4	Discipline Specific Elective	BITDSE704A	Data warehousing and Data Mining /MOOC	3	1	-	4	30	70	100
		BITDSE704B	Advance RDBMS/MOOC							
Practical										
5	Discipline Specific Elective	BITP71	LAB-UNIX	-	-	2	1	30	70	100
6	Discipline Specific Elective	BITPR705A BITPR705B BITPR705C	Dissertation on Research /Academic /Entrepreneurship Based Project	-	-	12	6	30	70	100
Total				12	3	16	22	180	420	600

**STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)**

B.Sc. (IT) Honors in (Research/Entrepreneurship/ Academic Project)

EIGHTH SEMESTER:

S. No.	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Sessional (Internal)	External (ESE)	
Theory										
1	Discipline Specific Core	BITDSC801	ASP.NET Programming	3		-	3	30	70	100
2	Discipline Specific Elective	BITDSE802A	Research Publication Ethics	3	1	-	4	30	70	100
		BITDSE802B	Software Project management -II							
		BITDSE802C	Entrepreneurship Management-II							
3	Discipline Specific Elective	BITDSE803A	Artificial Intelligence /MOOC	3	1	-	4	30	70	100
		BITDSE803B	Analysis and Design of Algorithm/MOOC							
4	Discipline Specific Elective	BITDSE804A	Machine Learning/MOOC	3	1	-	4	30	70	100
		BITDSE804B	Advance Software Engineering/MOOC							
PRACTICAL										
5	Discipline Specific Elective	BITP81	ASP.NET LAB	-	-	2	1	30	70	100
6	Project	BITPR805A BITPR805B BITPR805C	Dissertation on Research/Academic /Entrepreneurship Based Project	-	-	12	6	30	70	100
Total				12	3	12	22	180	420	600
UG Honors Degree (with research /Academic project/Entrepreneurship) in Information Technology (with the completion of courses) equivalent to a minimum of 176credits				Total Credits (I st to VIII th Semester)			176	Total Marks (I st to VIII th Semester)		6300

FIRST SEMESTER:

Course code	: BITDSC101			
Course Name	: Fundamental of Computers & Information Technology			
Semester /Year	: 1st /1st			
	L	T	P	C
	3	-	-	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSEOBJECTIVES:

- The main objective is to introduce Programming in a simple language to all undergraduate students, regardless of their specialization.
- It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry.
- The focus of the subject is on introducing skills relating to computer basics, computer applications, programming, interactive Medias, Internet basics etc.

COUSECONTENTS:**UNIT1 Introduction to Computers****[No. of Hours: 10]**

Generation of Computer, Hardware Components, Memory Devices, Magnetic Disk, Floppy Disk, Compact Disc/ DVD; **Input Devices**-Keyboard, Mouse, Scanner, OCR, OMR, MICR. **Output Devices**- Printer, Types of Printer, Plotter, **Monitor**: CRT; Central Processing Unit, CPU Arithmetic Logic Unit, Control Unit, Instruction Set, Registers, Processor Speed, Type of Processors; **Memory**- Main Memory Organization, Main Memory Capacity, RAM, ROM, EPROM,PROM, Cache Memory , Number Systems: Binary, Decimal, Octal, Hexadecimal, Binary Arithmetic, Character Codes(BCD),Excess-3, Gray Code, ASCII

UNIT2–System Software and Application Software**[No. of Hours: 10]**

System software, utility packages, compilers, interpreters, Operating Systems, Elementary Commands of DOS, Booting.

Application software's – Word-processing, spreadsheet, presentation graphics, Data Base Management Software, Characteristics, Virus-working, features, types of viruses, virus detection prevention and cure.

UNIT- 3 MS-WORD**[No. of Hours: 10]**

MS Word -Working with Documents-Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help, Formatting Documents-Setting Font styles, Font selection-style, size, color etc., Type face-Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering. Setting Page style-Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes–Shortcut Keys; Inserting manual page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master

Documents, Web page. Creating Tables-Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula.

UNIT -4 MS-EXCEL

[No. of Hours: 5]

Spread Sheet & its Applications, Opening Spreadsheet, Menus-main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets-opening, Saving files, setting Margins, Converting files to different formats(importing, exporting, sending files to others), Spread sheet addressing-Rows, Columns & Cells, Referring Cells & Selecting Cells-Shortcut Keys. Entering & Deleting Data-Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc. Inserting Functions, Manual breaks, Setting Formula-finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae. Creating Charts -Drawing. Printing.

UNIT -5 MS-POWER POINT

[No. of Hours: 5]

Introduction to presentation -Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts. Creating a presentation -Setting Presentation style, Adding text to the Presentation. Formatting a Presentation-Adding style, Color, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation-Inserting pictures, movies, tables etc. into presentation, Drawing Pictures using draw. Adding effects to the Presentation- Setting Animation & transition effect. Printing Handouts, Generating Standalone Presentation viewer.

TEXTBOOKS:

TB1. Raja Raman V: Fundamentals of Computers

REFERENCE BOOKS:

RB1. Sanders D.H: Computers Today

COURSE OUTCOMES:

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	To understand the fundamentals of Computers, Block Diagram of Computer, Computer hardware, Memory Architecture, to perform conversion from one number system to another number system.
CO2	Will be able to analyze software, to identify type of software, to know the concept of Operating System and Functions of Operating System, to memorize the various commands of different Operating System.
CO3	Students will be able to know concept of networking, Networking based reference model, Internet and different term related to internet. Different types of protocols associated with internet.
CO4	Will be able to get idea about what is program and program paradigms, to develop strategies behind designing a program, to know the structure i.e. Top-Down and Bottom-Up approach of Modular Programming.
CO5	Will be able to learn about different generations of Programming language, to know different methodologies to solve computation task,

CO6	To create and design algorithm suitable flowchart of different problems
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CO-POMAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1			1	1				2	
CO2	1	3	2	2	1		1	1				
CO3	2	2	1	1		1			2		2	
CO4		2	3	1	1	3	1	1		2	1	
CO5	1	3	2	2	1		1	2			2	2
CO6	1	2	2	1	1		1	2	1	2	1	2
AVG	1.33	2.16	1.83	1.16	0.66	0.83	0.83	1	0.5	0.66	1.33	0.66

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	:BITDSC102			
Course Name	:Programming in 'C'			
Semester /Year	:1 st /1 st			
	L	T	P	C
	3	-	-	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Understand the basics of Programming.
- Understand functional hierarchical code generation.
- Understand the usage of characters, string, integers and special symbols in programming.
- Understand loops and decision-making statements in order to solve problems.
- Understand arrays and implementation of various operations on arrays.
- Understand the use of functions and pointer in programming.
- Understand the use of structure & union.
- Understand file operations and implement file operation in C programming for a set of problems.

COURSE CONTENTS:**Unit1****[No. of Hours: 05]**

History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programs. Debugging Techniques

Unit 2**[No. of Hours:05]**

Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.

Unit3**[No. of Hours: 05]**

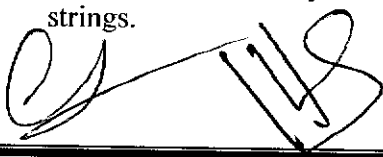
Operators: Unary operators, Arithmetic & logical operators, Bitwise operators, Assignment operators and expressions, Conditional expressions, precedence and order of evaluation. Control Statements: if-else, switch, break, continue, the comma operator, go to statement. Loops: for, while, do-while.

Unit4:**[No. of Hours: 10]**

Functions: built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multi file programs.

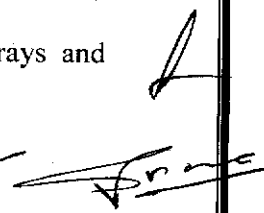
Unit5:**[No. of Hours: 10]**

Arrays: Linear arrays, multidimensional arrays, passing arrays to functions, Arrays and strings.




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Structure and Union: Definition and differences, self-referential structure. And address of (&) operator, pointer to pointer, Dynamic Memory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers.

Unit6:

[No. of Hours: 5]

File: File Handling in C

TEXTBOOKS:

TB1: Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.

TB2: Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.

REFERENCEBOOKS:

RB1. Gottfried, "Programming in C, Schaum's Series Tata McGraw

COURSEOUTCOMES:

CO#	Detailed Statement of the CO
CO1	Identify the need and use of programming in real world environment
CO2	Explain data types, variables and arithmetic operations in programming.
CO3	Apply the concept of functions and pointer. Resolve Real world problems using Functions and pointers.
CO4	Analyze array and String concepts and implement array and string using functions and pointers.
CO5	Appraise user defined data types including structure and union.
CO6	Create programs for all programming problems

COPOMAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			1	1		1				
CO2	2	2	2	3	1					1	1	1
CO3	2	3	2	3	1	1	1	2	1			1
CO4	2	2	2	3	1	1	1		1		1	
CO5		2	2	3	1		1	1	1			1
CO6	2	3	3	3	1		1	1			2	
AVG	2	2.33	1.83	2.5	1	0.5	0.66	0.833	0.16	0.5	0.66	0.5

3: Highest Correlated, 2: Medium Correlated, 1:Lowest Correlated

Course code	: BITDSC103			
Course Name	: Basic Mathematics			
Semester /Year	: 1st /1st			
	L	T	P	C
	3	1	-	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSEOBJECTIVES:

- To study the concept of functions.
- To apply various methods to solve the problems.
- To find the concept of function from relation.
- To study probability and solve various real life problems
- To study the matrices and its types.

COURSECONTENTS:**UNIT I. Proposition Logic****[No. of Hours: 10]**

Proposition, logical connectives, truth tables, tautologies, contradiction, normal forms (conjunctive and disjunctive), validity of an argument, converse, inverse, contrapositive, Universal and existential quantifiers.

UNIT II. Matrix**[No. of Hours: 10]**

Definition & types of matrix, Matrix addition and multiplication, Transpose and inverse of matrix, Rank of matrix, linear independence/dependence of vectors, Consistency of System of Linear Equations and its Solution, Eigen values and Eigenvectors, Cayley-Hamilton Theorem, Diagonalization.

UNIT III. Relations and functions**[No. of Hours: 10]**

Cartesian product of sets, relation, types of relation, equivalence relation, equivalence classes, matrix and graph representation of a relation, closure of a relation, partial order relation, Hasse diagram. Binary operations, groups and properties, subgroups, cyclic groups and properties, group of permutations, orbit, cycles and alternating group, cosets, Lagrange's theorem.

UNIT -IV. Lattices & Posets**[No. of Hours: 10]**

Posets, well ordered set, maximal and minimal element, greatest and least element, least upper bound, greatest lower bound, Lattices, properties of Lattices, Isomorphism, Some special lattices: Bounded lattice and complemented lattices, distributive lattice Modular lattice, complete lattice.

UNIT -V. Recurrence relation**[No. of Hours: 10]**

Homogenous and Non homogenous equation, discrete numeric function, basis operations, convolution, recurrence relation, solution by iteration method, undetermined coefficient method, generating function method.

TEXT BOOKS:

TBI Text Book of Engineering Mathematics, Mr. N.P.Bali.

REFERENCEBOOKS:

RB1. Higher Engineering Mathematics, B.S.Grewal

COURSEOUTCOMES:

CO#	Detailed Statement of the CO
CO1	Define the differentiation and integration of functions.
CO2	Understand the various concepts of relations and functions like recursively defined functions.
CO3	Teach to use mathematical induction to solve various linear and non-linear problems.
CO4	Analyze Posset and Hasse diagrams and solve various types of logic by using propositional logic.
CO5	Evaluate basic concepts of Recurrence relation and explore them
CO6	Design and explain the basic operations of matrices and to solve the problems of matrices.

CO-POMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	1	1				2	
CO2	3	1	3	2	2	1	3	1				
CO3	3	2	1	1		2	1		2		2	
CO4	2	1	2	2	1	2	3	1		2	1	
CO5	3	3	3	1	2	1	3	2			2	2
CO6	3	2	1	2	3	1	3	2	1	2	1	2
AVG	2.8	1.83	2.16	1.5	1.5	1.33	2.33	1	0.5	0.66	1.33	0.66

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITGE101				
Course Name	: E- Governance				
Semester /Year	: 1 st /1 st				
		L	T	P	C
		3	1	-	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To study the concept of e governance, e -Governance Models and Role of ICT in e Governance.
- To learn policies, infrastructure and various issues related to it.
- To know different public grievances.
- To study probability and solve various real life problems
- To study the role e Governance in different areas and sectors.

COURSE CONTENTS:**Unit I****[No of Hours=15 Hrs]**

Overview of E-Government and E-Governance, Stages of E-Governance, National E- Governance Plan (NeGP), Mission Mode Projects and their implementation status, E-Governance , Introduction to E-governance, Role of ICT's in e-governance, Need, importance of E-governance

Unit II**[No of Hours=15 Hrs]**

Categories of E-governance, Key Issues of E-Governance, Technology, Policies, Infrastructure, Training, Copyrights , Consulting Funds, E-governance Models, Model of Digital Governance, Broadcasting /Wider Dissemination Model

Unit III**[No of Hours=10 Hrs]**

Critical Flow Model, Interactive-service model/Government –to-Citizen-to-Government Model (G2C2G), Major areas of E-governance Services, Public Grievances: Telephone, Ration card, transportation, Rural services Land Records, Police: FIR registration, Lost and found, Social services: Death, domicile, school certificates.

Unit IV**[No of Hours=10 Hrs]**

Public information: employment, hospitals, railway, Agricultural sector: Fertilizers, Seeds, Utility payments Electricity, water, telephone, Commercial: income tax, custom duty, excise duty- Governance, Infrastructure, stages in evolution and strategies for success, e-Governance Infrastructure, stages in evolution and strategies for success.

TEXT BOOKS:

TB1. E-Governance: Concepts And Case Studies, 2nd Edition by C S R Prabhu, PHI.

REFERENCE BOOKS:

RB1. E-governance projects, PHI publication

Course outcomes (COs):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Describe , Define, list, label, relate and show the functionality of E-Government and E-Governance
CO2	Explain, compare, classify, and outline strengths and limitations of Stages of E-Governance, National E- Governance Plan.
CO3	Identifying, develop, construct choose, build and apply the various Categories of E-governance, Key Issues of E-Governance, Technology, E-governance Models, Model of Digital Governance.
CO4	Analyze, compare, simplify Critical Flow Model, Interactive-service model/Government –to-Citizen-to-Government Model (G2C2G), Major areas of E-governance Services
CO5	Compare, deduct, determine, mark or criticize different public information employment, hospitals, railway, Agricultural sector: Fertilizers, Seeds, Util payments Electricity, water, telephone
CO6	Improve, change, develop, design, modify or propose new applications related to Commercial sector: income tax, custom duty, excise duty-Governance, Infrastructure, e-Governance Infrastructure, stages in evolution and strategies for success.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1			1				1	1	1	1	1
CO2	1			1	1		1	1	1	1	1	1
CO3	1	1	1	2	1	1		1	1	1	1	1
CO4	2	2	2	2	1	2	1	1	1	1	1	1
CO5	2	1	1	2	2	2	2	1	1	2	2	2
CO6	1	1	1	2	2	2	2	1	1	2	2	2
AVG	1.33	0.8	0.8	1.6	1.1	1.1	1	1	1	1.3	1.3	1.3

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	:BITSC101			
Course Name	: Programming paradigm and Internet Technologies			
Semester /Year	: 1 st /1 st			
	L	T	P	C
	2	-	-	2

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

1. Understand the basics of Programming Paradigms,
2. To learn the different categories of Programming languages
3. To be able to understand fundamentals of Computer network..
4. To learn various fundamental concepts on Internet and its prevailing technologies.

COURSE CONTENTS

UNIT-1

[No. of Hours: 7]

Basics of Programming

Program, Algorithm, Flowchart, software, System Software, Application Software ,Program bug , debugging , Programming error: syntax error , logical error ,runtime error ,exception handling

UNIT-2

[No. of Hours: 7]

Basics of Programming Language

Category of language: High level language, Middle level language,, Low level language.

Types of Language: Procedural programming, structured programming, object oriented programming, Event Driven programming, Web based programming, App based programming language, embedded programming etc.

Language translators: Compiler, Assembler, Interpreter.

Programming jargons: Variable, constant, operands, operators, data types, conditional statements, iterative statements.

UNIT-3

[No. of Hours: 7]

Basics of Computer Network

Component of computer network, Mode of Communication, Data communication and Voice communication, digital and analog signal types of Network : LAN ,WAN, MAN, LAN topology, Guided and Non Guided Media, IP address , MAC address ,Protocols of Computer Network: ARP , RARP, BOOTP, IP ,TCP ,UDP, HTTP, HTTPS, FTP, TFTP ,POP ,SMTP ,DNS.

UNIT-4

[No. of Hours: 7]

Internet Technology

Webpage ,static and dynamic webpage ,website , we server, hypertext ,hyper link , HTML, Scripting languages, URL, Downloading , uploading, search engine ,Browser, ISP ,Web hosting ,Domain and its registration , Email, MODEM, Broadband ,bandwidth.

TEXT BOOKS:

TB1. Programming Languages: Principles and Paradigms Maurizio Gabbrielli , Simone Martini .
TB2. Programming Language Pragmatics by Michael Scott

REFERENCE BOOKS:

RB1. Types and Programming Languages , by Benjamin The MIT Press.

COURSE OUTCOMES (CO):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	To understand the concepts of program, flow chart, algorithm, error in program .
CO2	Will be able to analyze Types of programming languages and language translators.
CO3	Students will be able to know concepts of computer network, types and internet technologies and protocols used.
CO4	Will be able to get idea about what is program and program paradigms, to develop strategies behind designing a program, to know the structure i.e. Top-Down and Bottom-Up approach of Modular Programming.
CO5	Will be able to learn about different generations of Programming language, to know different methodologies to solve computation task.
CO6	To create and design algorithm suitable flowchart of different problems

CO-PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	1	1	1		1		1	1
CO2	2	2	1	1	1	1	1			1		
CO3	1	2	2	2	1	1	1	1	1	1		1
CO4	1	2	2	2	1	1	1			1	1	
CO5	2	1	1		1	1	1	2	1			1
CO6	1		1	1	1		1	1			1	
AVG	1.5	1.33	1.5	1.33	1	0.83	1	0.66	0.5	0.5	0.5	0.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: AEC1				
Course Name	: Environmental Studies – I				
Semester /Year	: 1 st Sem / 1 st Year				
		L	T	P	C
		2	0	0	2

Unit I. Humans and the Environment Course Learning Outcomes

After completing this unit, students will be able to:

- Appreciate the historical context of human interactions with the environment.
- Gain insights into the international efforts to safeguard the Earth's environment and resources.

Unit1.Outline

- Human population growth: Impacts on environment, human health and welfare
- Dams: Resettlement and rehabilitation of project-affected persons (case studies)
- Disaster management: Floods, earthquake, cyclones and landslides
- Environmental movements: *Chipko*, Silent valley, *Bishnois* of Rajasthan
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

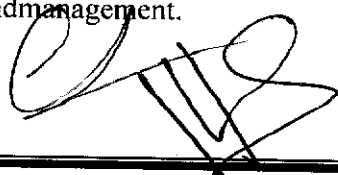
Suggested readings

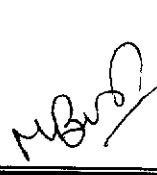
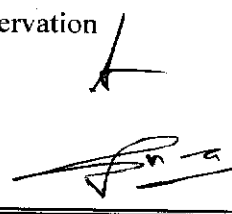
1. Fisher, Michael H. (2018) An Environmental History of India- From Earliest Times to the Twenty-First Century, Cambridge University Press.
2. Headrick, Daniel R. (2020) Humans versus Nature- A Global Environmental History, Oxford University Press.
3. Hughes, J. Donald (2009) An Environmental History of the World- Humankind's Changing Role in the Community of Life, 2nd Edition. Routledge.
4. Perman, R., Ma, Y., McGilvray, J., and Common, M. (2003) Natural Resource and Environmental Economics. Pearson Education.
5. Simmons, I. G. (2008). Global Environmental History: 10,000 BC to AD 2000. Edinburgh University Press

Unit II. Natural Resources and Sustainable Development Course Learning Outcomes

After completion of this unit, students would be able to:

- Understand the concept of natural resources; identify types of natural resources, their distribution and use with special reference to India.
- Discuss the factors affecting the availability of natural resources, their conservation and management.



- Explain sustainable development, its goals, targets, challenges and global strategies for sustainable development.

Unit II Outline

- Definition of resource; Classification of natural resources- biotic and abiotic, renewable and non-renewable.
- Forest resources: Types, threats and conservation strategies.
- Water resources: Types of water resources- fresh water and marine resources; Availability and use of water resources; Environmental impact of over-exploitation, issues and challenges; Water scarcity and stress; Conflicts over water.
- Soil and mineral resources: Important minerals; Mineral exploitation; Environmental problems due to extraction of minerals and use; Soil as a resource and its degradation.
- Energy resources: Sources of energy and their classification, renewable and non-renewable sources of energy
- Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs.

Suggested readings

1. Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future. 10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson.
2. John W. Twidell and Anthony D. (2015). Renewable Energy Sources, 3rd Edition, Weir Publisher (ELBS).
3. William P. Cunningham and Mary A. (2015) Cunningham Environmental Science: A Global Concern, Publisher (Mc-Graw Hill, USA).
4. Gilbert M. Masters and W. P. (2008). An Introduction to Environmental Engineering and Science, Ela Publisher (Pearson).
5. Singh, J.S., Singh, S.P. & Gupta, S.R. 2006. Ecology, Environment and Resource Conservation. Anamaya Publications <https://sdgs.un.org/goals>.

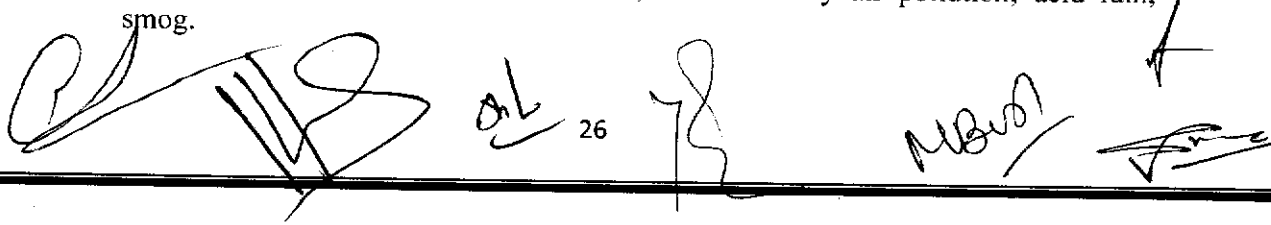
Unit III. Environmental Issues: Local, Regional and Global Course Learning Outcomes

After completion of this unit, students would be able to:

- Develop a critical understanding of the environmental issues of concern
- Understand the concepts of spatial and temporal scales and their importance
- Understand the sectoral effects on the local, regional, and global environmental issues

Unit III Outline

- Pollution: Types of Pollution- air, noise, water, soil, thermal, radioactive; municipal solid waste, hazardous waste; transboundary air pollution; acid rain; smog.



- Land use and Land cover change: land degradation, deforestation, desertification, urbanization.
- Global change: Ozone layer depletion; Climate change. Disasters – Natural and Man-made(Anthropogenic).

Suggested Readings

1. Harper, Charles L. (2017) Environment and Society, Human Perspectives on Environmental Issues 6th Edition. Routledge.
2. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley- Blackwell.
3. William P. Cunningham and Mary A. (2015). Cunningham Environmental Science: A global concern, Publisher (Mc-Graw Hill, USA)
4. Manahan, S.E. (2022). Environmental Chemistry (11th ed.). CRC Press.
<https://doi.org/10.1201/9781003096238>
5. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press.

Unit IV. Conservation of Biodiversity and Ecosystems Course Learning Outcomes

After completion of this unit, students would be able to:

- Understand the concepts of ecosystems, biodiversity and conservation.
- Describe the main types of ecosystems and their distribution.
- Discuss the factors impacting biodiversity loss and ecosystem degradation.
- Explain major conservation strategies taken in India.

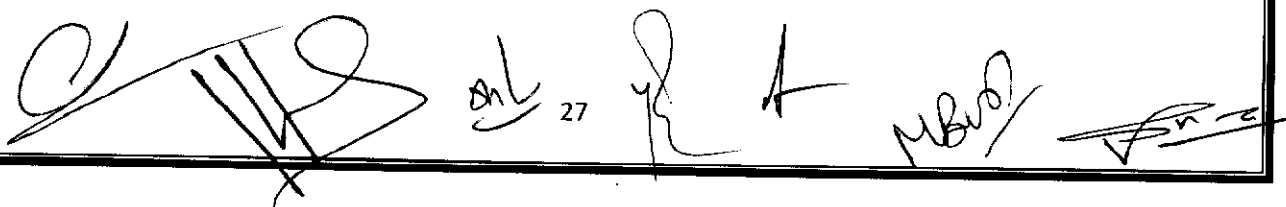
Unit V. Case Studies & Fieldwork

Unit Outline

- Biodiversity and its distribution: Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity hotspots; Species and ecosystem threat categories.
- Ecosystems and ecosystem services: Major ecosystem types in India and their basic characteristics-forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services- classification and their significance.
- Threats to biodiversity and ecosystems: Land use and land cover change; Commercial exploitation of species; Invasive species; Fire, disasters and climate change.
- Major conservation policies: in-situ and ex-situ conservation approaches; Major protected areas; National and International Instruments for biodiversity conservation; the role of traditional knowledge.

Suggested Readings

1. Bawa, K.S., Oomen, M.A. and Primack, R. (2011) Conservation Biology: A Primer for South Asia. Universities Press.

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2. Sinha, N. (2020) Wild and Wilful. Harper Collins, India.
3. Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022) Conservation through Sustainable Use: Lessons from India. Routledge.
4. Bhagwat, Shonil (Editor) (2018) Conservation and Development in India: Reimagining Wilderness, Earthscan Conservation and Development, Routledge.
5. Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall and list the major environmental challenges faced by humanity, including population growth, resource depletion, pollution types, and the impact of human-made structures such as dams.
CO2	Comprehend the concepts of sustainable development, the classification of natural resources, and the significance of biodiversity and ecosystem services.
CO3	Demonstrate the ability to document biodiversity in various ecosystems, participate in environmental conservation activities like plantation drives, and use knowledge of environmental issues in real-world contexts.
CO4	Examine and interpret the causes and effects of major environmental problems, including land degradation, deforestation, and climate change, and analyze the Environmental impact of over-exploitation of resources.
CO5	Assess the effectiveness of various conservation policies, both national and international, in preserving biodiversity and ecosystems, and critique the role of different environmental movements in India.
CO6	Design and construct detailed reports on specific environmental case studies, such as the Tehri Dam's impact, and produce maps highlighting the protected areas of India.

CO –PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	3	1	1	1	1	1	2	2	1
CO2	3	2	2	3	1	2	1	1	1	3	2	1
CO3	2	3	3	2	2	2	2	2	1	3	3	1
CO4	2	3	3	3	2	2	2	2	2	3	3	1
CO5	1	2	2	3	3	2	2	2	1	2	2	1
CO6	2	3	3	2	2	2	3	2	2	3	3	1
AVG	2	2.5	2.5	2.67	1.83	1.83	1.83	1.67	1.33	2.67	2.5	1

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Value Addition Course

Course code	: CITVC101			
Course Name	: COMPUTERS AND ETHICS			
Semester /Year	: 1 st / 1 st			
	L	T	P	C
	2	0	0	2

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

- Understand ethical considerations in computing and information technology.
- Explore the ethical dimensions of privacy, cybersecurity, and social media.
- Analyze the ethical implications of emerging technologies and artificial intelligence.
- Apply ethical decision-making models to resolve ethical dilemmas in computing.
- Evaluate the social and cultural impacts of technology on society.
- Develop ethical guidelines for responsible technology use and development.

COURSE CONTENTS:**Unit 1: Introduction to Computers and Ethics****[No. of Hours: 4]**

Introduction to ethical theories and frameworks, Ethical decision-making models and approaches, Ethical considerations in computing and information technology, Historical perspectives on computers and ethics

Unit 2: Privacy and Data Protection**[No. of Hours: 4]**

Concepts of privacy and data protection, Ethical issues related to data collection, storage, and sharing, Legal and regulatory frameworks for privacy, Privacy-enhancing technologies and practices, Privacy implications of emerging technologies (e.g., Internet of Things, biometrics)

Unit 3: Intellectual Property and Copyright**[No. of Hours: 4]**

Introduction to intellectual property rights, Ethical issues surrounding software piracy and copyright infringement, Open source software and its ethical implications, Digital rights management and fair use of copyrighted material, Ethical considerations in software development and intellectual property licensing

Unit 4: Cybersecurity and Ethical Hacking**[No. of Hours: 4]**

Fundamentals of cybersecurity and its importance, Ethical considerations in hacking and penetration testing, Ethical hacking techniques and methodologies, Legal and ethical issues related to vulnerability disclosure, Cybersecurity ethics in the context of organizational security practices

Unit 5: Social Media and Online Ethics**[No. of Hours: 4]**

Social media ethics and responsible online behavior, Privacy risks and ethical dilemmas in social media usage, Cyber bullying, harassment, and online hate speech, Implications of social media algorithms and filter bubbles, Social media and its impact on democracy and political discourse

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Unit 6: Ethical Implications of Artificial Intelligence**[No. of Hours: 5]**

Introduction to artificial intelligence (AI) and machine learning, Ethical considerations in AI algorithm development and bias, Privacy and transparency issues in AI systems, Automation, job displacement, and socioeconomic impacts of AI, Ethical guidelines and principles for AI development and deployment

Unit 7: Technology and Society**[No. of Hours: 4]**

Ethical issues arising from the digital divide, Social and cultural impacts of technology, Ethical considerations in emerging technologies (e.g., blockchain, virtual reality), Technology addiction and its ethical implications, Ethical responsibilities of technology professionals

Text Books:

- TB1. Computers and Society: Modern Perspectives by Ronald M. Baecker
 TB2. THE HANDBOOK OF INFORMATION AND COMPUTER ETHICS by Kenneth Einar Himma and Herman T. Tavani.

Reference Books/ Online Resources

- RB1. "Ethics for the Information Age" by Michael J. Quinn
 RB2. "Ethics in Information Technology" by George Reynolds
 RB3. "Ethics in Computing: A Concise Module" by Joseph Migga Kizza
 RB4. "Information Ethics: Privacy, Property, and Power" by Adam D. Moore

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall and explain key ethical theories and frameworks relevant to computing and information technology. Identify and describe the legal and regulatory frameworks for privacy and intellectual property in the digital domain.
CO2	Demonstrate an understanding of the ethical considerations in computing, including privacy, cybersecurity, and social media. Explain the social and cultural impacts of technology and the ethical responsibilities of technology professionals.
CO3	Apply ethical decision-making models and approaches to analyze and resolve ethical dilemmas in computing and information technology. Apply privacy-enhancing technologies and practices to protect personal data and mitigate privacy risks.
CO4	Analyze the ethical implications of emerging technologies, such as artificial intelligence, blockchain, and virtual reality, on society and individuals. Evaluate the ethical considerations in hacking and penetration testing, considering legal and ethical issues related to vulnerability disclosure.
CO5	Evaluate the ethical implications of social media usage, including privacy risks, cyberbullying, and the impact of algorithms on information access. Critically evaluate the ethical dimensions of artificial intelligence, including algorithmic bias, job displacement, and transparency.

CO6	Construct well-reasoned arguments and proposals for addressing ethical challenges in the use of computers and information technology. Design ethical guidelines and principles for the development and deployment of emerging technologies, considering privacy, transparency, and societal impact.
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CO –PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	2	1	1	1	1	2	2	2
CO2	2	3	3	2	3	2	2	2	2	3	3	3
CO3	2	2	2	1	2	2	1	1	1	2	2	2
CO4	1	2	2	2	2	1	1	1	1	2	2	2
CO5	1	2	2	2	2	1	1	1	1	2	2	2
CO6	2	2	2	2	2	2	2	2	2	2	2	2
AVG	1.6	2.4	2.4	1.8	2.4	1.6	1.4	1.4	1.4	2.4	2.4	2.4

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITP11			
Course Name	: LAB-Fundamental of Computers			
Semester /Year	: 1st /1st			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

1. To provide understanding of DTP Skills.
2. To provide insight into various office automation Tools like MS Access , MS word ,MS excel , MS power Point.

COURSE CONTENTS:**UNIT1 DOS & MS WORD****[No. of Hours: 7]**

Internal and External DOS Commands, Windows Operating System Interface and Utility programs

Making table , inserting page Numbers date and time ,subscript and super script , Inserting Word art ,clipart, Textbox, inserting Mathematical equation and symbol, pictures, clipart, shapes, charts, book mark, Hyperlink, Header Footer.

Page layout:

Setting Margins, orientation, watermark page colon, page Border, line spacing Alignments, Rotation of Text, effects and theme, **Review:** spell check , check grammar, Translate, protecting document **View:** print layout, web layout, view ruler, macro, split screen ,multipage view.

UNIT2 MS-EXCEL**[No. of Hours: 8]**

Creating &Opening Spreadsheet, Formula Editing, Formatting, Spreadsheet types. setting Margins, Referring Cells, Highlighting values, Find, Search & replace, Inserting Column, rows & sheets, inserting Symbols, Data from external files, Frames, Clipart, Pictures, Files etc., Inserting Functions, Manual breaks, Setting Formula-finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae. Creating Charts –Drawing, Printing.

UNIT 3 MS-POWER POINT**[No. of Hours: 8]**

Different presentation templates, setting backgrounds, selecting presentation layouts. -Setting Presentation style, Adding text to the Presentation. Formatting a Presentation-Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation-Inserting pictures, movies, tables etc. into presentation, Drawing Pictures using draw. Adding Effects to the Presentation-Setting Animation

& transition effect. Printing Handouts, Generating Standalone Presentation viewer.

UNIT4 MS-ACCE

[No. of Hours: 7]

Creating a New Database, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview-Importing data from other databases viz. MS Excel etc. Web Browser And E-mail

COURSE OUTCOMES (CO):

Upon successful completion of the course a student will be able to

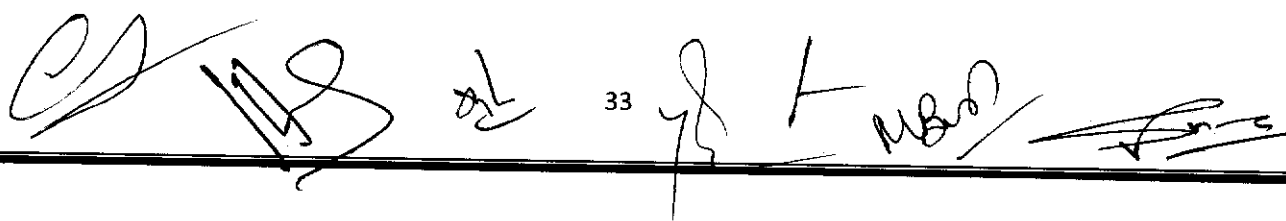
CO#	Detailed Statement of the CO
CO1	Describe the basics of computer
CO2	Apply word processing techniques
CO3	Implement word processing using spread sheets
CO4	Analyze the problem-solving techniques
CO5	Apply factoring and array techniques in real time
CO6	To create and design spreadsheets , advertisement ,visiting cards ,invitation letters etc. in MS word and power point presentation

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2			1	1	1	1		1	1
CO2	3	3	2	2				1	1	1		1
CO3	3	3	2		1		1	1	1	1	1	
CO4	2	3	3				1	1				1
CO5	3	3	3			2	1	1		1		
CO6	1	1	1	1	2	1	1	1			1	
AVG	2.5	2.66	2.16	0.5	0.5	0.66	0.83	1	0.5	0.5	0.5	0.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

33



Course code : BITDSCP12				
Course Name : LAB - PROGRAMMING IN C				
Semester /Year : 1st /1st				
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

- Understand the basics of Programming.
- Understand functional hierarchical code generation.
- Understand the usage of characters, string, integers and special symbols in programming.
- Understand loops and decision-making statements in order to solve problems.
- Understand arrays and implementation of various operations on arrays.
- Understand the use of functions and pointer in programming.
- Understand the use of structure & union.
- Understand file operations and implement file operation in C programming for a set of problems.

COURSE CONTENTS:

1. Programs based on variables
2. Programs based on conditional
3. Programs based on loops
4. Programs based on arrays
5. Programs based on strings
6. Programs based on functions
7. Programs based on pointers
8. Programs based on structure and union
9. Programs based on file handling

TEXTBOOKS:

TB1: Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.

TB2: Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.

REFERENCE BOOKS:

RB1: Gottfried, "Programming in C, Schaum's Series Tata McGraw

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COURSEOUTCOMES:

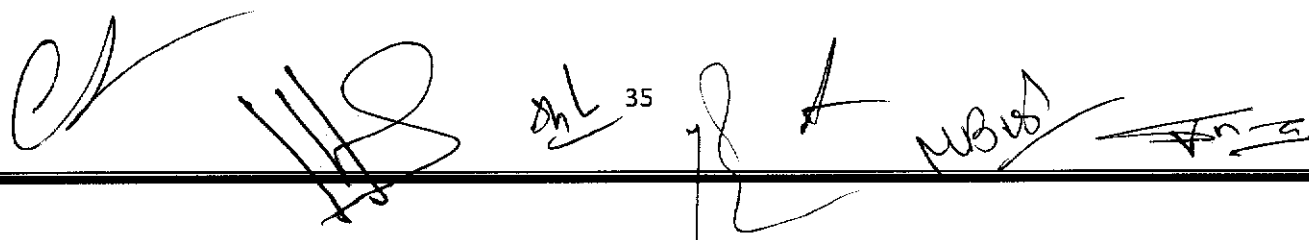
Upon successful completion of the course as a student will be able to

CO#	Detailed Statement of the CO
CO1	Identify the need and use of programming in real world environment
CO2	Explain data types, variables and arithmetic operations in programming.
CO3	Apply the concept of functions and pointer. In addition, resolve real world problems using functions and pointers.
CO4	Analyze Array and String concepts and implement array and string using functions and pointers.
CO5	Appraise user defined data types including structure and union.
CO6	Create programs for all programming problems.

COPOMAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2						1				1
CO2	2	2	2	3	1					1		
CO3	2	3	2	3	1		1	2			2	1
CO4	2	2	2	3	1		1				1	
CO5		2	2	3	1		1	1		2		1
CO6	2	3	3	3	1		1	1				
AVG	1.83	2.33	1.83	2.5	0.83		0.66	0.83		0.5	0.5	0.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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SECOND SEMESTER:

Course code	: BITDSC201			
Course Name	: Operating System			
Semester /Year	: 2nd Sem / 1st Year			
	L	T	P	C
	3	-	0	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To understand various operating system types, Architecture design of OS and their services.
- To study process management concepts and various scheduling algorithm.
- To understand process synchronization concepts and deadlock handling mechanism.
- To learn various memory management schemes.
- To study file management and Disk management techniques

COURSE CONTENTS:**UNIT 1****[No. of Hours: 10]**

Introduction: Operating System- Definition, Types of OS- Simple batch system, Time sharing systems, Real time systems, Multiprocessor systems, Distributed systems, System components -OS Services, System Calls.

UNIT 2**[No. of Hours: 10]**

Process concepts: PCB, Process Scheduling, Operations on Processes, Co-operating process IPC , Threads- Overview, Benefits, User & Kernel Threads. CPU Scheduling: Scheduling criteria , Preemptive & Non-preemptive scheduling, Scheduling Algorithms.

UNIT 3**[No. of Hours: 10]**

Process Synchronization: Background, Critical Section problem, Critical Regions, Synchronization, hardware, Semaphores, Classic Problems of Synchronization, Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

UNIT 4**[No. of Hours: 07]**

Memory Management: Logical vs. Physical address space, Swapping, Contiguous memory allocation , Non-Contiguous memory allocation- Paging, Segmentation, Segmentation with paging. Virtual Memory: Background, Demand paging - Performance, Page replacement, Page replacement algorithms (FCFS, LRU), Allocation of frames, Thrashing.

UNIT 5**[No. of Hours: 08]**

File Systems: File concept, access methods, Allocation methods-contiguous, linked and index allocation, Directory System – single level, tree structured, acyclic graph and general graph directory,

File protection. Disk Management: Secondary storage structure: Disk structures, Disk Scheduling, Disk reliability.

TEXT BOOKS:

TB1. Milankovic M "Operating System concepts and Design", 2nd edition, Tata Mcgraw Hill.

REFERENCE BOOKS:

RB1. Abraham Silberschatz, Peter Baer Galvin & Greg Gagne, "Operating System Concepts", Sixth Edition, John Wiley & Sons, Inc.

COURSE OUTCOMES:

Upon successful completion of the course as a student will be able to

CO	DESCRIPTION
CO1	To understand & remember different OS types and basic component of OS Architecture.
CO2	Analyze issues in process management and evaluations of various scheduling algorithms.
CO3	Understand process synchronization problem and provide (create) solution for critical section Problem and deadlock management.
CO4	Analyze and understand various memory management techniques.
CO5	Identify or evaluate the use of storage management techniques and solve various disk scheduling problems.
CO6	Identify or evaluate the use File System.

CO-POMAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1		1	1						2
CO2	1	3	1	2	1				1			
CO3	2	3		2	1	1		1		2		2
CO4	1	2	2	1		2	1		1		2	1
CO5		3	1	2	1	2		1	2			2
CO6	1		1	1		1		1	2	1	2	1
AVG	1.33	1.5	1	1.33	0.66	1.16	0.16	0.5	1	0.5	0.66	1.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITDSC202			
Course Name	: Data Structure Using C			
Semester /Year	: 2nd Sem / 1st Year			
	L	T	P	C
	3	-	0	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

1. To understand basics knowledge of data structure operations, algorithms and their application.
2. To design and implement algorithms and data structure operations using C program.
3. To learn various techniques for representation of the data in nonlinear fashion
4. To learn advance concept of searching
5. To understand basics of file organization and graphs.

COURSE CONTENTS:

UNIT 1

[No. of Hours: 10]

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off.

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered list, Sparse Matrices.

UNIT 2

[No. of Hours: 10]

Linked Lists: Representation and implementation of Singly linked lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List of Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

UNIT 3

[No. of Hours: 10]

Stacks: Array Representation and Implementation of stack, Operations and Stacks: Push and POP, Array Representation of Stack, Linked Representation of stack, Operations Associated with Stacks, Application of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes. Queues: Array and linked representation and implementation of queues, Operations on Queue; Create, Add, Delete, Full and Empty, Circular queue,

UNIT 4

[No. of Hours: 08]

Trees: Basic terminology, Binary Tree, Binary tree representation algebraic Expressions, Complete Binary Tree, Extended Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary tree, Huffman algorithm, Binary Search (BST), Insertion and Deletion in BST.

UNIT 5**[No. of Hours: 07]**

Sorting ,Searching and Hashing: Selection sort, Insertion Sort, Bubble sorting, Quick Sort, Merge Sort
Sequential and Binary searching, comparison and analysis, Hash Table, Hash Function, Collection
Resolution Strategies.

TEXT BOOKS:

TB1: Horowitz and Sahani, "Fundamentals of data Structures" Galgotia

TB2: R. Kruse etal, "Data Structures and Program Design in C" Person Education

REFERENCE BOOKS:

RB1: A.M. Tenenbaume , "Data Structures and Program Design in C" Person Education

RB2: Lipschutz, "Data Structure", TMH

RB3: K Loudon, "Mastering Algorithms With C", Shroff Publishers and Distributors

COURSE OUTCOMES (COS):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO
CO1	Understand basics knowledge of data structure operations like insertion, deletion etc. for various data structure and their application.
CO2	Analyze the problem and create appropriate algorithm.
CO3	Develop and implement various programs using C for nonlinear data structure.
CO4	Investigate and solve difficulties in the implementation of searching techniques.
CO5	Know application file and graphs in real world.
CO6	Know the application of sorting , searching and hash techniques

PO-CO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2	1	1	1			2	
CO2		3	2	1	2	1						
CO3	1	1	3		1		1	1	2		2	
CO4		2	2	3	2		1			2	1	
CO5	1		2	1	1	1					2	2
CO6	1	1	1					1	1	1	1	2
AVG	1	1.5	1.66	0.66	1.33	0.5	0.5	0.5	0.5	0.5	1.33	0.66

1 – Highest Correlated, 2 – Medium Correlated, 3 – Low Correlated

Course code	: BITDSC203			
Course Name	: Digital Electronics			
Semester/Year	: 2 nd Sem / 1 st Year			
	L	T	P	C
	3	1	0	4

L- Lecture T-Tutorial P – Practical C –Credit

COURSE OBJECTIVES: The objectives of this course are:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.

COURSE CONTENTS:

UNIT 1

[No. of Hours: 10]

Number Systems: Binary, Decimal, Octal, Hexadecimal, Conversion from One Number System to another, Character Codes (BCD), Excess-3, Gray Code, ASCII, 1's Complement Representation, 2's Complement Representation

Logic Gates: AND, OR, NOT, XOR, XNOR, NAND and NOR as Universal Gates

Logic Families: Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOSFET Logic, TTL Gates

UNIT 2

[No. of Hours: 10]

Boolean Algebra: Boolean postulates and laws, De Morgan's Theorem, Principle of Duality, Boolean expression, Boolean function, Minimization of Boolean expressions, Sum of Products (SOP), Product of Sums (POS), Minterm- Maxterm, Canonical forms, Karnaugh map Simplification- Don't care conditions.

UNIT 3

[No. of Hours: 10]

Combinational Circuits: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Serial Adder/ Subtractor, Parallel Adder/ Subtractor, BCD Adder/ Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer

UNIT 4

[No. of Hours: 10]

Sequential Circuits: Latch, Flip Flops- SR, JK, Data, Toggle, Counters- Synchronous and Asynchronous, Registers- Serial-in-Parallel-out, Parallel-in-Serial-Out, Parallel-in-Parallel-out, Applications of Flip Flops

TEXT BOOKS:

- TB1.** M. M. Mano, Digital Design, 3rd ed., Pearson Education, Delhi, 2003.
TB2. D.P. Leach, Malvino, Guha, Digital Principles and Applications, TMH, New Delhi, 2011.

REFERENCE BOOKS:

- RB1.** T. L. Floyd and Jain, Digital Fundamentals, Pearson Education, 2003.
RB2. R.J. Tocci and N.S. Widner, Digital Systems - Principles & Applications, PHI, 10th Ed., 2007.

COURSE OUTCOMES:

Upon successful completion of the course as a student will be able to

CO#	Detailed Statement of the CO
CO1	Identify and represent numeric information in different forms.
CO2	Understand machine level representation of data and perform operations on it.
CO3	Apply K-Maps and Tabulation methods for Simplification of Boolean expressions and construct logic circuit.
CO4	Analyze logic circuits and deduce logic expressions and truth tables.
CO5	Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical form for digital logic circuit design.
CO6	Design and analyze small combinational & sequential circuits to build larger more complex circuits.

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	2		2		1		1	
CO2	2	1	2	2	2		1			1		2
CO3	3	2	2	2	1		1		1	1		1
CO4	2	1	1	3	1		1			1	2	
CO5	2	1	1	3	1		1		1			
CO6	3	2	2	2	1		1					
AVG	2.5	1.33	1.5	2.16	1.33		1.16		0.5	0.5	0.5	0.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code : BITGE204				
Course Name : CYBER SECURITY AND CYBER LAW				
Semester /Year : 2nd Sem / 1st Year				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Learn the foundations of Cyber Security and threat landscape.
- To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
- To develop skills in students that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.
- To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of Cyber Security.
- To expose students to responsible use of online Social media network.
- To systematically educate the necessity to understand the impact of cybercrimes and threats with solutions in a global and societal context.
- To select suitable ethical principles and commit to professional responsibilities and human values and contribute value and wealth for the benefit of the society

COURSE CONTENTS**UNIT 1: Introduction to Cyber Security****[No. of Hours: 07]**

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World Wide Web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of Cyber Security, Issues and challenges of Cyber Security.

UNIT 2: Cybercrime and Cyber law**[No. of Hours: 08]**

Classification of cybercrimes, Common cybercrimes - cybercrime targeting computers, cybercrime against woman and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks., Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act,2000 and its amendments, Cybercrime and offences, Organizations dealing with Cybercrime and Cyber Security in India, Case studies

UNIT 3: Social Media Overview and Security**[No. of Hours: 10]**

Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies

UNIT 4: E-Commerce and Digital Payments**[No. of Hours: 10]**

Electronic Commerce definition, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payment related common frauds and preventive measures. RBI guidelines on digital payment and customer protection in unauthorized banking transactions. Relevant provisions of Payment settlement Act, 2007.

UNIT 5: Digital Devices Security, Tools and Technologies for Cyber Security [No. of Hours: 10]

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

TEXT BOOKS:

- TB1. Cyber Crime Impact in the New Millennium, by Marine R. C, Auther Press.
 TB2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd.

REFERENCE BOOKS:

- RB1. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform.
 RB2. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt. Ltd.
 RB3. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
 RB4. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
 RB5. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

COURSE OUTCOMES (COS):

After completion of the course, a student will be able to

CO	Detailed Statement of the CO
CO1	Define a deeper understanding and familiarity with various types of Cyber-attacks, cybercrimes, vulnerabilities and remedies thereto.
CO2	Understand and evaluate existing legal framework and laws on Cyber Security.
CO3	Use the security aspects of social media platform and ethical aspects associated with use of social media.
CO4	Analyze and evaluate the digital payment system security and remedial measures against digital payment frauds.
CO5	Analyze and evaluate the Digital devices security and cyber security risks.
CO6	Create Cyber Security Practices and Configuration of basic security policies and permissions.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	1	1	1				2
CO2	2		2					1	1			
CO3	2	1		2	3	2	1			2		2
CO4	2	1			1	2	3	1	1		2	1
CO5	2		2	2				1	2			2
CO6	3	2		1				1	2	1	2	1
AVG	2.33	1	0.83	1	0.83	0.83	0.83	0.83	1	0.5	0.66	1.33

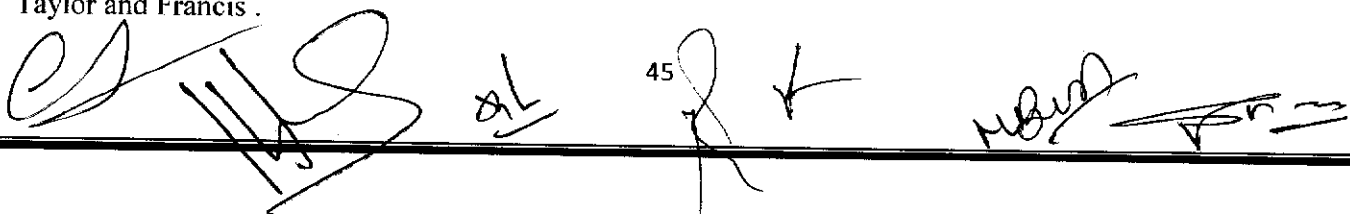
3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITSC201			
Course Name	: Health awareness and Hygiene			
Semester /Year	: 2 nd Sem / 1 st Year			
	L	T	P	C
	2		-	2

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVE: The objective of this course is:

- Student will be able to understand the significance of public health and hygiene in our life.
- Student will also be able to know about the environmental challenges, Diseases spread due to lack of hygiene.

COURSE CONTENT:**Unit 1:****[No. of Hours: 10]****Scope of health and Hygiene:** nutrition and health – classification of foods –Nutritional deficiencies - Vitamin deficiencies.**Unit 2:****[No. of Hours: 10]****Environment and Health hazards:** Environmental degradation – Pollution and associated health hazards.**Unit 3:****[No. of Hours: 10]****Communicable diseases and their control measures:** Measles, Polio, Chikungunya, Rabies, Plague, Leprosy and AIDS.**Unit4:****[No. of Hours: 10]****Non-Communicable diseases and their preventive measures:** Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.**Unit 5:****[No. of Hours: 10]****Health Education in India:** WHO program's – Government and Voluntary Organizations and their health services – Precautions, First Aid and awareness on sporadic diseases.**TEXT BOOK:****TB1.** Public Health and Hygiene. Sudhar R. Wagh Vinod B. Kakade (2015) Success Publication**TB2.** Principles of Public Health: A Simple Text Book on Hygiene Presenting. The Principles Fundamental to The Conservation of Individual and Community Health Thomas Dyer Turtle (2020) Lector House LLP**REFERENCE BOOK :****RB1.** Public Health and Hygiene Dass K , (2021) Om Book International .**RB2.** Principles of Occupational Health and Hygiene: An introduction Sue Reed (2020) 3rd Edition Taylor and Francis .


COURSE OUTCOMES (COs):

Successful completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Identify the importance of public health in our life.
CO2	Illustrate how environmental degradation affects human health.
CO3	Construct and implement a plan to summarize the list of communicable and non-communicable disease along with their prevention mechanism.
CO4	Investigate and organized the impact of non-communication disease in our society and its possible preventive measure.
CO5	Evaluate and conclude the challenges effecting public health along with their possible remedial action.
CO6	Integrate and generate a report of WHO run program and their effects on our public health.

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2	1	3		2	3	2	2
CO2	2	3	3	2	3	1	3		3	2	2	2
CO3	3	3	3	3	3	2	2		3	3		
CO4	1	1	2	2	2	2	1	2	1	3		
CO5	3	3	1	1	2		2	1	1	3		
CO6	1	2	3	3	2	2		1		3	3	2
AVG	2.16	2.33	2.16	2	2.33	1.33	1.83	0.66	1.83	2.83	1.16	1

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	:	AEC-2				
Course Name	:	Communication Skill: Listening and Speaking Skill				
Semester /Year	:	2nd Sem / 1st Year				
			L	T	P	C
			2	0	0	2

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Students will heighten their awareness of correct usage of English grammar in writing and speaking
- Students will improve their speaking ability in English both in terms of fluency and comprehensibility
- Students will give oral presentations and receive feedback on their performance

UNIT 1: Elementary English

[No. of Hours: 10]

Grammar: Parts of Speech, Tenses, Short responses, Active and Passive Voice, Vocabulary: Idioms and Phrases, Antonyms, Synonyms, One word substitution, Writing skills: Formal and Informal Letters

UNIT 2: Employability skills

[No. of Hours: 10]

Communication: Types, Objectives, Formal and Informal Communication, Barriers to communication, Selection of appropriate communication medium, Verbal and Non- verbal Communication. Soft Skills: Public Speaking, Presentation Skills, Speech, Debates, Emotion Management

UNIT 3 : Career Skills

[No. of Hours: 10]

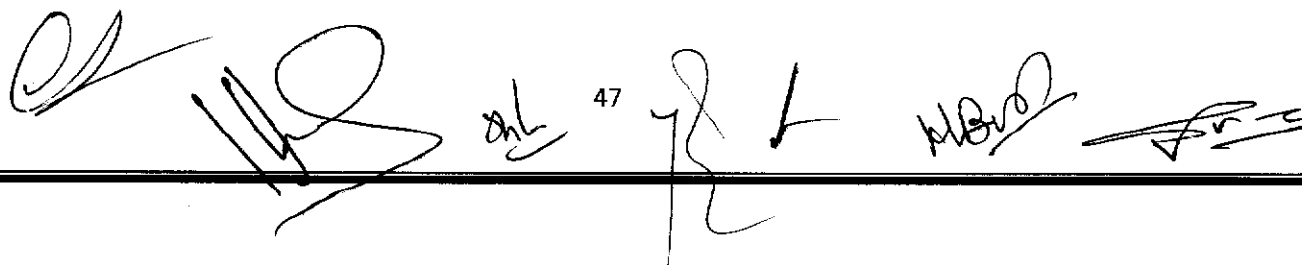
Interviews, CV Preparation, Group discussion, Personality Development

TEXT BOOKS:

- TB1.** Fluency in English - Part II, Oxford University Press, 2006.
TB2. Business English, Pearson, 2008.

REFERENCE BOOKS

- RB1.** Language, Literature and Creativity, Orient Blackswan, 2013.
RB2. Business Communication, Rajender Paul

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COURSE OUTCOMES:

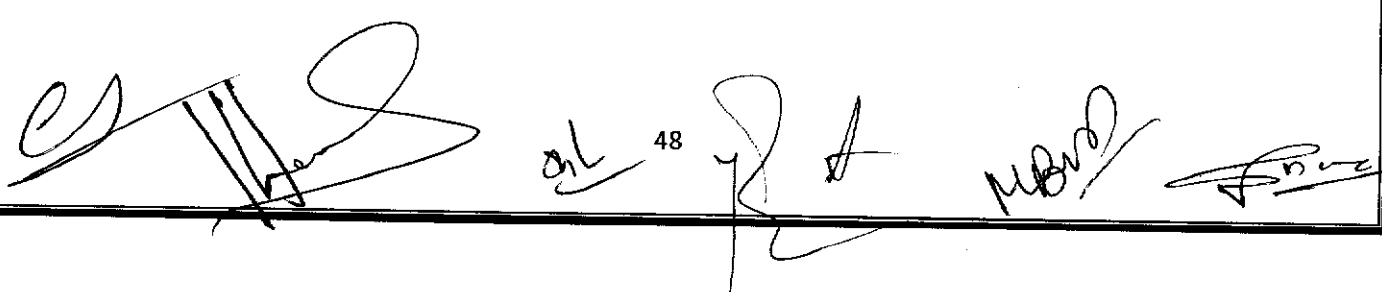
Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening.
CO2	Students will develop their ability as critical readers and writers.
CO3	Develop vocabulary and improve the accuracy in grammar.
CO4	Produce words with right pronunciation
CO5	Demonstrate positive group communication exchanges;
CO6	Plan effective communications.

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2							1			2	
CO2	1	2										
CO3	2	2	1		2			1			2	
CO4	1			2			2			2	1	
CO5	1							1	3		2	2
CO6	2	2	2	1	1		1		3	2	1	2
AVG	1.5	1	0.5	0.5	0.5		0.5	0.5	1	0.66	1.33	0.66

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



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Course code	: CITVC201			
Course Name	: THE ART OF CLEAN CODE			
Semester / Year	: 2nd Sem / 1st Year			
	L	T	P	C
	2	0	0	2

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

- Understand the principles of clean code and its significance in software development.
- Apply coding standards and best practices for writing readable and maintainable code.
- Analyze and refactor existing code to eliminate code smells and improve code quality.
- Implement design patterns to enhance code structure and flexibility.
- Develop effective unit tests using Test-Driven Development (TDD) principles.
- Evaluate and optimize code performance to identify and resolve bottlenecks.
- Create software projects showcasing clean code practices and design patterns.

COURSE CONTENTS:

Unit 1: Introduction to Clean Code and Coding Standards [No. of Hours: 4]

Definition and significance of clean code, The impact of clean code on software development Code readability and maintainability, Naming conventions and meaningful identifiers, Formatting and indentation, Comments and documentation

Unit 2: Refactoring and Code Smells [No. of Hours: 4]

Introduction to code refactoring, identifying code smells, Common refactoring techniques, understanding common code smells and anti-patterns, Refactoring exercises to improve code quality.

Unit 3: Design Principles and Design Patterns [No. of Hours: 6]

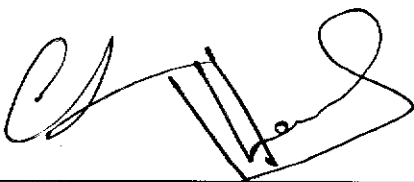
SOLID principles, DRY (Don't Repeat Yourself) principle, KISS (Keep It Simple, Stupid) principle, Introduction to design patterns, Creational, Structural, and Behavioral patterns, Applying design patterns to real-world problems.

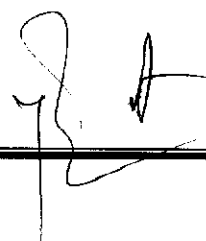
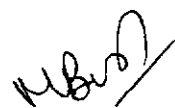
Unit 4: Unit Testing and Test-Driven Development (TDD) [No. of Hours: 4]

Importance of testing in clean code development, writing effective unit tests, Test-Driven Development (TDD) methodology

Unit 5: Debugging, Error Handling, and Performance Optimization [No. of Hours: 5]

Techniques for effective debugging, Proper error handling and exception management, identifying performance bottlenecks, Techniques for optimizing code performance




Unit 6: Version Control, Code Collaboration, Code Reviews, and Code Quality Metrics**[No. of Hours: 7]**

Using version control systems (e.g., Git), Collaborating on code using version control, Conducting code reviews, Code quality metrics and tools, Real-world Case Studies, Presentations and discussions on code quality improvement

Text Books:

- TB1.** Clean Architecture: A Craftsman's Guide to Software Structure and Design by Robert C. Martin
TB2. Code Complete: A Practical Handbook of Software Construction by Steve McConnell
TB3. Working Effectively with Legacy Code by Michael C. Feathers

Reference Books/ Online Resources

- RB1.** Refactoring: Improving the Design of Existing Code by Martin Fowler
RB2. Design Patterns: Elements of Reusable Object-Oriented Software by Erich Gamma,
RB3. Test-Driven Development: By Example by Kent Beck

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall the importance of clean code in software development and its impact on project maintainability and collaboration. List and explain the basic coding standards and best practices, including naming conventions, formatting, and code documentation. Identify common code smells and anti-patterns and describe their negative impact on code quality.
CO2	Demonstrate an understanding of various design principles, such as SOLID, DRY, and KISS, and apply them to design cleaner and maintainable code. Explain the purpose and characteristics of different design patterns and illustrate their use in solving specific software design challenges.
CO3	Apply code refactoring techniques to improve existing codebases by eliminating code smells and enhancing code readability. Implement unit testing and Test-Driven Development (TDD) methodologies to write effective unit tests for code validation and enhancement.
CO4	Analyze codebases to identify performance bottlenecks and inefficiencies, and propose appropriate optimization strategies. Critically evaluate code quality using code reviews, code quality metrics, and static analysis tools to suggest improvements.
CO5	Evaluate the trade-offs and benefits of using various design patterns and justify their application in specific software development scenarios.
CO6	Design and implement clean code solutions for real-world software development problems, demonstrating creativity and proficiency in coding practices.

CO –PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	2	1	2	1	2	2	2
CO2	2	2	3	2	2	2	2	2	2	2	2	3
CO3	1	2	2	1	1	2	1	1	1	1	1	2
CO4	1	2	2	2	2	2	1	1	1	1	2	2
CO5	1	2	2	2	2	2	1	1	1	1	2	2
CO6	3	3	3	3	3	3	2	2	2	2	3	3
AVG	1.8	2.4	2.6	2	2	2.4	1.6	1.8	1.6	1.8	2.2	2.6

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITP21			
Course Name	: LAB UNIX			
Semester	: 2 nd Sem / 1 st Year			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Describe the basic file system in Linux and its file attributes.
- Appraise different filters, process handling, regular expressions and network handling features using suitable commands.
- Summarize different Linux commands to write Shell Programs.

LIST OF EXPERIMENTS:

PART-A

1. Introduction- UNIX Architecture- Shell, Kernel, System calls.
Comparison between Unix/Linux and other Operating Systems, Applications of Linux Operating System.
2. Internal & External commands in Linux.
 - Internal commands- echo, type, etc.
 - External commands- ls, cp, mv, rm, cat, etc
 - Other commands – tput clear, who, cal, date, bc, man, passwd, uname(with different options).
3. Working with files & directories.
 - Know the categories of files.
 - Directory related Commands – pwd, mkdir, rmdir, cd, ls
 - Manipulating Absolute paths and Relative paths using cd command.
 - File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc
4. Basic File attributes.
 - Listing seven attributes of a file : ls and its options
 - File Permissions: Absolute and Relative permissions
 - Manipulating File permissions using chmod command
 - Manipulating File Ownership using chown command
 - Manipulating Hardlink and Softlink using ln command
5. Learn to use vi editor.
Three modes of vi editor.
 - Input mode commands.
 - Command mode commands.
 - Ex mode commands.
6. Simple Filters – head, tail, cut, paste, sort, uniq, tr, pr.
7. Expressions & search patterns .(dot operator), *, ^, +, ?, grep, egrep, fgrep
8. Process Management commands.
 - Process creation, status, Identifying process, ps -f & its options,
 - Running process in background, Job control, and Process termination.

- Changing process priority, scheduling process (Usage of sleep and wait commands)
- 9. Introduction to shell programming.
 - Introduction, Uses of shell script, Shell special characters, comments, command separator, escaping, quoting command substitution.
 - Creating shell script, Shell identifiers, Shell variables, Destroying a variable, Positional parameters & command line arguments.
 - Evaluating expressions, Text formatting with echo & tput script termination.
- 10. Shell control structures
 - if, case, for, while, relational and logical operators,
 - Advanced filter – sed and awk.
- 11. Unix system administration Managing file system, Disk management utilities, mounts, umount, df, du, fdisk, su, useradd etc.
- 12. Unix Environment Introduction, Environment variables, Command prompt system variables, Profiles, files, terminal variable stty command and its options, Command history, editing Environment variable.

PART-B

13. Write a shell script to display current date, time, username and directory.
14. Write script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument
15. Write shell script to show various system configuration like: a) Currently logged user name and his long name b) Current shell c) Your home directory
16. Write shell script to show various system configuration like: a) Your operating system type b) Your current path setting c) Your current working directory d) Show all available shells
17. Write a Shell script to accept any two file names and check their file permissions.
18. Write a Shell script to read a file name and change the existing file permissions.
19. Write a shell script to print current month calendar and to replace the current day number by '**' or '**' respectively.
20. Write a C-program to fork a child process and execute the given Linux commands.
21. Write a C-program to fork a child process, print owner process ID and its parent process ID.

TEXT BOOKS:

- TB1. "UNIX - Concepts and Applications", Sumitabha Das 4th Edition, Tata McGraw Hill, 2006.
TB2. Stephan Prata: Advanced Unix – A Programrs Guide – BPB PUB.

REFERENCE BOOKS:

- RB1. <http://heather.cs.ucdavis.edu/~matloff/Linux/LinuxInstall.pdf> (Chapter 1, Linux installation).
RB2. Kernighlan&Pike : The Unix Programming Environment – PHI.

COURSE OUTCOMES:

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Able to understand the basic Unix architecture, commands and utilities of the UNIX operating system and to work confidently in Unix/Linux environment and open systems.
CO2	Appraise various command usage of files and directories
CO3	Show the working of vi editor in all its modes using various commands.
CO4	Manage shell and processes using various commands.
CO5	Write Shell scripts and C programs using vi editor. Demonstrate Unix administration and its environment.
CO6	To Create Shell Scripting Programs

CO-PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		1		2	2		1			3
CO2	1	2	3	2	3	1	1	1		1	1	1
CO3	3	1		2		2	2		1		1	3
CO4	2	1	1	2	2	1	2	1		1		2
CO5	1	2	2	1	3	2	2		1		1	1
CO6	1		2		3			3		1		
AVG	1.83	1.66	1.33	1.33	1.83	1.83	1.5	0.66	0.5	0.5	0.5	1.66

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITP22			
Course Name	: Lab-Data Structure			
Semester /Year	: 2nd Sem / 1st Year			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To learn basic knowledge about data structure and arrays.
- To learn how to create and use linked list and its applications.
- To learn the importance of static and dynamic use of stack and queues.
- To learn the basic terminology of trees.
- To learn basics of sorting and searching techniques.

COURSE CONTENT:

- 1 Write a C program that uses functions to perform the following:
 - a) Create a singly linked list of integers.
 - b) Delete a given integer from the above linked list.
 - c) Display the contents of the above list after deletion.
- 2 Write a C program that uses functions to perform the following:
 - a) Create a doubly linked list of integers.
 - b) Delete a given integer from the above doubly linked list.
 - c) Display the contents of the above list after deletion.
3. Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.
- 4 Write C programs to implement a double ended queue ADT using
 - a) array
 - b) doubly linked list
- 5 Write a C program that uses functions to perform the following:
 - a) Create a binary search tree of characters.
 - b) Traverse the above Binary search tree recursively in Post order.
- 6 Write a C program that uses functions to perform the following:
 - a) Create a binary search tree of integers.
 - b) Traverse the above Binary search tree non recursively in in order.
- 7 Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:
 - a) Insertion sort
 - b) Merge sort
 - c) Quick sort

d) Selection sort

COURSE OUTCOMES (COS):

Upon successful completion of the course as a student will be able to

CO#	Detailed Statement of the CO
CO1	Able to understand basics of C programming language and arrays.
CO2	Able to understand basic concepts of linked list.
CO3	To understand the basic concepts of stack and queues through array and linked list.
CO4	To understand the basic knowledge of trees and graph.
CO5	Able to understand the concepts of sorting and searching techniques.
CO6	Able to understand Tree

CO PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		1	2	1	1	1				2
CO2		3	2	1	2	1		1	1			
CO3	1	1	3		1		1			2		2
CO4		2	2	3	2		1	1	1		2	1
CO5	1	1				3		1	2			2
CO6	1		2	1	1	1		1	2	1	2	1
AVG	1	1.5	1.5	1	1.33	1	0.5	0.83	1	0.5	0.66	1.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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THIRD SEMESTER:

Course code	: BITDSC301			
Course Name	:DBMS			
Semester /Year	: 3rd Sem/2nd Year			
	L	T	P	C
	3	-	-	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Develop a broad understanding of database concepts and database management system software, data models, schemas and instances, data constraints, relational algebra and calculus.
- Acquire Knowledge to model an application data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
- Be able to write SQL commands to create and manipulate database objects.
- Be able to discuss importance of normalization and improve the database design by applying various normal forms.

COURSE CONTENTS:**UNIT 1****[No. of Hours: 5]**

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database structure. Data modelling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation.

UNIT 2**[No. of Hours: 10]**

Relational Data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, constraints, relational algebra, relational calculus, tuple and domain calculus.

UNIT 3**[No. of Hours: 10]**

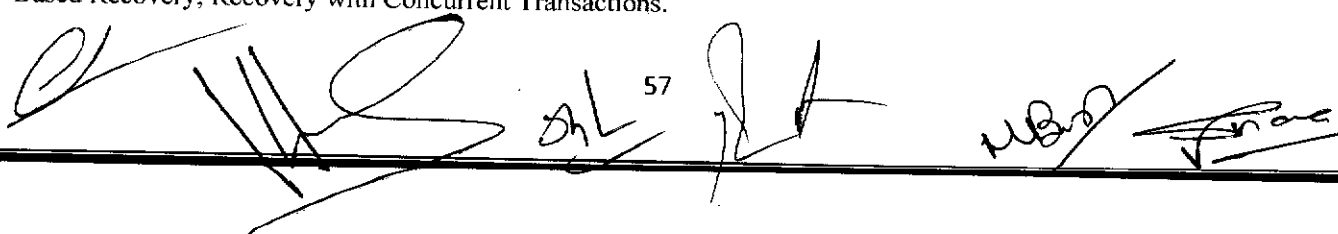
Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins

UNIT 4**[No. of Hours: 8]**

Database Design & Normalization: Functional dependencies, normal forms, first, second third normal forms, BCNF, Multi valued Dependencies, 4NF, 5NF.

UNIT 5**[No. of Hours: 7]**

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log-Based Recovery, Recovery with Concurrent Transactions.



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TEXT BOOKS:

TB1: Korth, Silbertz, Sudarshan, "Database Concepts" McGraw Hill

REFERENCE BOOKS:

RB1: Date C.J. "An Introduction to Database System". Addison Wesley

RB2: Elmasri, Navathe, "Fundamentals of Database systems" Addison Wesley
RB3: Bipin C. Desai, "An introduction to Database Systems", Galgotia Pub.**COURSE OUTCOMES:**

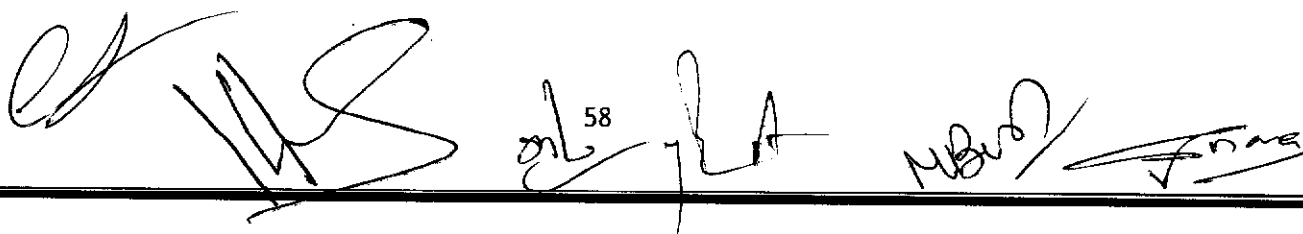
Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Define various database components, models, DBMS architecture and Database Security.
CO2	Explain relational database theory to construct relational algebra expression, tuple and domain relation expression for SQL queries
CO3	Apply the concept of database to write advanced SQL queries on data.
CO4	Compare various normal forms and perform normalization and functional Dependency for database.
CO5	Appraise concept of functional dependencies and keys.
CO6	Create database using SQL queries

CO-PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		3		1		1			2	
CO2	3	3	3	2		1	1					
CO3	3	3	3	2	3	1		1	2		2	
CO4	3	3	3	2		1	1			2	1	
CO5	3	3	2	2		1					2	2
CO6	3	3	3	2	3	1		1	1	1	1	2
AVG	3	3	2.33	2.16	1	1	0.33	0.5	0.5	0.5	1.33	0.66

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



Course code	: BITDSC302			
Course Name	: Web Programming Using HTML CSS & JavaScript			
Semester /Year	: 3rd Sem/2nd Year			
	L	T	P	C
	3	-	-	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To learn the basic concepts of World Wide Web.
- To learn the basic concepts and syntax of HTML and CSS programming.
- To be able to develop logics which help them to create programs and applications using HTML& CSS.
- To use JavaScript in a program
- To learn the skills that will help the students in creating websites with great look and feel using CSS and JavaScript

UNIT 1

[No. of Hours: 10]

Introduction- Introduction to the Internet, Introduction to HTML Terminology, Designing a Webpage: Design Considerations and Planning, Basic Tags and Document Structure, HTML Tags, Head Tags, Title Tags, Body Tags, Metadata, Saving an HTML Page

UNIT 2

[No. of Hours: 10]

Page Formatting- Adding a New Paragraph, Adding a Line Break, Inserting Blank Space, Preformatted Text, Changing a Page's Background Color, Div Element. Text Items and Objects: Headings, Comments, Block Quotes, Horizontal Lines. Special Characters, Creating Lists- Numbered (Ordered) Lists, Bulleted (Unordered) Lists, Nested Lists, Definition Lists.

UNIT 3

[No. of Hours:05]

Links-What are Links?, Text Links, Image Links, Opening a Page in a New Window or Tab, Setting all Links on a Page to Open in a New Window or Tab, Linking to an Area on the Same Page (Bookmarks), Linking to an E-mail Address, Linking to Other Types of Files, Images- Introduction to Images for Webpages, Adding Images to Webpages, Resizing an Image, Alternative (ALT) Text, Image Labels.

UNIT 4

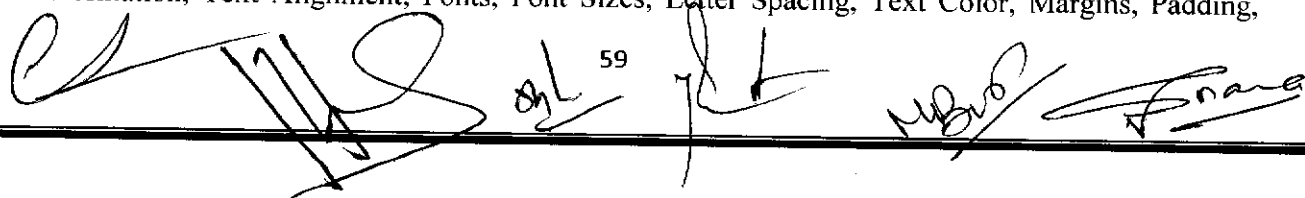
[No. of Hours: 05]

Basic Tables-Inserting a Table, Table Borders, Table Headers, Col and row span, IFrames: What is an Iframe, Inserting Iframes, Setting Height and Width, Using an Iframe for a link target. Forms: About Forms, Text Boxes, Text Areas, Check Boxes, Menu Lists, Radio Buttons, The Submit Button, The Reset Button, Changing the Tab Order, Sending to E-mail, event handling

UNIT 5

[No. of Hours: 05]

Cascading Style Sheets- CSS Introduction , CSS Syntax, Creating an External CSS, Linking to a CSS, Adding Comments and Notes to a CSS, Creating an Internal Style Sheet, ID and Class, Inline Styling. Working With Text in CSS: Emphasizing Text (Bold and Italic), Decoration, Indentation, Transformation, Text Alignment, Fonts, Font Sizes, Letter Spacing, Text Color, Margins, Padding,

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Borders, Styling Links, Number and Bullet Styles, Sizing Elements, Text Wrapping, Shadowing.

UNIT 6**[No. of Hours: 10]**

JavaScript and Browsers. Client-side scripting, JavaScript development tools, JavaScript case sensitivity and comments. Variables, datatypes, reserve words, Operators, Control statements- if-else, loops, break, continue and labels, functions and event handling, Dialog boxes- alert, confirm and prompt. JavaScript library functions- string, arrays, date, math. Introduction to advanced JavaScript- RegExp, DOM, ImageMaps, Form validation.

TEXT BOOK:

- TB1. HTML & CSS: The Complete Reference, Fifth Edition, Thomas A. Powell.
TB2. Burdman, "Collaborative Web Development", Addison Wesley

REFERENCE BOOK

- RB1. Sharma & Sharma, "Developing E-Commerce Sites" Addison Wesley
RB2. Ivan Bayross, "Web Technologies Part-I" BPB Publications

COURSE OUTCOMES:

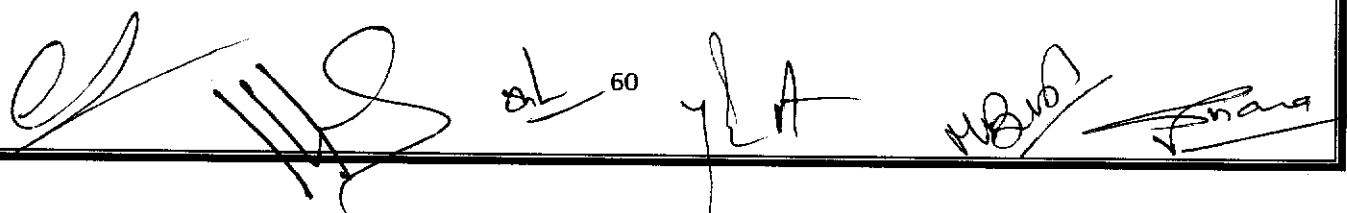
Upon successful completion of the course as a student will be able to

CO#	Detailed Statement of the CO
CO1	Able to understand the basic concepts and write HTML programs.
CO2	Able to design and develop various programming problems using CSS programming concepts.
CO3	Able to Implement concepts like changing look-n-feel of the multiple web pages from single source using CSS.
CO4	Able to decide which type of style sheet is suitable to use in particular case by analyzing the inline, internal and external type of CSS.
CO5	Able create and evaluate the websites with professional look and feel using both HTML and CSS.
CO6	Create web pages using HTML, CSS and Javascript

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1		1		2			
CO2	2	2	3	1			1		1			
CO3	1	3	3						2			
CO4	2	3	3									
CO5	3	3	1									1
CO6	3	3	1			1						
AVG	2.33	2.66	2.33	0.33	0.16	0.16	0.33		0.83			0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

 60 yLA MB/07 Jhara

Course code	: BITDSC303			
Course Name	: Computer Network			
Semester /Year	: 3 rd Sem/2 nd Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To understand the concepts of communicating channel in order to deal with the different transmission media.
- To learn different about the different approaches of networking through switching modes and different multiplexing techniques.
- To learn the importance of IEEE standard to raise good results and modes to apply various protocols internally and externally in specified time domain. To deal with the problems arises due to channel allocation and ultimately to detect collisions so as to avoid them on priority basis.
- To learn different models o transfer data through physical communicating medium with the helpof routing algorithms. To analyze the features of different algorithms to find a short way to approach to the destination.
- To understand significance of various layers in OSI as well as TCP/IP models to bring a data in segment form and to synchronize the interaction of source and destination using respective layers.
- To draw elementary knowledge regarding different known systems that provide various characteristics, when number of protocols are applied to secure the data.

COURSE CONTENT:

UNIT 1: Overview of Networking

[No. of Hours: 8Hrs]

Introduction, Need of Networking; Elements of Network, Modes of communication, Network topology, categories of network (LAN, MAN, WAN), Reference models: OSI reference model, TCP/IP reference model.

Physical Layer: transmission media (guided & unguided), TDM, FDM, Circuit switching: time division & space division switch, Telephone network.

UNIT 2: Data link layer:

[No. of Hours: 8Hrs]

Framing (character and bit stuffing), Types of errors , error detection & correction methods; Flow control: Protocols: Stop & wait ARQ, Sliding Window Protocols, HDLC Medium access sub layer: Channel Allocation, LAN Protocols, , CSMA/CD/CA, ALOHA protocols, Multiplexing.

UNIT 3: Network layer

[No. of Hours: 8Hrs]

Internetworking devices, Routing: Routing types & techniques, static vs. dynamic routing; Routing algorithms: flooding, distance vector routing, link state routing; network layer Protocols: ARP, RARP, ICMP; IP Addressing: class full address, subnetting, IPv4 and datagram, IPv6, Congestion control strategies & algorithms.

UNIT 4: Transport layer

[No. of Hours: 8Hrs]

Design issues, Connection management, TCP window Management, Port No., Socket Address, User Datagram Protocol, Transmission Control Protocol.

UNIT 5: Application layer

[No. of Hours: 8Hrs]

E-mail, SMTP, FTP, POP, SNMP, TFTP, HTTP; Introduction to Network Security: Terminology and Keys Symmetric and Asymmetric Algorithm.

TEXT BOOKS:

TB1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH

REFERENCE BOOKS:

RB1. A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
RB2. W. Stallings – “Data and Computer Communications (5th Ed.)” – PHI/ Pearson Education

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to:

CO#	Detailed Statement of the CO
CO1	To gain knowledge and remember Computer network and communication term, network protocols, functions of different layers, media, mode etc.
CO2	To understand computer network and communication term, network protocols, functions of different layers, media, mode etc.
CO3	To apply Computer network protocols, methods of error detection to solve problem related to computer network
CO4	To analyze Computer network term, protocols, functions of different layers, media, mode etc.
CO5	To evaluate various numerical based on bandwidth, error detection, channel allocation, efficiency of algorithms, routing, Congestion, TCP etc.
CO6	To create new protocols and method to solve real life problems in a computer network environment.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			1	1					2	
CO2	1		1	2	1					1		2
CO3	2	3		1	1	1		1	2		2	
CO4	1	2	2	1		2	1			1	2	
CO5		1	1	2	1	2		1			1	
CO6	1			2				1	1	1	1	2
AVG	1.16	1.16	0.66	1.33	0.66	1	0.16	0.5	0.5	0.5	1.33	0.66

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITGE301			
Course Name	: Digital Marketing			
Semester /Year	: 3rd Sem/2nd Year			
	L	T	P	C
	3	1		4

L - Lecture T - Tutorial P - Practical C - Credit

COURSE OBJECTIVES:

- Overall understanding of Digital Marketing.
- Various strategies involved in Marketing products and Services Digitally.
- Understanding of Digital Marketing Platforms.
- Techniques for Search Engine Optimization (SEO) and Mobile Marketing.
- Develop insight on Current Trends-Digital and Social Statistics (Info graphics).

COURSE CONTENTS:**UNIT 1****[No. of Hours:10]**

Introduction to Digital Marketing: Evolution of Digital Marketing from traditional to modern era, Role of Internet, Current trends, Info-graphics, implications for business & society, Emergence of digital marketing as a tool, Digital marketing strategy, P.O.E.M. framework, Digital landscape, Digital marketing plan, Digital marketing models

UNIT 2**[No. of Hours:10]**

Internet Marketing and Digital Marketing Mix: Internet Marketing, opportunities and challenges, digital marketing framework, Digital Marketing mix, Impact of digital channels on IMC **Email Marketing:** Basics of Email Marketing, Opt-in Email Permission Marketing, Online PR, Interactive Advertising, Online Partnerships, Viral Marketing, Blogs

Search Engine Advertising: Search Advertisements, AdPlacement, AdRanks, Creating Ad Campaigns, Campaign Report Generation

Display Marketing: Types of Display Ads, Buying Models, Programmable Digital Marketing, Analytical Tools, YouTube Marketing, Trends

UNIT 3**[No. of Hours: 12]**

Social Media Marketing-Role of Influencer Marketing, Tools &Plan: Introduction to s social media platforms, penetration & characteristics, Building a successful social media marketing strategy .

Facebook Marketing: Introduction to Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools.

LinkedIn Marketing: Introduction and Importance of Linked in Marketing, Framing Linked in Strategy, Lead Generation through LinkedIn, Content Strategy, Analytics and Targeting

Twitter Marketing: Introduction to Twitter Marketing, how twitter Marketing is different than Other forms of digital marketing, framing content strategy, Twitter Advertising Campaigns

Instagram and Snapchat: Digital Marketing Strategies through Instagram and Snapchat

Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, And Mobile Advertising Analytics.

UNIT 4

[No. of Hours: 8]

Introduction to Search Engine Optimization(SEO): Introduction and need for SEO, How to use internet & search engines, search engine and its working pattern; On-page and off-page optimization, SEO Tactics, Introduction to Search Engine Marketing (SEM).

Web Analytics: Introduction to social media metrics, Google Analytics, Google Ad Words, data collection for web analytics, multi-channel attribution, Universal analytics, tracking code in digital advertising

TEXTBOOKS:

TB1 Seema Gupta, "Digital Marketing", Mc-Graw Hill, 8th Edition, 2018.

TB2 Ian Dodson, "The Art of Digital Marketing", Wiley, 2017.

REFERENCE BOOKS:

RB1 Chhafey D., Ellis-Chadwick F., Johnston K .and Mayer R, "Internet Marketing: Strategy, Implementation and Practice" , Pearson Education, 2018.

RB2 Strauss, Judy and Frost, Raymond, "E-Marketing", PHILearning Pvt.Ltd., 2013.

RB3 Puneet Singh Bhatia, "Fundamentals of Digital Marketing", Pearson, 2nd Edition, 2016.

COURSE OUTCOMES (COs):

After completion of the course, a student will be able to:

CO#	Detailed Statement of the CO
CO1	Describing Digital Marketing preliminaries.
CO2	Explaining effective Digital Marketing strategies for different products and services.
CO3	Illustrate varied Digital Marketing Platforms like Email, Facebook, Twitter, YouTube, Pinterest, etc. as per given scenario.
CO4	Analyze the concept of Search Engine Optimization (SEO), SEM and Mobile Marketing to given scenarios.
CO5	Evaluate trends using Google Analytics.
CO6	Create a plan to apply digital marketing knowledge to business situations in local and global environment.

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3	2					1				
CO3	2	2	1					3				
CO4	1	1	2	2	2	1					1	
CO5	1	2	2	2	2	1	1	1	1	1	1	1
CO6	3	2	2	2	1						2	
AVG	2.33	1.66	1.5	1	0.83	0.33	0.16	0.66	0.16	0.16	0.66	0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITSC301			
Course Name	: Numerical Aptitude & Logical reasoning			
Semester /Year	: 3 rd /2 nd			
	L	T	P	C
	2	-	-	2

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OUTCOME:

On successful completion of the course the students will be able to:

- Understand the basic concepts of logical reasoning Skills
- Acquire satisfactory competency in use of reasoning
- Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability
- Understand the basic concepts of reasoning ability

COURSE CONTENTS:**UNIT-I. Quantitative Ability (Basic Mathematics)****[No of Hours: 6 Hrs.]**

Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots Average, Problems on Ages, Percentages.

UNIT – II. Arithmetic Ability (Applied & Engineering Mathematics)**[No of Hours: 6 Hrs.]**

Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest, Time, Speed and Distance, Time & Work, Ratio and Proportion.

UNIT –III. Data Interpretation**[No of Hours: 6 Hrs.]**

Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams.

UNIT IV. Verbal Reasoning**[No of Hours: 6 Hrs.]**

Analogy, Classification, coding-decoding, blood relation, Venn diagram, calendar, clocks, direction and distance, decision-making, input-output, puzzles

UNIT – V. Non Verbal Reasoning**[No of Hours: 6 Hrs.]**

Embedded Figure Paper Folding and cutting, Image Series, Construction of Shapes, classification, Picture Analogies, Rule Detection, Pattern Completion

TEXTBOOKS:**TB1:** RS AGARWAL, "A Modern Approach to Verbal & Non-Verbal Reasoning", S.

Chand Publishing

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REFERENCE BOOKS:

RBI: M.K Pandey, "Analytical Reasoning", BSC Publication

COURSE OUTCOMES (COs):

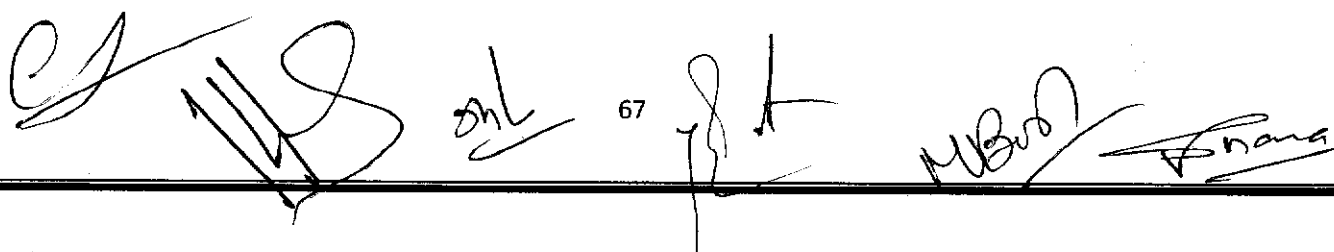
After completion of the course, a student will be able to:

CO#	Detailed Statement of the CO
CO1	Illustrate varied problems on Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots Average.
CO2	Evaluate trends of Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest.
CO3	Create a plan to apply Data Interpretation techniques.
CO4	Analyze the concept of Problems on Ages, Percentages, Problems on Numbers.
CO5	Describing Verbal Reasoning.
CO6	Explaining Non-Verbal Reasoning.

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	2	3	2					1				
CO3	2		1					2				
CO4	1	1	2		1	1					1	
CO5	1		1	2	2	1	1	1	1	1	1	1
CO6	1	1	1	1	1						1	
AVG	1.5	0.83	1.16	0.5	0.66	0.33	0.16	0.66	0.16	0.16	0.5	0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



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Course code	: AEC3			
Course Name	: Environmental Studies-II			
Semester /Year	: 3 rd Sem/2 nd Year			
	L	T	P	C
	2	-	-	2

L - Lecture T – Tutorial P – Practical C – Credit

Unit I. Environmental Pollution and Health Course Learning Outcomes

After completing this unit, students would be able to:

- Develop an understanding of pollution and its types.
- Learn about sources of different kinds of pollution.
- Sensitize themselves to adverse health impacts of pollution.

UNIT OUTLINE

- Definition of pollution; Point sources and non-point sources of pollution.
- Air pollution: Sources of air pollution; Primary and secondary pollutants; Criteria pollutants; Other important air pollutants- (VOCs), (PAN), (PAHs) and (POPs); Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards.
- Water pollution: Sources of water pollution; river, lake and marine pollution, groundwater pollution; water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life.
- Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health.
- Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health.
- Thermal and radioactive pollution: Sources and impact on human health and ecosystems.

Suggested Readings:

1. Jackson, A. R., & Jackson, J. M. (2000). Environmental Science: The Natural Environment and Human Impact. Pearson Education.
2. Masters, G. M., & Ela, W. P. (2008). Introduction to environmental engineering and science (No. 60457). Englewood Cliffs, NJ: Prentice Hall.
3. Miller, G. T., & Spoolman, S. (2015) Environmental Science. Cengage Learning.
4. Central Pollution Control Board Web page for various pollution standards. <https://cpcb.nic.in/>
5. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).

Unit II. Climate Change: Impacts, Adaptation and Mitigation

Course Learning Outcomes

After completing this unit, students would be able to:

- Gain a comprehensive knowledge of climate change, its science and response measures
- Have an overview of national and global efforts to address climate change adaptation and mitigation.

UNIT OUTLINE

- Structure of atmosphere; Climate Change, GHGs (greenhouse gas emissions).
- Paris Agreement; Climate change projections for the Indian sub-continent. Impacts, vulnerability and adaptation to climate change: Sea level rise, changes in marine and coastal ecosystems; Impacts on forests and natural ecosystems; Impacts on animal species, agriculture, health, urban infrastructure; the concept of vulnerability and its assessment.
- Adaptation vs. resilience; Climate-resilient development; Indigenous knowledge for adaptation to climate change.
- Mitigation of climate change: Synergies between adaptation and mitigation measures; Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality.
- National and international policy instruments for mitigation, decarbonizing pathways and net zero targets for the future; National climate action plan and Intended Nationally Determined Contributions (INDCs); Climate justice.

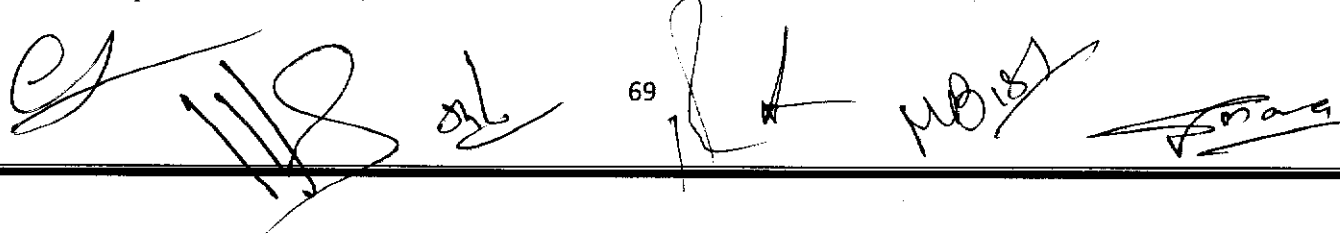
Suggested Readings

1. Pittock, Barrie (2009) Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge.
2. www.ipcc.org; <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>.
3. Adenle A., Azadi H., Arbiol J. (2015). Global assessment of technological innovation for climate change adaptation and mitigation in developing world, Journal of Environmental Management, 161 (15): 261-275.
4. Barnett, J. & S. O'Neill (2010). Maladaptation. Global Environmental Change—Human and Policy Dimensions 20: 211–213.
5. Berrang-Ford, L., J.D. Ford & J. Paterson (2011). Are we adapting to climate change? Global Environmental Change—Human and Policy Dimensions 21: 25-33.

UNIT III. Environmental Management

Course Learning Outcomes

After completion of this unit, students would be able to:

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- Develop a critical understanding of the complexity of environmental management.
- Understand broad aspects of environmental management systems.
- Understand different methods of assessing environmental quality and associated risks.

Unit Outline

- Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control.
- Environmental management system: ISO 14001. Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis.
- Environmental audit and impact assessment; Environmental risk assessment Pollution control and management.
- Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Eco mark scheme.

Suggested Readings

1. Jørgensen, Sven Marques, Erik João Carlos and Nielsen, Søren Nors (2016) Integrated Environmental Management, A transdisciplinary Approach. CRC Press.
2. Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press.
3. Barrow, C. J. (1999). Environmental management: Principles and practice. Routledge.
4. Tiefenbacher, J (ed.) (2022), Environmental Management - Pollution, Habitat, Ecology, and Sustainability, Intech Open, London. 10.5772/
5. Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press.

UNIT IV. Environmental Treaties and Legislation

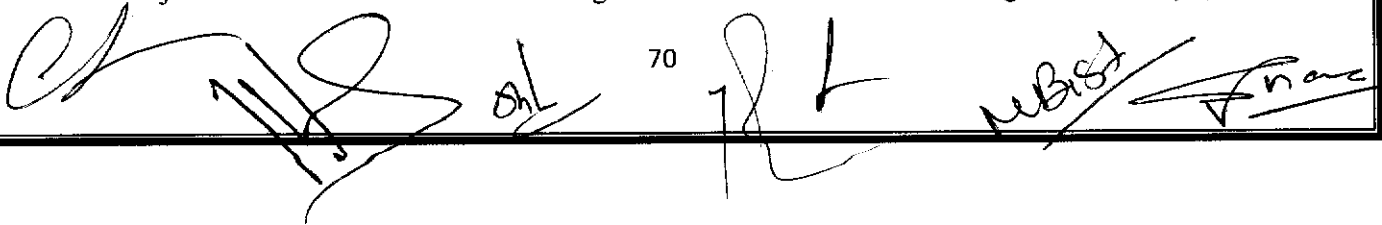
Course Learning outcomes

After completion of this unit, students would be able to:

- Learn about how the nations of the world work together for the environment.
- Learn about the major international treaties and our country's stand on and responses to the major international agreements.
- Learn about major international institutions and programs and the role played by them in the protection and preservation of the environment.

Unit Outline

- Major International Environmental Agreements: Convention on Biological Diversity (CBD);

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Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention on Wetlands of International Importance; United Nations Convention to Combat Desertification (UNCCD); Montreal Protocol on Substances that Deplete the Ozone Layer and the Kigali Amendment; Minamata Convention on Mercury; United Nations Framework Convention on Climate Change (UNFCCC); Kyoto Protocol; Paris Agreement; India's status as a party to major conventions.

- Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002; Noise Pollution (Regulation and Control) Rules, 2000; Waste management rules.
- National Green Tribunal; United Nations Environment Program (UNEP), International Union for Conservation of Nature (IUCN), World Commission on Environment and Development (WCED), United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Panel on Climate Change (IPCC), and Man and the Biosphere (MAB) program.

Suggested Readings

1. UNEP (2007) Multilateral Environmental Agreement Negotiator's Handbook, University of Joensuu, ISBN 978-952-458-992-5
2. Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programs. <https://moef.gov.in/wp-content/uploads/2020/02/convention-V-16-CURVE-web.pdf>
3. Kanchi Kohli and Manju Menon (2021) Development of Environment Laws in India, Cambridge University Press.
4. India Code – Digital repository of all Central and State Acts: <https://www.indiacode.nic.in/>
5. Bohra, Saroj, Judicial Intervention and Evolution of Environmental Principles and Doctrines (January 7, 2019). Available at SSRN: <https://ssrn.com/abstract=3311406> or <http://dx.doi.org/10.2139/ssrn.3311406>

- Discussion on one international case study related to the environment and sustainable development.
- Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report.
- Participation in cleanliness drives and nature camps.
- Campus environmental management activities such as solid waste disposal and management.
- Campus environmental management activities such as water management and sanitation, and sewage treatment.
- Case Studies on any one Pollution related Disaster: (Bhopal Gas Tragedy, Chernobyl Disaster, London smog, Delhi Smog, Minamata Disaster).
- Prepare a brief report on any one Environment related Treaty/Protocol: (Kyoto Protocol,

Montreal Protocol, CITES, Paris Agreement, CBD).

- Prepare a map highlighting the Ramsar Sites of India.

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall key concepts, definitions, and types of environmental pollution, major international environmental agreements, and fundamental principles of environmental management.
CO2	Understand the sources and impacts of different types of pollution on human health and ecosystems, the intricacies of climate change, and the significance of international environmental treaties and domestic legislations.
CO3	Apply knowledge to identify local and regional environmental issues during field visits, participate in environmental management activities, and document observations on various environmental topics.
CO4	Analyze the causes and effects of environmental disasters, the implications of environmental treaties and protocols, and evaluate the effectiveness of different environmental management systems.
CO5	Assess the global and national efforts in addressing climate change, the effectiveness of environmental laws and regulations, and the role of major international institutions and programs in environmental conservation.
CO6	Design and formulate reports on specific environmental case studies, such as pollution-related disasters and international treaties, and create informative maps highlighting significant environmental sites, like the Ramsar Sites of India.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	2	1	1	1	1	1	2	1
CO2	1	2	2	2	3	1	1	1	1	2	2	2
CO3	1	3	2	2	2	2	2	1	1	2	3	2
CO4	1	3	2	3	2	2	2	1	1	2	3	3
CO5	1	2	2	2	3	2	2	1	1	2	2	2
CO6	1	2	2	2	3	2	3	1	1	2	2	2
AVG	1	2.33	1.83	2	2.5	1.67	1.83	1	1	1.83	2.33	2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: CITVC301				
Course Name	: DIGITAL EMPOWERMENT				
Semester / Year	: 3 rd Sem / 2 nd Year				
		L	T	P	C
		2	0	0	2

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

- Understand the concept and scope of digital empowerment.
- Explore the evolution and impact of digital technologies in India.
- Analyze the challenges and future prospects of digital infrastructure in the country.
- Develop digital skills and literacy necessary for the 21st-century workforce.
- Examine the role of digital entrepreneurship, e-commerce, and digital payments in the Indian economy.
- Evaluate the implementation of e-governance models and their impact on public service delivery.
- Investigate the social impact of digital initiatives in healthcare, education, and agriculture.
- Discuss ethical considerations, privacy, and responsible use of digital technologies.
- Understand the policies and legal frameworks governing digital ethics and citizenship.
- Explore strategies for promoting digital inclusion, especially for marginalized communities.

COURSE CONTENTS**Unit 1: Introduction to Digital Empowerment****[No. of Hours: 2]**

Definition and scope of digital empowerment, Evolution of digital technologies in India, Digital divide and its implications, Overview of government initiatives for digital empowerment (e.g., Digital India program)

Unit 2: Digital Infrastructure in India**[No. of Hours: 4]**

Internet and broadband penetration in India, Mobile technology and its impact on digital empowerment, Role of government and private sector in developing digital infrastructure, E-governance initiatives in India (e.g., Aadhaar, GSTN), Challenges and future prospects of digital infrastructure in India

Unit 3: Digital Skills and Education**[No. of Hours: 4]**

Importance of digital skills in the 21st century, Digital literacy initiatives in India, Online education and e-learning platforms, Skill development programs for digital empowerment

Unit 4: Digital Economy in India**[No. of Hours: 4]**

Digital entrepreneurship and start-up ecosystem in India, E-commerce and its impact on Indian businesses, Digital payments and financial inclusion, Opportunities and challenges in the gig economy, Government policies and regulations for promoting the digital economy

Unit 5: Digital Governance and Public Services**[No. of Hours: 5]**

E-governance models and their implementation in India, Digital platforms for service delivery

(e.g., e-health, e-education), Role of technology in improving transparency and accountability in governance, Privacy and security concerns in digital governance, Citizen engagement and participatory governance through digital platforms

Unit 6: Digital Inclusion and Social Impact

[No. of Hours: 5]

Role of digital technologies in social development, Digital initiatives for healthcare, education, and agriculture, Digital inclusion of marginalized communities (e.g., rural areas, differently-abled individuals), Ethical considerations in digital inclusion

Unit 7: Digital Ethics and Responsible Use

[No. of Hours: 6]

Ethical considerations in digital technologies, Privacy, data protection, and cybersecurity, Responsible use of social media and online platforms, Digital rights and digital citizenship, Policy and legal frameworks for ensuring digital ethics

Text Books:

- TB1. Rodney Jones and Christoph Hafner. "Understanding digital literacies: A practical Introduction". Routledge Books, 2nd edition, 2021.

Reference Books/ Online Resources

- RB1. <https://www.digitalindia.gov.in>
 RB2. <https://www.digilocker.gov.in>
 RB3. <https://www.cybercrime.gov.in>
 RB4. <https://www.cybersafeindia.in>
 RB5. <https://www.meity.gov.in/cyber-surakshit-bharat-program>
 RB6. David Sutton. "Cyber security: A practitioner's guide", BCS Learning & Development Limited, UK, 2017.
<https://www.mha.gov.in/document/downloads/cyber-safety-handbook>

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall the definition and scope of digital empowerment. Recall the key government initiatives for digital empowerment in India. Remember the importance of digital skills in the 21st century.
CO2	Explain the evolution of digital technologies in India. Describe the implications of the digital divide and its impact on society. Understand the role of digital infrastructure in facilitating digital empowerment.
CO3	Apply knowledge of e-governance initiatives in India to analyze their impact on service delivery. Apply digital literacy skills to access and utilize online educational platforms. Apply principles of responsible use of social media and online platforms to real-world scenarios.
CO4	Analyze the challenges and future prospects of digital infrastructure in India. Examine the impact of e-commerce on Indian businesses and the digital economy. Analyze the ethical considerations and implications of

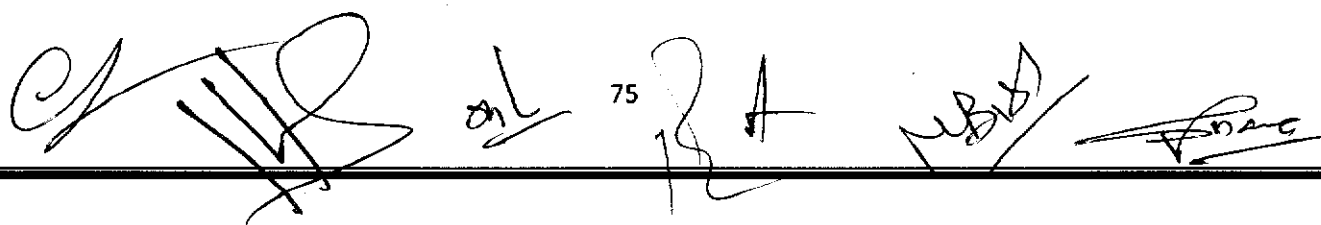
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	digital inclusion initiatives.
CO5	Evaluate the effectiveness of government policies and regulations in promoting the digital economy. Assess the role of technology in improving transparency and accountability in digital governance. Evaluate the social impact of digital initiatives in healthcare, education, and agriculture.
CO6	Create a proposal for a digital entrepreneurship venture, considering the start-up ecosystem in India. Develop an e-governance model that enhances citizen engagement and participatory governance.

CO –PO Mapping:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	1	1	1	1	1	1	1	2
CO2	1	2	2	2	2	2	1	1	1	1	2	2
CO3	1	1	2	1	2	2	1	1	1	1	1	2
CO4	1	2	2	2	2	2	1	1	1	1	2	2
CO5	1	2	2	2	2	2	1	1	1	1	2	2
CO6	1	1	2	1	2	2	1	1	1	1	1	2
AVG	1.2	1.8	2	1.6	2	2	1.2	1.2	1.2	1.2	1.6	2.2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated


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Course code	: BITP31			
Course Name	: Lab -DBMS			
Semester /Year	: 3rd Sem /2nd Year			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Working expertise of DDL and DML commands with their application on solving real time problems.
- Ability to apply filters using where clause and nested queries, integrity constraints attainable level and column level and to use built-in functions including numeric, character and date functions.
- Adequate knowledge to fetch data from multiple tables using different types of JOIN operations.

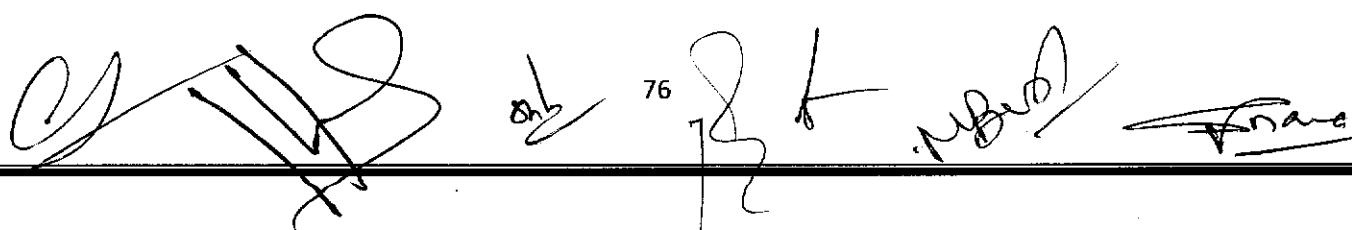
COURSE CONTENTS:

1. Queries used for creating and managing tables i.e. Data Definition Language (DDL) e.g., createtable, alter table, drop, rename table etc.
2. Queries used for manipulating data i.e. Data Manipulation Language (DML) e.g., inserting rows into a table, update rows in a table, delete rows from a table,
3. Writing and executing basic SQL queries
4. Including constraints while creating tables.
5. Queries based on restricting and sorting data
6. Queries based on single row functions used in character, number and date.
7. Queries based on displaying data from multiple tables.
8. Aggregating data using group functions
9. Queries based on sub queries.
10. Describing and creating view, retrieving data through a view, alter definitions of a view, insert, delete and update data through a view, drop a view
11. Creation of triggers cursors, stored procedure, packages, functions in PL/SQL

COURSE OUTCOMES:

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of
CO1	Identify DML/DDL commands and write queries based on them .
CO2	Demonstrate the use of constraints, relational algebra operations and Grouping.
CO3	Apply the concept of Views, Rollback, Commit, Grant and Revoke Permission.
CO4	Examine SQL queries and developing database applications.
CO5	Appraise solutions for real world problems/case studies by creating efficient databaseschema.
CO6	Creation of triggers cursors, stored procedure, packages, functions in PL/SQL

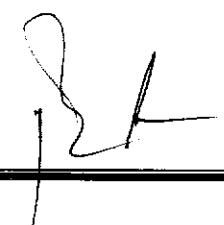


CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	2	3	2	1					
CO2	2	1	2	1	2	1		1				
CO3	3	1		1	1	1	2					
CO4	1	1	3	2	1		3	1			2	1
CO5	1	1	2			1	2	2			3	
CO6	1	1	2			1	2	2			3	
AVG	1.5	1	2	1	1.16	1	1.66	1			1.33	0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated




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Course code	: BITP32			
Course Name	: Lab- Web Designing			
Semester /Year	: 3rd Sem/2nd Year			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To learn the basic concepts of World Wide Web.
- To learn the basic concepts and syntax of HTML and CSS programming.
- To be able to develop logics which help them to create programs and applications using HTML& CSS language.
- To use the types of CSS and CSS Overriding in a web site.

COURSE OUTCOMES:

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	To gain knowledge about the basic concepts of HTML and CSS.
CO2	To understand the basic concepts of HTML and CSS.
CO3	To apply html and CSS into programming concepts
CO4	To analyze the different style of CSS in particular cases (inline/internal/external)
CO5	To evaluate various codes of basic html and variety of style sheets for designing web pages
CO6	To create websites with professional look and feel using both HTML and CSS.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1		1		2			
CO2	3						2		1	1		
CO3	2	2	3	1			1		1			
CO4	1	3	3						2			
CO5	2	3	3									
CO6	2			1			2		2			
AVG	2.16	1.16	2	0.5	0.16		1		1.33	0.16		

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

FOURTH SEMESTER

Course code	: BITDSC401			
Course Name	: Java Programming			
Semester /Year	: 4th Sem/ 2nd year			
	L	T	P	C
	3	0	0	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To learn why Java is useful for the design of desktop and web applications.
- To learn how to implement object-oriented designs with Java.
- To identify Java language components and how they work together in applications.
- To design and program stand-alone Java applications.

COURSE CONTENTS**UNIT 1****[No. of Hrs:10]**

Java Programming: Introduction, Operator, Data types, Variables, Methods and Classes, Multi threaded programming.

UNIT 2**[No. of Hrs:10]**

I/O Java applet. Java Library: String handling, I/O exploring JAVA, Networking, Applet Classes, EventHandling

UNIT 3**[No. of Hrs:10]**

Introduction to AWT & JDBC Connectivity- Database concepts and HTML Forms. JDBC driver types, JDBC-ODBC Bridge, SQL Statements, and Prepared Statements. Using JDBC in servlets.

Working with windows, Graphics, AWT Controls, Layout manager and menu, Images, Additional Packages.

UNIT4**[No. of Hrs:10]**

Java Beans- Preparing a Class to be a Java Bean, Creating a Java Bean, Java Bean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean.

TEXT BOOKS:

TB1. Naughton, Schidt, "The Complete Reference JAVA2" , TMH

TB2. Balagurusamy E, "Programming in JAVA, TMH

REFERENCE BOOKS:

RB1. Dustin R. Calway, "Inside Servlets" , Addison Wesley

RB2. Mark Wutica, "Java Enterprise Edition" , QUE

RB3. Steven Holzner, "Java2 Black book", Dreamtech

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COURSE OUTCOMES

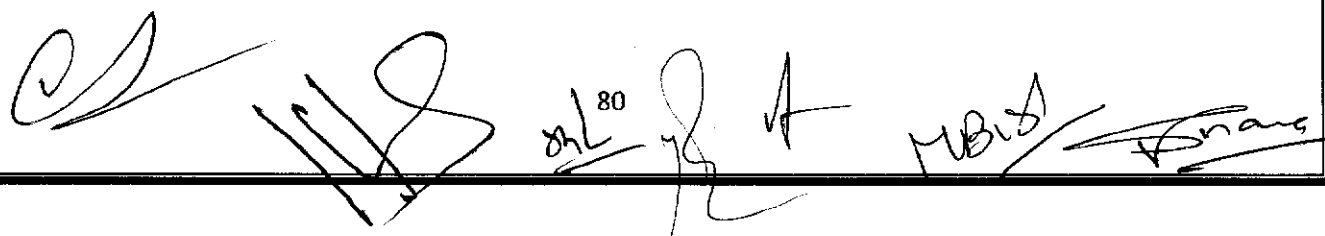
Upon successful completion of the course as a student will be able to

CO#	Detailed Statement of the CO
CO1	To remember object oriented concepts
CO2	To understand multi-threading programs
CO3	To apply Exception handling
CO4	To analyze GUI based applications
CO5	Evaluate file concepts
CO6	Design Servlets program

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2		2				2	2					
CO3			2									
CO4				2		2						
CO5		2		2	1				1			
CO6	3	2	2	2	2	1	1	1	2			
AVG	1	1	0.66	1	0.5	0.83	0.5	0.16	0.5			

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



Course code	: BITDSC402				
Course Name	: PHP PROGRAMMING				
Semester /Year	: 4 th Sem/ 2 nd year				
		L	T	P	C
		3	0	0	3

L - Lecture T - Tutorial P - Practical C - Credit

Course Objectives:

- To learn the advance concepts of websites.
- To learn the basic concepts and syntax of HTML and PHP programming.
- To be able to develop interactive programs using PHP.
- To use the types of CSS and CSS Overriding in a web site.
- To learn the skills that will help the students in creating websites with great look and feel using CSS.

COURSE CONTENTS**UNIT I Introduction to PHP****[No. of Hours: 10]**

History of PHP, basic syntax, variable and constant, datatypes, operators and expressions. Decision making- if-else, switch case, loops, nesting control statements. PHP and HTML together.

UNIT II Function in PHP**[No. of Hours: 10]**

Define a function, call-by-value and call-by-reference, recursive functions, strings and its operations- searching, replacing, formatting, string library functions. PHP arrays- index based and associative arrays, array looping- index and associative based using each () and foreach(). Useful PHP library functions.

UNIT III HTML Forms and Files**[No. of Hours: 10]**

Handling Html form with PHP- capturing form, generating file uploaded form, form redirection. Working with file and directories- opening, closing, copying, renaming and deleting a file. Working with directories- creating and deleting directories. File uploading and downloading.

UNIT IV Session and Cookies**[No. of Hours: 10]**

Session handling in PHP- creating and destroying sessions, session variables. Cookies and session handling, deleting cookies.

UNIT V Database Connectivity**[No. of Hours: 10]**

Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins) , Exception Handling Understanding Exception and error, Try, catch, throw, Error tracking and debugging.

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Text Books:

TB1. Learning PHP, MySQL, books by 'O' riley Press

TB2: "PHP and MySQL Web Development" by Luke Welling and Laura Thomson

Reference Books:

RB1: "PHP: The Complete Reference" by Steven Holzne

RB2: "Programming PHP" by Kevin Tatroe, Peter MacIntyre, and Rasmus Lerdorf

Course Outcomes (COs):*After completion of the course, a student will be able to*

CO#	Detailed Statement of the CO
CO1	Understand the basic concepts of PHP and write PHP programs.
CO2	Design and develop interactive websites.
CO3	Implement concepts like session handling, database operations etc.
CO4	Develop professional websites using various PHP tools such as PHP Super Global, Exception handling and other PHP programming constructs.
CO5	Serve the society by creating and evaluating the websites with professional look and feel and use these skills to build successful career.
CO6	Create the connection between PHP with MySql Database2

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1		1		2			1
CO2	2	2	3	1			1		1			
CO3	1	3	3						2			
CO4	2	3	3			2				2		
CO5	3	3	1								3	1
CO6	2	2	2									
AVG	2.1	2.5	2.5	0.3	0.1	0.3	0.3		.8	0.3	0.5	0.1

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code : BITDSC403				
Course Name : Introduction to IoT				
Semester /Year: 4th Sem/ 2nd year				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

1. To understand the basic concept of Internet of Things (IoT), its standards and components.
2. Learn the Network and Communication protocols for IoT.
3. Identify the role of controllers and sensors in IoT.

COURSE CONTENTS**Unit I IOT concepts****[No. of Hours: 8]**

Technologies that led to the evolution of IoT, IOT and SCADA, IOT and M2M, IoT and Big data

Unit II IoT Standards and Components**[No. of Hours: 8]**IoT standards in practice, Operating platforms /systems. **IoT Components:** Design of IoT systems, Development of prototypes.**Unit III Challenges in IoT implementation.****[No. of Hours: 8]**

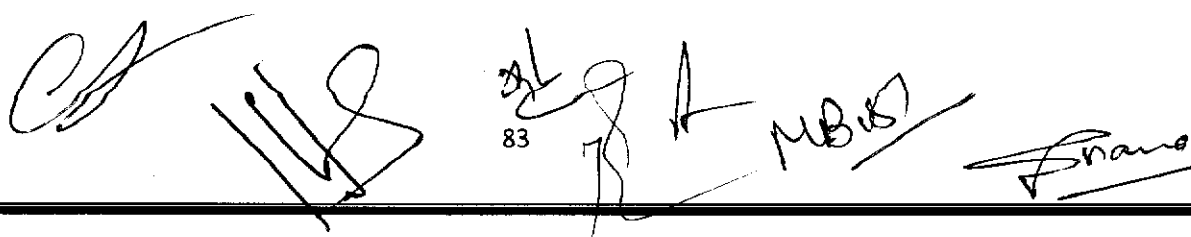
Big Data Management, Connectivity challenges, Mission-critical applications. Security issues in IOT

Unit IV IoT Applications (Case studies)**[No. of Hours: 8]**

Lighting as a service, Intelligent Traffic systems, Smart Parking, Smart water management etc.

Unit V Relevance of IoT for the future.**[No. of Hours: 8]**IoT in everyday life, Internet of Everything, IOT and Individual Privacy. **IoT in Indian Scenario:** IOT and Aadhaar, IOT for health services, IOT for financial inclusion, IOT for rural empowerment.**Text Books:**

- TB1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
- TB2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
- TB3. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", Cambridge University Press, 2010.
- TB4. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key Applications and Protocols", Wiley, 2012.



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Reference Books:

- RB1. Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014
- RB2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
- RB3. Cuno Pfister, Getting Started with the Internet of Things, O'Reilly Media, 2011, ISBN: 978-1- 4493-9357-1

Course outcomes (COs):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall and list the key technologies that led to the evolution of IoT, including the concepts of SCADA, M2M, IoT, and Big Data.
CO2	Understanding of IoT standards and components, including the ability to explain the functions of various IoT platforms and operating systems.
CO3	Apply knowledge to design and develop prototype IoT systems, utilizing appropriate IoT components and platforms to address specific needs.
CO4	Analyze various challenges in IoT implementation, such as big data management, connectivity issues, mission-critical applications, and security concerns, and identify potential solutions.
CO5	Evaluate real-world IoT applications through case studies (such as Lighting as a Service, Intelligent Traffic Systems, Smart Parking, and Smart Water Management) to assess their effectiveness, efficiency, and societal impact.
CO6	Demonstrate creativity by designing an innovative IoT solution for a real-world problem, considering the relevance of IoT in everyday life, individual privacy, and specific applications in the Indian context, such as health services and rural empowerment.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	1	1	1	1	1	1	1
CO2	3	2	2	1	1	1	1	1	1	1	1	1
CO3	3	3	3	3	2	1	2	2	2	1	2	2
CO4	2	3	2	3	2	1	1	1	1	1	1	1
CO5	2	2	1	2	3	1	1	1	1	1	2	1
CO6	3	2	3	3	3	2	3	2	1	2	2	3
AVG	2.7	2.2	2	2.2	2	1.2	1.5	1.3	1.2	1.2	1.5	1.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITGE401				
Course Name	: e-COMMERCE				
Semester /Year	: 4 th /2 nd				
		L	T	P	C
		3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

1. To learn the concepts and skills for the strategic use of e-commerce.
2. To learn E-commerce Models,; business to consumers, business-to-business, and Consumer to consumer.
3. To be able to examine Electronic Payment systems, and Mobile commerce
4. To understand Security on Internet
5. Overall improve the business profits and thereby improve the profit of the organization.

COURSE CONTENTS:**Unit-I****[No. of Hours:10]**

Basic of e-commerce- Introduction: Electronic Commerce, Definition of E-Commerce , Advantages and Disadvantages of .E-commerce models, Architectural framework of e-commerce Applications of E- commerce

Unit-II**[No. of Hours: 10]**

Electronic Payments: Overview, The SET protocol, Payment Gateway, certificates, Digital tokens, Smart card credit card, magnetic strip card, E-checks, Credit/Debit Card based EPS, Online Banking

Unit-III**[No. of Hours: 10]**

Mobile Commerce: Introduction, Wireless Application Protocol (WAP), Mobile Computing devices and applications

Unit-IV**[No. of Hours: 10]**

Web security and Encryption: Security issues on the Web, Importance of Firewall, Limitation of Firewall, Encryption Techniques, Symmetric and Asymmetric Encryption, Digital Signature, Virtual Private Network.

Unit-V**[No. of Hours: 10]**

EDI: Introduction to EDI, Definition of EDI, Difference between EDI and Email, Edi implementation , Security and Agreements

TEXT BOOKS:

TB1: Ravi Kalakota, Andre Winston, "Frontiers of E-commerce", Addison Wesley

TB 2: Bajaj and Nag, "E-commerce: The cutting edge of business", TMH

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REFERENCE BOOKS

RB1: 3. P. Loshin, John Vacca, "Electronic Commerce", Firewall Media, New Delhi

COURSE OUTCOMES (COS):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Defining the basic concepts e-commerce.
CO2	Understanding the Architectural framework of E-commerce.
CO3	Apply various concepts viz. EDI, Electronic Payments systems .
CO4	Analyse the security aspects of E-commerce
CO5	Evaluate the smart e-commerce processes and M-commerce.
CO6	Discuss the mobile commerce and E-commerce platforms

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3		3	3		2		2		2
CO2	2	2	3		2	3		2		2		2
CO3	3	3	1								3	1
CO4	2	1	3		3	3	2	2		2		2
CO5	2	1	3		3	3	1	2	1	2		2
CO6	2	2	2		2	2	1	1	1	1		2
AVG	2.33	1.66	2.5		2.16	2.3	0.66	1.5	0.33	1.5	0.5	1.83

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITSC401			
Course Name	: Reasoning Aptitude			
Semester/Year	: 4th /2nd			
	L	T	P	C
	2	0	0	2

L- Lecture T-Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are:

- 1 Understand and apply basic mathematical concepts from number systems, arithmetic, and algebra to solve real-world problems.
- 2 Grasp geometry concepts to visualize, analyze, and solve problems related to space, shapes, and sizes, as well as apply trigonometric principles to real-world scenarios.
- 3 Interpret and analyze various forms of data presentations, such as tables, charts, and graphs, to draw meaningful conclusions and make informed decisions.
- 4 Utilize concepts like time, speed, distance, work, profit, loss, and interest to make effective decisions in everyday life and professional scenarios.
- 5 Employ advanced mathematical principles like probability, statistics, permutations, and combinations to predict outcomes and optimize results in complex situations.

COURSE CONTENTS:

Arithmetic and Reasoning Aptitude

UNIT I. Arithmetic

[No of Hours: 10 Hrs.]

Number Systems, Percentages, Ratios, Proportions and Averages, Simple and Compound Interest, Time, Speed, and Distance, Time and Work, Profit and Loss

UNIT – II. Algebra and Geometry [No of Hours: 10 Hrs.]

- Quadratic Equations, Inequalities, Series, Functions, Equations, Basic Geometry, Area and Perimeters of Lines and Angles, Circles, Triangles, Quadrilaterals, Polygons.

UNIT –III. Data Interpretation

[No of Hours: 5 Hrs.]

Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart.

UNIT – IV. Modern Math's

[No of Hours: 5 Hrs.]

Probability and Statistics, Permutations and Combinations

UNIT–V. Verbal Reasoning

[No of Hours: 6 Hrs.]

Number Series, Letter Series, Analogies, verbal classification, coding-decoding, blood relation, Venn diagram, Syllogism, Direction Sense Test, Logical Problems

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Text Books:

- TB1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal
 TB2. "Quantitative Aptitude Quantum CAT" by Sarvesh K. Verma
 TB3. "Fast Track Objective Arithmetic" by Rajesh Verma
 TB4. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
 TB5. "A Modern Approach to Verbal & Non-Verbal Reasoning" by R.S. Aggarwal

Reference Books:

- RB1. "Quantitative Aptitude for All Competitive Examinations" by Abhijit Guha
 RB2. "Logical Reasoning and Data Interpretation for the CAT" by Nishit K. Sinha
 RB3. "How to Prepare for Logical Reasoning for the CAT" by Arun Sharma

Course outcomes (COs):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall and recognize fundamental concepts, formulas, and problem-solving techniques related to quantitative aptitude.
CO2	Understanding of the underlying principles and strategies involved in solving quantitative and logical problems, including the ability to interpret and explain key concepts and methodologies.
CO3	Apply knowledge and skills in quantitative aptitude to solve a variety of real-world problems, both independently and Collaboratively.
CO4	Analyze complex quantitative and logical problems, break them down into component parts, identify patterns, and make connections between Different concepts and data sets.
CO5	Evaluate the appropriateness and effectiveness of different problem-Solving approaches, strategies, and solutions in the context of quantitative aptitude and logical reasoning.
CO6	Generate creative and innovative solutions to complex quantitative and logical problems, integrating multiple concepts and techniques to develop New problem-solving approaches.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3	1	1	2	1	1	1	2	1	1
CO2	1	2	2	2	1	2	1	1	1	2	1	1
CO3	3	2	3	2	1	3	2	2	1	2	2	2
CO4	2	1	2	3	1	2	2	1	2	2	1	2
CO5	1	2	1	1	3	1	1	2	1	2	1	1
CO6	2	1	2	1	1	3	2	1	1	2	1	2
AVG	1.83	1.5	2	1.67	1.17	2	1.5	1.33	1.33	2	1.33	1.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	:AEC4			
Course Name	:English Communication -Reading and writing skills			
Semester/Year	: 4 th /2 nd			
	L	T	P	C
	2	0	0	2

L- Lecture T-Tutorial P – Practical C –Credit

Course Objectives:

The objectives of this course are-

1. To communicate appropriately in real-life situation.
2. To use English effectively for study and communicative purpose for successful career.
3. To develop and integrate the use of four language skills- Reading and Writing in his/her whole life.
4. To understand different types of barriers and kinds of communication.
5. Learn the skills to face interview, making a speech, presentation etc.

Course Contents:

Unit	Topics and Contents
1. Introduction: Types and modes of Communication	Barrier to Communication, Kinds of communication: intrapersonal, personal, group and mass, Verbal and non-Verbal communication.
2. Reading Skills	Skimming, Scanning, Summary, Paraphrasing, Comprehension
3. Writing Skills: Social and Official Correspondence	Complaints and replies, Letter to the editors, Standard business letter, Email drafting and etiquettes, Preparing agenda and minutes for meetings, Job application, Cover letters, Bio-data, CV and Resume

Reference Books:

1. Dangwal, Surekha. *The Art Effective Communication*. Delhi: Macmillan, 2017.
2. Prasad, P. *The Functional Aspects of Communication skills*, Delhi
3. Sen, Leena. *Communication Skills*, Prentice hall of India, New Delhi.
4. McCarty, Michel. *English Vocabulary in Use*, Cambridge University Press.
5. Communication Skill by Sanjay Kumar & PushpLata, Oxford University Press
6. An Introduction to Professional English and Soft Skills by B.K. Das, Cambridge University.

Course outcomes (COs):

Upon successful completion of the course a student will be able:

CO#	Detailed Statement of the CO
CO1	To memorize the functions of communication and related topics.
CO2	To improve communication skills to communicate within the society.
CO3	To implement writing and reading as skills.
CO4	To organize vocabulary and improve accuracy in grammar.
CO5	To select positive attitudes for English Communication.
CO6	To design formal letters, CV, interview, resume and cover letters etc for successful career skills.

CO-POMAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1			1	1				2	
CO2	1	3	2	2	1		1	1				
CO3	2	2	1	1		1			2		2	
CO4		2	3	1	1	3	1	1		2	1	
CO5	1	3	2	2	1		1	2			2	2
CO6	1	2	2	1	1		1	2	1	2	1	2
AVG	1.33	2.16	1.83	1.16	0.66	0.83	0.83	1	0.5	0.66	1.33	0.66

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course Code	:CITVC 401			
Course Name	:Challenges in Programming			
Semester/Year	: 4th /2nd			
	L	T	P	C
	2	0	0	2

L- Lecture T-Tutorial P – Practical C –Credit

Course Objectives:

- Understand the software development life cycle and its coding phase challenges.
- Apply techniques for code optimization and efficiency to improve performance.
- Demonstrate effective debugging and troubleshooting skills.
- Implement secure coding practices and error handling mechanisms.
- Utilize version control and collaborative coding strategies.
- Analyze legacy code and propose refactoring solutions.
- Evaluate code quality, documentation, and external dependencies.
- Create efficient, secure, and well-documented code to meet project requirements.

COURSE CONTENTS

Unit 1: Introduction to Software Development Challenges

[No. of Hours: 4]

Understanding the software development life cycle, Identifying common challenges faced during the coding phase. Role of code quality and maintainability.

Unit 2: Code Optimization and Efficiency

[No. of Hours: 4]

Techniques for optimizing code for speed and memory usage. Identifying performance bottlenecks and applying suitable solutions. Importance of algorithmic efficiency.

Unit 3: Debugging and Troubleshooting

[No. of Hours: 4]

Strategies for debugging code effectively, Use of debugging tools and techniques, Common coding errors and how to avoid them.

Unit 4: Code Security and Error Handling

[No. of Hours: 5]

Basics of software security., Common vulnerabilities and how to avoid them., Best practices for secure coding., Understanding and implementing error handling mechanisms., Handling exceptions and writing robust code., Graceful degradation and fail-safe strategies.

Unit 5: Version Control, Collaboration, and Documentation

[No. of Hours: 6]

Introduction to version control systems (e.g., Git), Collaborative coding using version control. Branching and merging strategies., Integration of third-party APIs and libraries., Handling external dependencies., Risks and precautions while using external code., Importance of code documentation., Writing meaningful comments and documentation., Tools for generating documentation.

Unit 6: Dealing with Legacy Code, Project Management, and Emerging Trends

[No. of Hours: 7]

Challenges when working with legacy codebases., Techniques for refactoring and modernizing legacy code., Strategies for maintaining and extending legacy applications., Meeting deadlines and managing time effectively., Agile development methodologies., Handling changing requirements and scope., Introduction to new programming paradigms and languages., Exploring cutting-edge tools and frameworks., Challenges and opportunities with new technologies.

Text Books:

- TB1.** Clean Architecture: A Craftsman's Guide to Software Structure and Design by Robert C. Martin
- TB2.** Code Complete: A Practical Handbook of Software Construction by Steve McConnell
- TB3.** Working Effectively with Legacy Code by Michael C. Feathers

Reference Books/ Online Resources

- RB1.** Refactoring: Improving the Design of Existing Code by Martin Fowler
- RB2.** Design Patterns: Elements of Reusable Object-Oriented Software by Erich Gamma,
- RB3.** Test-Driven Development: By Example by Kent Beck

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall the stages of the software development life cycle and the challenges associated with the coding phase. Identify and describe common coding errors and their potential impact on software functionality. Recognize the importance of code quality and maintainability in software development.
CO2	Explain the principles of code optimization and efficiency, and apply techniques to improve code performance. Describe the fundamental concepts of software security and identify potential vulnerabilities in code. Demonstrate an understanding of error handling mechanisms and how to implement them effectively in code.
CO3	Apply debugging strategies and utilize debugging tools to identify and resolve issues in code. Implement secure coding practices to protect software applications from common security threats. Utilize version control systems to manage collaborative coding and track changes in software projects.
CO5	Evaluate the effectiveness of error handling and exception management in code for robustness. Critically assess the documentation of code and identify opportunities for improvement. Evaluate the impact of using third-party APIs and libraries on software development.
CO6	Create efficient and optimized code to address specific performance requirements. Develop secure code that incorporates best practices to mitigate potential security risks. Create well-documented and maintainable code that adheres to industry standards.

CO –PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	1	1	2	1	1	1	1	2
CO2	2	2	2	2	2	2	2	2	1	1	1	2
CO3	1	2	2	2	2	2	2	2	1	1	1	2
CO4	1	2	2	2	2	2	2	2	1	1	1	2
CO5	1	2	2	2	2	2	2	2	1	1	1	2
CO6	2	3	3	3	3	3	3	3	1	1	1	3
AVG	1.5	2.16	2.16	2	2	2	2.16	2	1	1	1	2.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITP41			
Course Name	: Lab-Java Programming			
Semester /Year	: 4th /2 nd			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

- To teach the students basics of JAVA programs and its execution.
- To teach the students the differences between C++ and Java programming.
- To make the students learn concepts like packages and interfaces.
- To make the students understand threads.
- To make the students understand the usage utility package.
- To teach the student, to develop java programs using inheritance and interfaces.
- To understand exceptional handling, command line arguments and file handling

COURSE OUTCOMES

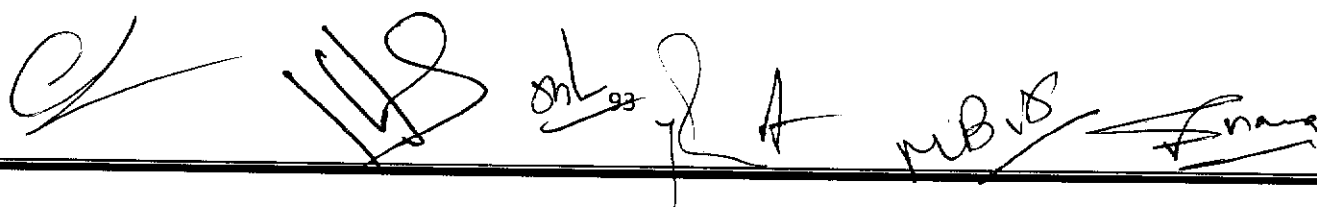
Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	To remember object oriented concepts
CO2	To understand multi-threading programs
CO3	To apply Exception handling
CO4	To analyze GUI based applications
CO5	Evaluate simple java program
CO6	Design servlet program

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2		3						2				
CO3	1		2			2						
CO4	1	1										
CO5						2	1	2				
CO6	2	2	2	1	2	2	1	1				
AVG	1	1	0.66	0.16	0.33	1	0.33	0.83				

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



Course code	: BITP42			
Course Name	: PHP PROGRAMMING LAB			
Semester /Year	: 4th /2nd			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

1. To implement the advance concepts in the basic websites.
2. To create and implement the basic concepts and syntax of HTML and PHP programming together.
3. To be able to develop interactive programs using PHP.
4. To apply the various website governing tools such as session handling, exception handling, super globals etc.
5. To learn the skills that will help the students in creating websites with great look and feel using PHP programming constructs.

Course Outcomes (COs):*After completion of the course, a student will be able to*

CO#	Detailed Statement of the CO
CO1	Understand the basic concepts of PHP and write PHP programs.
CO2	Design and develop interactive websites.
CO3	Implement concepts like session handling, database operations etc.
CO4	Develop professional websites using various PHP tools such as PHP Super Globals, Exception handling and other PHP programming constructs.
CO5	Serve the society by creating and evaluating the websites with professional look and feel and use these skills to build successful career.
CO6	Create the connection between PHP with MySql Database

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1		1		2			1
CO2	2	2	3	1			1		1			
CO3	1	3	3						2			
CO4	2	3	3			2				2		
CO5	3	3	1								3	1
CO6	2	1	1									
AVG	2.16	2.33	2.33	0.33	0.16	0.33	0.33	0	1	0.4	0.6	0.2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITDSC501			
Course Name	: Android Programming			
Semester /Year	: 5 th /3 rd			
	L	T	P	C
	3	0	0	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- This course facilitates classroom and laboratory learning.
- Letting students develop competence and confidence in android programming.
- Understand the entire Android Apps Development Cycle.
- Enable the students to independently create Android Applications.
- Access and work with databases under the Android operating system.

COURSE CONTENT

UNIT 1

[No. of Hours: 10]

History of Android, The Open Handset Alliance, Android Core building blocks, Android Architecture, Android SDK, Creation of New AVD, DVM, Creating run configuration, Building a sample Android application.

UNIT 2

[No. of Hours: 10]

OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

UNIT 3

[No. of Hours: 10]

Anatomy of Android Application, Android terminologies, Application Context, Activities, Activity lifecycle. Services, Intents and its Types, Android Manifest File and its common settings, Using Intent Filter.

UNIT 4

[No. of Hours: 10]

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Combo boxes), Android Toast, Event handling, Images, Designing User Interfaces with Layouts.

TEXT BOOKS:

TB1. Sayed Y Hashimi and Satya Komatineni, "Pro Android", Wiley India Pvt. Ltd.

TB2. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

REFERENCE BOOKS:

RB1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education 2nd edition.

RB2. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt. Ltd.

Handwritten signatures and initials are present at the bottom of the page, including a large signature on the left, a signature with '95' below it, and several other initials and signatures on the right.

RB3. Mark L Murphy, "Beginning Android", Wiley India Pvt. Ltd.

COURSE OUTCOMES

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Knowledge and remember the basics of Java and Android
CO2	Describe the life cycles of Activities, Applications etc.
CO3	Apply the major components of Android API set to make apps. Use the development tools in the Android development environment.
CO4	Classifying and finding uses of UI –components and java Constructs.
CO5	Make UI-rich apps using all the major UI components.
CO6	Create Android apps using Java programming language.

CO PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	3	2	3	2	1					
CO2	1	2	3	2	2	1	2	1			1	
CO3	2	1		1		2	1					
CO4	1	1	3	2	3	1		1			1	
CO5	1	1	3	2	2		1	2			1	
CO6	1	1	2				1		1	1		
AVG	1	1.16	2.33	1.5	1.66	1	1	0.66	0.16	0.16	0.5	0

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code : BITDSC502				
Course Name : Python Programming				
Semester /Year: 5th /3rd				
	L	T	P	C
	3	0	0	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Master the core of writing Python scripts
- Understand decision-making and functions in python
- Interpret Object-oriented programming features in python
- Gain knowledge of data structure in python
- Explore file handling and data base operations in python

COURSE CONTENTS

Unit1

[No. of Hours: 10]

Introduction: History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator, Conditional Statements: If, If- else, Nested if-else, Looping: For, While, Nested loops, Control Statements: Break, Continue, Pass

Unit 2

[No. of Hours: 11]

String: Accessing Strings, Basic Operations, String slices, Function and Methods.

Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods, sorting, searching. **Tuple:** Introduction, Accessing tuples, Operations, Working, Functions and Methods

Sets: Introduction, Accessing sets, Operations, Working, Functions and Methods. **Dictionaries:** Introduction, Accessing values in dictionaries, Working with dictionaries, Properties, Functions

Unit 3

[No. of Hours: 7]

Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables, Python Lambda, recursion. **Modules:** Importing module, Math module, Random module, Packages, Composition

Unit 4

[No. of Hours: 7]

Input-Output: Printing on screen, Reading data from keyboard, **File Handling:** Opening and closing file, Reading and writing files. **Database handling using SQLite3.** **Exception Handling:** Exception, Except clause, Try, finally clause, User Defined Exceptions

Unit 5

[No. of Hours: 5]

OOPs concept: Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding.

Handwritten signatures and initials are present at the bottom of the page, including a large signature on the left, a signature with '97' in the middle, and several other initials and signatures on the right.

TEXTBOOKS:

TB1. Budd T A, "Exploring Python", McGraw-Hill Education, 1st Edition, 2011.

TB2. Mark Lutz, "Learning Python", O., Reilly, 4th Edition, 2013.

TB3. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson, 1st Edition, 2013.

REFERENCE BOOKS:

RB1. Kenneth A. Lambert, "The Fundamentals of Python: First Programs", Cengage Learning, 1st Edition, 2011.

RB2. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O., Reilly, 2nd Edition, 2015.

RB3. Reema Thareja, "Python Programming using Problem Solving Approach", Oxford University Press, 1st Edition, 2017.

RB4. Joel Grus, "Data Science from Scratch", O' Reilly, 2nd Edition, 2019.

COURSE OUTCOMES

After completion of the course, a student will be able to:

CO#	Detailed Statement of the CO
CO1	Knowledge and remember the programming constructs used in python.
CO2	Understanding the facts behind the sequences, functions, modules, files, database and object oriented etc. used in Python
CO3	Apply data structure primitives like strings, lists, tuples, sets and dictionaries on various types of data with or without using functions, object-oriented concepts to the programs in Python etc.
CO4	Distinguish and analyze basic constructs of Python and how constructs can be used all together.
CO5	Evaluate the programming constructs of Python to provide verdict on findings.
CO6	Create python programs using various programming constructs of Python.

CO-PO MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	1		1		2					
CO2	3	3	3	2	1	1	2			1		
CO3	1	3	3	2	1	1				1		
CO4	3	3	3	2	1	1	2	1	1	1	2	1
CO5	1	3	3	2	1	1				1		
CO6	3	3	3	3	1	1	1	1	1	1	1	1
AVG	2.33	2.66	2.66	1.83	1	0.83	1.16	0.33	0.33	0.83	0.5	0.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITDSC503			
Course Name	: STATISTICS			
Semester /Year	: 5 th /3 rd			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To study methods of collection, classification, tabulation of data.
- To apply various statistical methods and analyses the data
- To find correlation between the data.
- To study probability and probability distribution to solve various real life problems
- To test hypothesis using various statistical test.

COURSE CONTENTS:

UNIT 1: DATA & ITS DIAGRAMMATIC REPRESENTATION

[No. of hours:10]

Definition of Statistics, Data , Primary data & secondary data, classification of data, tabulation of data , individual series, Discrete frequency Distribution ,continuous frequency distribution, Exclusive and inclusive continuous series, Diagrammatic representation of data ,Tabular form ,1D (All Bar Diagrams),Histogram, Frequency polygon, frequency curve, Ogive.

UNIT 2: MEASURE OF CENTRAL TENDANCY & DISPERSION

[No. of Hours: 10]

Mean (Arithmetic Mean, Weighted Mean, Harmonic Mean, Geometric Mean), Median, Mode, Histogram & Mode, Relationship between mean, median, mode. Definition of dispersion, Range, Quartile deviation & its coefficient, Inter Quartile deviation, Mean deviation & its coefficient, Standard deviation.

UNIT 3: CORRELATION & REGRESSION ANALYSIS

[No. of Hours: 10]

Correlation definition, types of correlation, Karl Pearson coefficient of correlation, Spearman coefficient of correlation, repeated rank. Regression Analysis Regression lines, Regression line of Yon X & X on Y, Regression coefficient, Relationship between correlation & regression coefficient.

UNIT 4: PROBABILITY & PROBABILITY DISTRIBUTIONS

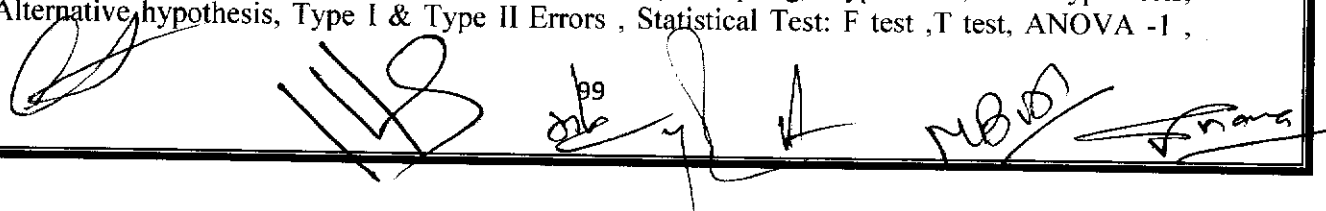
[No. of Hours: 10]

Probability & probability distribution: probability, Sample space & events , types of event, conditional probability, Bayes theorem, Mathematical expectation

UNIT 5: SAMPLING, HYPOTHESIS TESTING & STATISTICAL TEST

[No. of Hours: 10]

Sampling & its type, Probability & Non probability sampling, Hypothesis, Null hypothesis, Alternative hypothesis, Type I & Type II Errors , Statistical Test: F test ,T test, ANOVA -1 ,



ANOVA 2, Chi square test of independence.

TEXT BOOKS:

TB1. Gerald Keller : Managerial Statistics 9th Edition. **TB2** Statistical method , SP Gupta

REFERENCE BOOKS:

RB1. Richard Levin & David Rubin : Statistics for management, Prentice Hall.

RB2. Anderson, Sweeny & Williams: Statistics for Business and Economics, South W

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

CO	DETAILED STATEMENT OF THE CO
CO1	To gain knowledge of statistical method like Average, , Correlation Regression ,dispersion probability and probability distribution
CO2	To understand statistical method like Average, Correlation, Regression ,dispersion probability and probability distribution
CO3	To apply statistical method and probability distribution
CO4	To analyze various statistical method and probability distribution
CO5	To apply statistical method probability distribution and statistical test to test the hypothesis
CO6	To create new statistical method probability distribution and statistical test

CO-PO MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	2	1	3	1	1	2	1					
CO2	3	1		2		1	2	1				
CO3	3	2	1	1		2	1		2			
CO4	2	1	2	2	1	2	3	1		2	1	
CO5	1	2	1	3	2	2	2				1	1
CO6	1						2					1
AVG	2	1.16	1.16	1.5	0.66	1.5	1.83	0.33	0.33	0.33	0.33	0.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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ANOVA 2, Chi square test of independence.

TEXT BOOKS:

TB1. Gerald Keller : Managerial Statistics 9th Edition. **TB2** Statistical method , SP Gupta

REFERENCE BOOKS:

RB1. Richard Levin & David Rubin : Statistics for management, Prentice Hall.

RB2. Anderson, Sweeny & Williams: Statistics for Business and Economics, South W

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

CO	DETAILED STATEMENT OF THE CO
CO1	To gain knowledge of statistical method like Average, , Correlation Regression ,dispersion probability and probability distribution
CO2	To understand statistical method like Average, Correlation, Regression ,dispersion probability and probability distribution
CO3	To apply statistical method and probability distribution
CO4	To analyze various statistical method and probability distribution
CO5	To apply statistical method probability distribution and statistical test to test the hypothesis
CO6	To create new statistical method probability distribution and statistical test

CO-PO MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	2	1	3	1	1	2	1					
CO2	3	1		2		1	2	1				
CO3	3	2	1	1		2	1		2			
CO4	2	1	2	2	1	2	3	1		2	1	
CO5	1	2	1	3	2	2	2				1	1
CO6	1						2					1
AVG	2	1.16	1.16	1.5	0.66	1.5	1.83	0.33	0.33	0.33	0.33	0.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

100

100

Course code : BITGE504				
Course Name : ENTERPRISE RESOURCE PLANNING				
Semester /Year : 5th/3rd				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

- To learn the need and evolution of ERP Systems and related technologies.
- To learn ERP benefits and classification and implementation of ERP Life Cycle
- To learn Analytical Hierarchy Process & its applications and ERP implementation approaches and its strategies.
- To learn factors affecting ERP success and effectiveness.
- To learn extend ERP and its learning and emerging issues.

COURSE CONTENTS

Unit-I

[No. of Hours: 10]

Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system

Unit-II

[No. of Hours: 6]

ERP Domain, ERP Benefits classification, Present global and Indian market scenario, milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP product.

Unit-III

[No. of Hours: 6]

ERP Life Cycle: Adoption Decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement phases, ERP Modules

Unit- IV

[No. of Hours: 10]

Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in Evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendor's evaluation criterion, ERP Implementation approaches and methodology, ERP Implementation strategies, ERP Customization,

Unit- V

[No. of Hours: 8]

Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP Implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid: Useful guidelines for ERP Implementations.

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TEXT BOOKS:**TB1.** Enterprise Resource Planning, Alexis Leon**TB2.** ERP Concepts & Planning, V.K. Garg & N.K. Venkita Krishnan**REFERENCE BOOKS:****RB3.** ERP Ware: ERP Implementation Framework, V.K. Garg & N.K. Venkita Krishnan**COURSE OUTCOMES:**

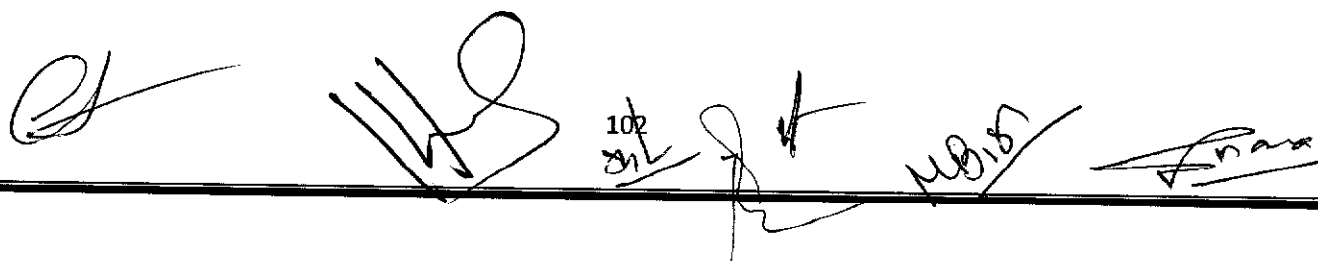
Upon successful completion of the course a student will be able to

CO	Detailed Statement of the CO
CO1	Defining basic use of enterprise software and its role in integrating business functions, reengineered business processes, phases of ERP implementation life cycle, domains of ERPs, implementation cost etc.
CO2	Understanding the work done during the ERP implementation life cycle.
CO3	Illustrate the Analytical Hierarchy Processes (AHP) for the selection of ERP system. Apply the customization to ERP system as per user's requirement.
CO4	Analyze the role of consultant, vendors and users in ERP implementation.
CO5	Evaluate critical success and failure factors for implementation, Hidden cost during ERP implementation.
CO6	Formulate methodology for the implementation of ERP system.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	1	1	1					
CO2	2	2	2	2	1	1	2	1	1	1	1	1
CO3	2	2	1	3	1		1					
CO4		1	3	1	3		1					
CO5	1	2	1	2	1		1					
CO6	2	2	2	2	1	2	2	2	1	1	1	1
AVG	1.5	1.66	1.83	2	1.33	0.66	1.33	0.5	0.33	0.33	0.33	0.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



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Course code	: BITDSE505A			
Course Name	: MOBILE COMPUTING			
Semester /Year	: 5th/3rd			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

1. To make the student understand the concept of mobile computing paradigm, its
2. Novel applications and limitations.
3. To understand the typical mobile networking infrastructure through a popular GSM
4. protocol
5. To understand the issues and solutions of various layers of mobile networks,
6. namely MAC layer, Network Layer & Transport Layer
7. To understand the database issues in mobile environments & data delivery models.
8. To understand the ad hoc networks and related concepts.
9. To understand the platforms and protocols used in mobile environment

COURSE CONTENTS**UNIT 1****[No. of Hours: 10]**

Introduction to Mobile Computing, Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, cellular system architecture, Multiple Access Protocols: TDMA, FDMA and CDMA, GSM, GPRS, handoffs Near-far problem, channel allocation in cellular systems.

UNIT 2**[No. of Hours: 10]**

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, TCP over wireless- Indirect TCP, Snoop Protocol, Fast retransmit and Mobile TCP, Mobile IP, WAP: Architecture, applications.

UNIT 3**[No. of Hours: 6]**

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system (CODA), Disconnected operations.

UNIT 4**[No. of Hours: 6]**

Mobile Agents computing, transaction processing in mobile computing environment, location management- static and dynamic, Ping pong effect, location based services.

UNIT 5**[No. of Hours: 8]**

What is Ad-hoc Network?, Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Dynamic State Routing (DSR), Route Maintenance and Routing error, Fisheye Routing (FSR), Ad-hoc on Demand Distance Vector (AODV)

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TEXT BOOKS:

- TB1.** SHAMBHU Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing", Kluwer Academic Publishers
- TB2.** UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles of Mobile Computing", Springer International Edition
- TB3.** Jochen Schiller, "Mobile Communications," 2nd Edition, Pearson Education Pvt. Ltd., 2018.
- TB4.** Raj Kamal, "Mobile Computing", 2nd edition, Oxford University Press, 2014.
- TB5.** Koushik Sinha, Sasthi C. Ghosh, B.P. Sinha, "Wireless Networks and Mobile Computing", CRC Press, 2016

REFERENCES BOOKS:

- RB1.** Sunil kumar S., Manvi M., S. Kakkasageri "Wireless and Mobile Networks, Concepts and Protocols", 2nd edition, John Wiley & sons, 2016.
- RB2.** Amitabh Ghosh and Rapeepat Ratasuk, "Essentials of LTE and LTE-A," Cambridge University Press, 2011.
- RB3.** Clint Smith and Daniel Collins, "3G Wireless Networks", 2nd Edition, Tata McGraw Hill, 2007.
- RB4.** Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", Wiley 2015.

COURSE OUTCOMES:

Upon successful completion of the course a student will be able to

CO	Detailed Statement of the CO
CO1	Defining the concept of mobile computing, architecture, multiple access protocols
CO2	Explain the concept of wireless LAN, Bluetooth, mobile IP
CO3	Utilize data management and data replication for mobiles computers
CO4	Compare the transaction processing models in mobile computer
CO5	Appraise the concept of ad-hoc network in wireless
CO6	Discuss and elaborate various adhoc routing algorithms

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3				1		1			1			2	1		1
CO2	3				1		1			1			1	1		1
CO3	3				1		1			1			1			1
CO4	3				1		1			1			1	1		1
CO5	3				1		1			1			2	1		1
CO6	3				1		1			1			2	1		1
AVG	3				1		1			1			1.5	0.8		1

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITDSE505B			
Course Name	: Cloud Computing			
Semester	: 5th/3rd			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

1. To explore Cloud Computing Basic concepts and its applications.
2. To understand Virtualization and its role in the implementation of cloud computing.
3. To Data center overview and its architecture.
4. To demonstrate popular public clouds and their features.
5. To discuss security issues in cloud and available countermeasures.

Course Contents:**Unit 1****[No. of Hours: 8]**

Introduction to Cloud Computing: Definition, Evolution & Characteristics, Service Models of cloud computing IaaS, PaaS, SaaS and their Comparisons, Issues & Challenges of Cloud Computing, Applications of Cloud computing, Overview of Cloud Computing Security Configurations.

Cloud Computing Architecture: Introduction, Cloud Architecture, Deployment of Models – (Public, Private, Community, and Hybrid Clouds) and their comparisons, IDaaS, Over View of Data intensive computing through Map Reduce.

Unit 2**[No. of Hours: 8]**

Virtualization in Cloud: Virtualization, Implementation of Virtualization, Middleware Support for Virtualization, Advantages & Applications of Virtualization, Virtualization Implementation Techniques, Hardware Virtualization, Types of Virtualization.

Unit 3**[No. of Hours: 8]**

Data Centre Architecture and Technologies: Architectural Building Blocks of Data Centre, Industry Direction and Operational and Technical Phasing, Industry Direction and Overview of Operational and Technical Phasing (Overview of 5 Phases).

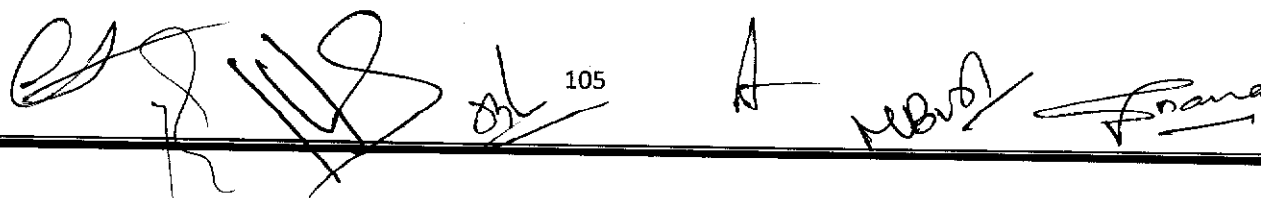
Unit 4**[No. of Hours: 10]**

Computing with Titans: Google, Microsoft, Amazon, IBM, Accessing the Cloud- Platforms through a brief overview of Web Applications, Web API's, Web Browsers.

Implementation of Cloud Using Any Cloud Platform : Introduction to Web Services, Structure, Objective, Cloud Portals, Groups, Mobile Apps, Setting up of Cloud Services, Containers, Handling Cloud Shell, Setting up of projects, Building Virtual Infrastructure, Deployment of Virtual Machine, Configuring Load Balancing.

Unit 5**[No. of Hours: 6]**

Security Issues in Cloud Computing: Introduction, Security Challenges in Cloud Computing, Information Security, Privacy and Trust in Cloud Computing.



Text Books:

- TB1.** V. K. Pachghare, "Cloud Computing" PHI Learning, 1st Edition, 2016.
- TB2.** Venkata Josyula, Malcom Orr, Greg Page, "Cloud Computing Automating the Virtualized Data Center", Cisco Press, 1st Edition, 2016.
- TB3.** Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing a Practical Approach", McGraw Hill, 1st Edition, 2015.

Reference Books:

- RB1.** Erl Thomas, Puttini Ricardo, Mahmood Zaigham, "Cloud Computing - Concepts, Technology and Architecture", Pearson India, 1st Edition, 2014. Srinivas Cheemalapati Yi-an Chang, Shahir Daya, Matthieu Debeaux, Odilon
- RB2.** Magroski Goulart, Vasfi Gucer, Rahul Gupta, Shamim Hossain, David Kwock, Jordan T Moore, David N Nguyen, Bobby Woolf, "Hybrid Cloud Data and API Integration: Integrate Your Enterprise and Cloud with Bluemix Integration Services", IBM Redbooks, 2nd Edition, 2016.

Course outcomes (COs):

Upon successful completion of the course a student will be able to

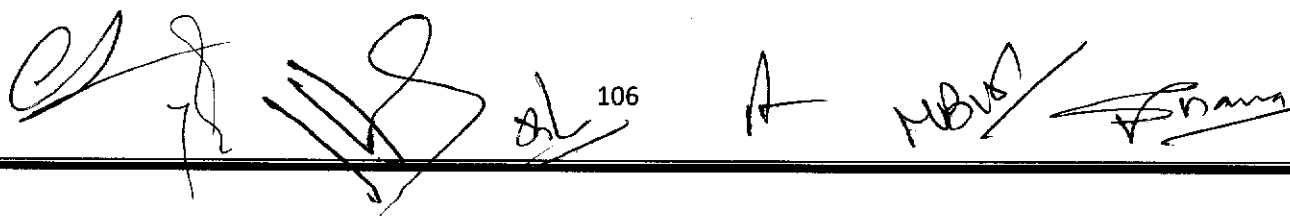
CO#	Detailed Statement of the CO
CO1	To understand Cloud Computing concepts, classifications, and the basic cloud architecture. Exploring various Cloud services and applications currently used in industry.
CO2	Understanding abstraction and virtualization techniques. and Security in the cloud computing environment.
CO3	Analyze the concept of Data Centre's with Cloud Computing and examine the Use cases
CO4	Exploring major Cloud service platforms currently ruling the industry.
CO5	To have knowledge on various standards used and cloud security features.
CO6	Implementation of any Cloud platform

CO-PO Mapping

After completion of the course, a student will be able to:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2		1			1		
CO2	2	3		3	3							
CO3	3		2		2		2			1		
CO4	3	3		3	2						1	1
CO5	1	1	1	1	1		1					
CO6	1	1		1	1		1			1	1	
AVG	2.16	1.66	0.66	1.66	1.83		0.83			0.5	0.33	0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

 106

Course code	: BITDSE505C			
Course Name	: Computer Graphics			
Semester /Year	: 5th/3rd			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objective s of this course is:

- Introduces the basic concepts of computer graphics
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- Use of geometric transformations on graphics objects and their application in composite form.

COURSE CONTENTS**Unit 1****[No. of Hours: 8]**

Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display, Liquid Crystal display Plotters, Printers. Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera. Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalarproduct of two vectors, Vector product of two vectors.

Unit 2**[No. of Hours: 8]**

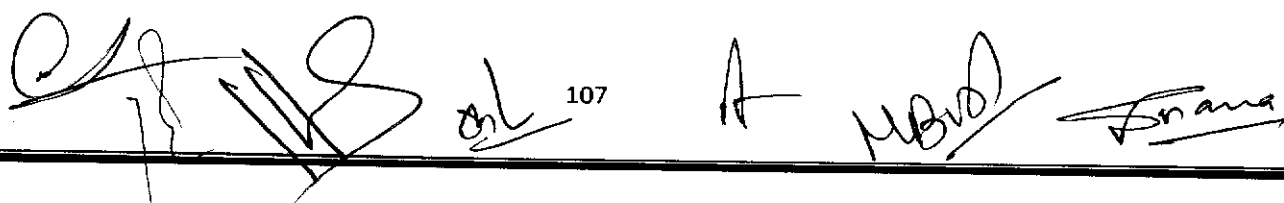
Line Drawing Algorithms: DDA Algorithms, Bresenham's Line algorithm. Segment & Display files: Segments, Functions for segmenting the display file, Posting and posting a segment, segment naming schemes, Default error conditions, Free storage allocation, Display file structure.

Unit 3**[No. of Hours: 8]**

Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems. 3D Graphics: 3D Display Methods, 3D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal Graphics Operations: Clipping, Point Clipping, Line Clipping, Polygon Clipping. Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

Unit 4**[No. of Hours: 8]**

Conics, Curves and Surfaces: Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, superellipsoid, Spline & Bezier Representations: Interpolation and approximation splines, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces



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TEXT BOOKS:

TB1. Donald Hearn and M Pauline Baker, "Computer Graphics" PHI

REFERENCE BOOKS:

RB1. Steven Harrington, "Computer Graphics: A Programming Approach" TMH

RB2. Prajapati A.K. "Computer Graphics" PPM Ed2

COURSE OUTCOMES:

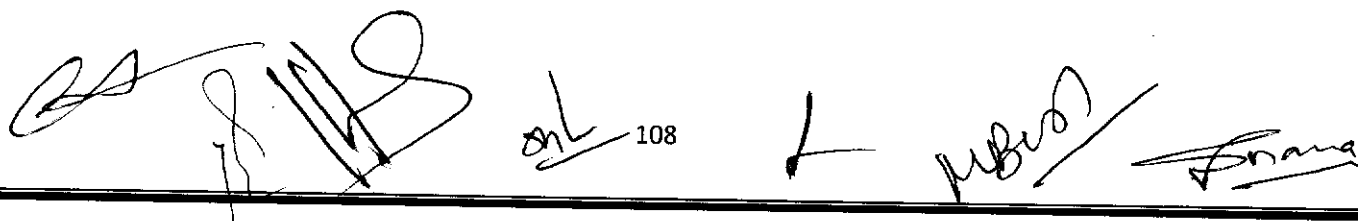
Upon successful completion of the course a student will be able to

CO	Detailed Statement of the CO
CO1	Describe the working of Cathode – ray tube
CO2	Describe the representation of point, line and circle
CO3	Construct 2D and 3D Transformation
CO4	Identify parallel and perspective projection
CO5	Understand the concept of Animation
CO6	Plan line drawing program

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3		3					1					
CO4			2		2							
CO5						2			1			
CO6	2	2	1		2	2	1	1	1			
AVG	1.33	0.83	0.5		0.66	0.66	0.33	0.16	0.33			

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

 108

Course code	: BITP51			
Course Name	: Lab-ANDROID PROGRAMMING			
Semester /Year	: 5 th /3rd			
	L	T	P	C
	0	0	2	1

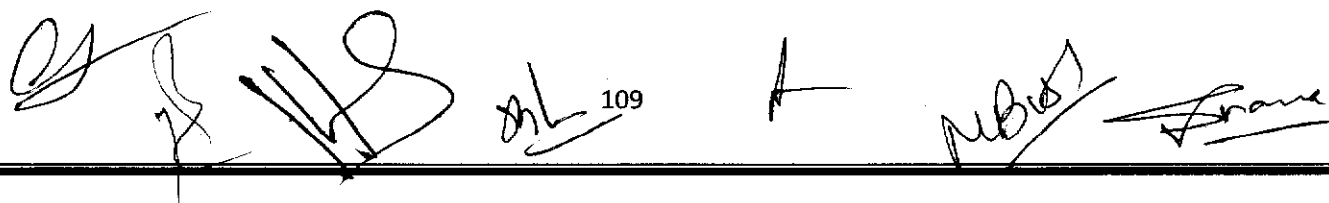
L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Apply Java programming concepts to Android application development.
- Apply essential Android Programming concepts.
- Develop various Android applications related to layouts & rich uses interactive interfaces

COURSE CONTENTS:

1. Write a program to show method overloading in java.
2. Write a program to show method overriding in java.
3. Write a program to use abstract class in java.
4. Write a program to implement interface in java.
5. Write a program to use the concept of multithreading in java.
 - a) Using Thread class
 - b) Using Runnable interface.
6. Write a program to multilevel inheritance in java.
7. Write an Android App to create dialog box.
8. Write a program to use final keyword in java.
9. Write a program to use super in java.
10. Write a program to handle exceptions encountered in java.
11. Write an Android program to print hello world.
12. Write an Android program to print addition of two numbers.
13. Write an Android program to create a calculator.
14. Write an Android program to create implicit intent.
15. Write an Android program to create explicit intent.
16. Write an Android program to create toggle button.
17. Write an Android program to create spinner.
18. Write an Android program to create EMI calculator.
19. Write an Android program to use image view.
20. Write an Android program to use different type of layouts.

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COURSE OUTCOMES*After completion of the course, a student will be able to:*

CO#	Detailed Statement of the CO
CO1	Understand the basics of Java programming, different graphicstools and their use.
CO2	Development of static and dynamic web APPs using standard toolsand learn various properties of the tools.
CO3	Develop interactive and user friendly APPs using front end andback end Programming.
CO4	Develop simple applications using tools available in android studio.
CO5	Implement interactive graphics applications that use graphics tools,using android studio.
CO6	Create Android apps using Java programming language.

CO-PO MAPPING:

CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	3	1	1			3	1	2				
CO2	3	1	2	3		3	2	3				
CO3	3	2	3	3	1	2	2	3				
CO4	2	1	3	3	2	3	2	3				
CO5	3	1	3	1	2	3	2	3				
CO6	3	2	2	2			1	1	2	1		
AVG	2.83	1.33	2.33	2	0.83	2.33	1.66	2.5	0.33	0.16		

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITP52			
Course Name	:Lab-Python Programming			
Semester /Year	: 5th /3rd			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Basic programming constructs and functions in python.
- Understand the applicability of data structures like lists, tuples, sets and dictionaries in python applications.
- Use object-oriented programming features of python to develop applications.
- Learn how to use exception handling in applications for error handling.
- Database and file based programming

COURSE CONTENTS

1. Working with Jupyter notebook.
2. Programs based on loops and conditional statements.
3. Programs based on string manipulations.
4. Programs based on List.
5. Programs based on tuples.
6. Programs based on sets.
7. Programs based on dictionary.
8. Working with user defined functions.
9. Working with lambda, map, filter and reduce functions.
10. Programs based on recursion.
11. Programs for file handling in Python.
12. Programs for Sorting and searching.
13. Database handling in Python using SQLite3.
14. Working with in built and user defined modules,
15. Working with Object Oriented Programming in Python.

COURSE OUTCOMES:

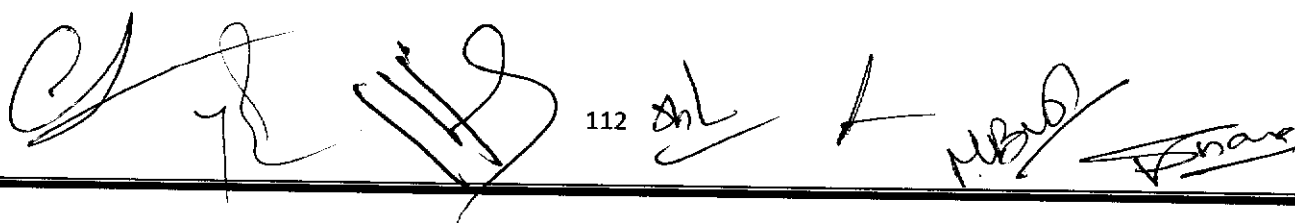
CO#	Detailed Statement of the CO
CO1	Describe the program creation in Python through usage of appropriate constructs
CO2	Demonstrate the working of basic programming constructors in Python.
CO3	Apply data structure primitives like strings, lists, tuples, sets and dictionaries on various types of data with or without using functions, object-oriented concepts to the programs in Python etc.
CO4	Analyze basic constructs of Python and how constructs can be used all together.
CO5	Evaluate the programs and its logic
CO6	Develop programs using methods of constructs define in Python.

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CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2							
CO2	3	3	3	2	2	1	2				1	
CO3	1	3	3	1	1							
CO4	3	3	3	3	3	3	1				1	
CO5	3	2	2	2	1							
CO6	3	3	3	3	1	1	1	1	1	1	1	1
AVG	2.66	2.66	2.83	2	1.66	0.83	0.66	0.16	0.16	0.16	0.5	0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



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Course code	: BITSM5			
Course Name	: SEMINAR			
Semester / Year	: 5th Semester / 3rd Year			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

1. Identify and compare technical and practical issues related to the area of course specialization.
2. Outline annotated bibliography of research demonstrating scholarly skills.
3. Prepare a well-organized report employing elements of technical writing and critical thinking.
4. Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting.

COURSE OUTCOMES (COS):

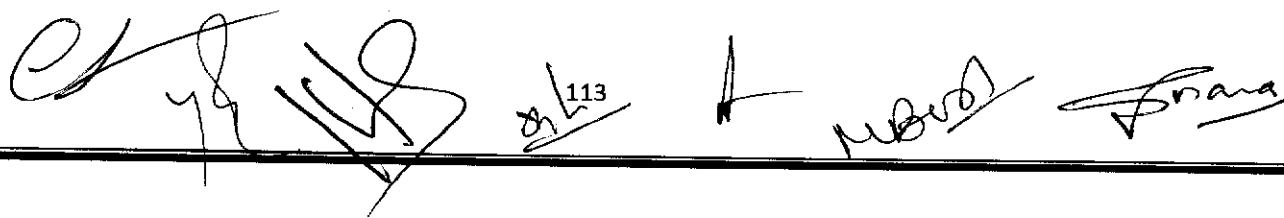
Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Recite and speak cogently with or without notes on the topic using audio-visual aids.
CO2	Utilize technical resources.
CO3	Acquire the confidence in presenting the topic.
CO4	Analyze technically relevant current topics on computer science/information technology/research.
CO5	Create audience-centered presentations.
CO6	Create technical documents and give oral presentations related to the work completed.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3							2		2		
CO2			3									2
CO3			3									2
CO4						2					3	
CO5				2							3	
CO6	2									2	2	
AVG	0.8	0.0	1.0	0.3	0.0	0.3	0.0	0.3	0.0	0.7	1.3	0.7

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



Course code	: BITDSC601				
Course Name	: C# and .NET Programming				
Semester /Year	: 6 th /3 rd				
		L	T	P	C
		3	-	-	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To study the features of .NET Technologies and to understand the framework and environment.
- To learn C# programming fundamentals for console application development.
- To learn use of C# libraries and exception handling techniques.
- To learn ADO. NET and advance features of C#.
- To learn .NET assemblies and attributes

COURSE CONTENTS**UNIT1****[No. of Hours:09]**

Introduction to .NET Framework And C#.NET framework, MSIL, CLR and its components, CLS, CTS, Just in time (JIT) Compiler, Base class library, Namespaces, Assemblies, DLL -Hell Problem, Garbage Collection.

UNIT 2**[No. of Hours:09]**

Introduction to C#, Visual studio console app, Boxing and Unboxing, loops, Array, Enumerations, structures.OOPs, Classes and objects, Encapsulation, Inheritance, Polymorphism, Constructor and Destructors, Method Overloading ,Method overriding,

UNIT3**[No. of Hours:09]**

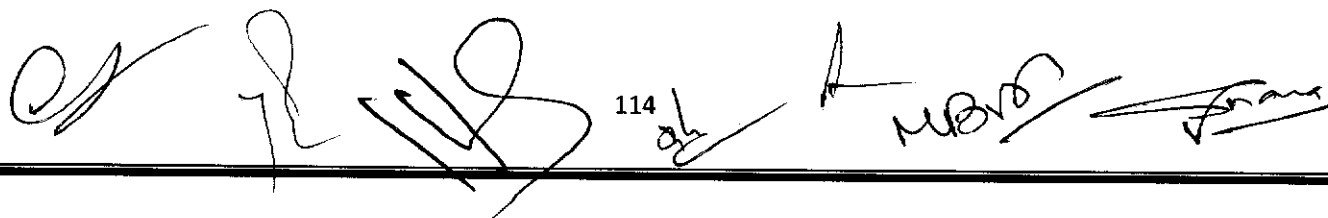
Modifiers, Abstract class, Sealed class, Interface, Indexers , Operator Overloading, Collections Namespaces,Delegates, Event handling , Exception Handling.

UNIT 4**[No. of Hours:09]**

Grid, Data source and data binding controls, Connected and disconnected scenarios, Dataset, connections, Adapters, commands, data readers. Windows Forms and Controls in details: Windows form, Windows FormsProperties and Events, Windows Form Controls etc.

UNIT 5**[No. of Hours:09]**

Introduction to ASP.NET, Architecture ,Working with Web and HTML Controls, Server Controls ,Overview of ASP.NET Validation Controls, Data base connectivity using ASP.NET, Master Pages.



TEXT BOOKS:

TB1. A Guide to the Project Management Body of Knowledge (PMBOK), Project Management Institute, PA, (2004).

TB2. Harold Kerzner, Frank P. Saladis, Project Management Workbook and PMP/CAPM Exam Study Guide, Wiley Publishers (2006)

TB3. Addison Wesley –C# Developers Guide to ASP.Net Wiley,” Beginning Visual C# 2008”, Wrox

REFERENCE BOOKS:

RB1. Claudia M. Baca, Patti, PMP: Project Management Professional Workbook, Sybex, Workbook (2003). **RB2.** C#.Net Developers Guide- Greg Hack, Jason Werry, Saurabh Nandu. (Syngress)

RB3. Wrox Press Professional C# 3rd Edition – Simon Robinson, Jay Glynn

COURSE OUTCOMES

After completion of the course, a student will be able to

CO	Detailed Statement of the CO
CO1	Knowledge and remember .NET Framework, its runtime environment and application development IDE of Visual Studio.
CO2	Understand the concept of object oriented for making programs.
CO3	Implement C# language constructs in the form of stand-alone console and window form applications.
CO4	Analyze and Understand database concepts in ADO.NET and apply the knowledge to implement distributed data-driven applications.
CO5	Design, document, debug ASP.NET web forms with server and validation controls and implement ASP.NET web services.
CO6	Create the programs based on console, windows and web application.

CO POMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	3	1	1	-	-	-	-	-
CO2	1	-	3	-	-	-	1	-	-	-	-	-
CO3	-	-	3	-	2	-	-	-	-	-	-	-
CO4	2	-	2	-	2	-	-	-	-	-	-	-
CO5	-	-	3	-	-	-	1	-	-	-	-	-
CO6	2	2	1	4	-	-	-	1	1	1	-	-
AVG	1.16	0.33	1.5	0.66	1.16	0.16	0.5	0.16	0.16	0.16	-	-

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code : BITDSC601				
Course Name : Software Engineering				
Semester /Year : 6th/ 3rd				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To provide the concepts of software crisis, issues, characteristics, evolution and application with respect to software engineering.
- To give fundamental aspects of software development with respect to requirement engineering, requirement analysis, design, coding, testing and maintenance.
- To give knowledge of practical implementation of software coding style and software testing strategies for software development.
- To provide the practical knowledge in software design, object oriented design and software development in terms of software implementation and maintenance.
- To provide the practical knowledge for ensuring the quality and reliability of software during software development using models

COURSE CONTENTS:

UNIT 1

[No of Hrs:8]

Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC). **Models:** Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT 2

[No of Hrs:8]

Software Requirement Specifications (SRS): Requirement Engineering Process- Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. **Software Quality Assurance (SQA):** Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

UNIT 3

[No of Hrs:8]

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. **Software Measurement and Metrics:** Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs

UNIT 4

[No of Hrs:8]

Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of products. **Static Testing Strategies:** Formal Technical, Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

UNIT 5**[No of Hrs:8]**

Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Needfor Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities. An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

TEXT BOOKS:

TB1. Pressman, Roger S., "Software Engineering: A Practitioner's Approach Ed.Boston: McGraw Hill,2001

TB 2. Jalote, Pankaj, "Software Engineering Ed.2"New Delhi: Narosa 2002

REFERENCE BOOKS:

RB1. Schaum's Series, "Software Engineering" TMH

RB2. Ghezzi Carlo and Others "Fundamentals of Software Engineering" PHI

COURSE OUTCOMES

After completion of the course, a student will be able to

CO	Detailed Statement of the CO
CO1	Learn the concepts of software crisis, issues, characteristics, evolution and Application with respect to software engineering.
CO2	Understand the fundamental aspects of software development with respect to Requirement engineering, requirement analysis, design, coding, testing and maintenance.
CO3	Apply the practical implementation of software coding style, design and software testing strategies.
CO4	To analyze the management of software project from initial stage to final stage for software development.
CO5	To evaluate cost ,effort time for project development life cycle
CO6	To create and design new software development models so to achieve quality software managing time effort and cost.

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		1		2	2					
CO2	3	1		2	1	1	1					
CO3	1	2	3	2	3	1	2	1			1	
CO4	2	1	1		1	1	2	3				
CO5	1	2	3	3	2	2	2	1			1	
CO6		1		2		2		1				
AVG	1.66	1.33	1.16	1.16	1.16	1.5	1.51				0.33	

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code : BITDSC603				
Course Name : Big Data Analytics				
Semester /Year : 6th / 3rd				
	L	T	P	C
	3	1	0	4

Lecture T – Tutorial P – Practical C – Credit

Course Objectives : The objectives of this course are

- To understand the concept of Bigdata
- To understand HADOOP
- To understand the BigData concerns: Storage and Analysis

Course Contents

UNIT I

[No. of Hours: 8]

Introduction to Big Data Platform, Structuring Big data, Elements of Big Data, Big data stack, Bigdata Analytics, Introducing Technologies for handling BigData: Distributed and Parallel Computing for Big Data, Cloud Computing and BigData

UNIT II

[No. of Hours: 8]

BigData Storage Concepts, Clusters, File Systems and Distributed File Systems, NoSQL, Sharding, Replication, CAP Theorem, ACID ,BASE, BigData Processing Concepts, Parallel Data Processing, Distributed Data Processing, Hadoop, Processing in Batch Mode, Processing in Real time Mode

UNIT III

[No. of Hours: 8]

Introduction to Hadoop Ecosystem, Hadoop Distributed File System, HDFS Architecture, Features of HDFS, Map Reduce, Features of MapReduce, Hadoop Yarn , HBase, Hive, Sqoop ,ZooKeeper, Flume, Oozie.

UNIT IV

[No. of Hours: 8]

Understanding Map Reduce Fundamentals, Map Reduce Framework, Exploring Features of MapReduce, Working of MapReduce, Exploring Map and Reduce Functions, Techniques to optimize MapReduce, Hardware/Network Topology, Synchronization, File System, Uses of MapReduce

UNIT V

[No. of Hours: 8]

BigData Storage Technology, **On-Disk Storage Devices:** Distributed File Systems, RDBMS Databases, NoSQL Databases, **In-Memory Storage Devices:** In-Memory Data Grids, In-Memory Databases.

Text Books:

TB1: VK Jain, "Big Data & Hadoop", Khanna Book Publishing Co. [P] Ltd.

TB2: Tom White "Hadoop: The Definitive Guide" Third Edit on, O'reilly Media, 2012.

TB3: Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

References Books:

RB1: Robert D. Schneider , "Hadoop for Dummies", Wiley publication

RB2: Bernard Marr, "Big Data In Practice", Wiley publication

RB3: Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.

RB4: Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)

Course outcomes (COs):

Upon successful completion of the course a student will be able to

CO	Detailed Statement of the CO
CO1	Defining Big Data Fundamentals
CO2	Understanding Hadoop applications for Big Data.
CO3	Comparing Analytic results using HDFS.
CO4	Illustrate the concepts of MapReduce framework
CO5	Compare Big Data Storage Technologies.
CO6	Depict Map Reduce Functions.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	1	2										
CO3		3										
CO4			2									
CO5					2					2		
CO6												
AVG	0.5	0.83	0.33		0.33					0.33		

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITGE604			
Course Name	: MANAGEMENT INFORMATION SYSTEM			
Semester /Year	: 6th /3rd			
	L	T	P	C
	3	1	-	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
- To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.

COURSE CONTENTS:

UNIT 1

[No. of Hours: 5]

Organization and types, Decision Making, Data & information, Characteristics & Classification of information, Cost & value of information, various channels of information & MIS.

UNIT 2

[No. of Hours: 10]

Foundation of Information System: Introduction to Information System in Business Fundamentals of Information System, Solving Business Problems with Information System, Concept of Balanced MIS, Effectiveness & Efficiency Criteria. Tool and Techniques of MIS- dataflow diagram, flow chart etc.

UNIT 3

[No. of Hours: 10]

Business application of information technology: electronic commerce Internet, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information system for managerial Decision Support, Information System for Strategic Advantage.

UNIT 4

[No. of Hours: 5]

Managing Information Technology, Enterprise & Global Management, Security & Ethical Challenges, Planning & Implementing Change. Reports: Various types of MIS reports, GUI & Other Presentation tools.

UNIT 5

[No. of Hours: 10]

Advanced concepts in information system: Enterprise Resource Planning: introduction, various modules like Human Resources, Finance, Accounting, and Production & Logistics. Supply Chain Management, CRM, Procurement, and Management System Object Oriented modeling case studies.

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TEXT BOOKS:

TB1. Brein James O. – Management Information Systems

TB2. Murdick & Ross – Information Systems for Modern Management

REFERENCE BOOKS:

RB1. Parker C.S. – Management Information Systems – Strategy and Action.

RB2. Aktas A. Ziya – Structured Analysis and Design of Information Systems.

COURSE OUTCOME (CO):

On completion of the course the student should be able to:

CO	Detailed Statement of the CO
CO1	Illustrate the basic concepts and technologies used in the field of management information systems.
CO2	Understand the processes of developing and implementing information systems.
CO3	Apply the role of the ethical, social, and security issues of information systems.
CO4	Analyze and translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
CO5	Evaluate and able to Identify which information technology tools are used to solve various business problems.
CO6	Design and analyze an information system based on user requirements.

CO-PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			1	3	2	2	2	3	3
CO2		1	1		1	1	2	2	2	3	3	3
CO3						3	2	1	2	3	2	2
CO4			2	1	1	2	2	3	3	2	2	2
CO5	1	1	1	1	2	2	2	2	3	1	2	3
CO6	1	3	2	1	1	1	3	2	1	3	3	2
AVG	0.33	0.83	1.16	0.5	0.83	1.66	2.33	2	2.16	2.33	2.5	2.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code : BITSE605A				
Course Name : Operation Research				
Semester /Year : 6 th / 3 rd				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are:

- The course aims at building capabilities in the students for analyzing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints.
- The objective of this course is to enable the student to understand and analyses managerial and engineering problems to equip him to use the resources such as capitals, materials, productions, controlling, directing, staffing, and machines more effectively.

COURSE CONTENTS

UNIT 1:

[No. of Hours: 10]

Linear programming: Mathematical formulations of LP Models graphical and simplex method of solving LP problems; sensitivity analysis; duality.

UNIT 2:

[No. of Hours: 10]

Transportation problem: Various methods of finding Initial basic feasible solution and optimal solution –North West Corner Rule, Least Cost Method, Vogel's Approximation Method.

UNIT 3:

[No. of Hours: 10]

Assignment model: Hungarian Method.

Game Theory: Concept of game; Two-person zero-sum game; Pure and Mixed Strategy Games; Saddle Point;

UNIT 4:

[No. of Hours: 10]

Sequencing Problem: Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, Two jobs and m - Machines Problems.

UNIT 5:

[No. of Hours: 10]

Project Management: Rules for drawing the network diagram, Applications of CPM and PERT techniques in Project planning and control.

TEXT BOOKS:

TB1: Apte - Operation Research and Quantitative Techniques (Excel Books)

TB2: S Kalawathy - Operation Research (Vikas IVth Edition)

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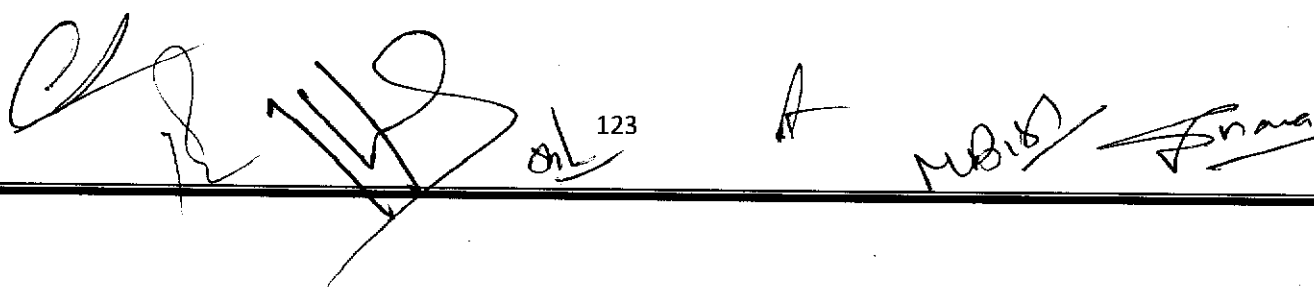
REFERENCE BOOKS:**RB1:** Natarajan- Operation Research(Pearson)**RB2:** Singh & Kumar—Operation Research(UDH Publisher edition 2013)**COURSE OUTCOMES (COs):****Upon successful completion of the course a student will be able to**

CO	Detailed Statement of the CO
CO1	Determine optimal strategy for Minimization of Cost of shipping of products from source to Destination/ Maximization of profits of shipping products using various methods
CO2	Optimize the allocation of resources to Demand points in the best possible way using various techniques and minimize the cost or time of completion of number of jobs by number of persons.
CO3	Model competitive real-world phenomena using concepts from game theory.
CO4	Formulate Network models for service and manufacturing systems
CO5	Develop mathematical skills to analyse and solve integer programming and network models arising from a wide range of applications.
CO6	Effectively communicate ideas, explain procedures and interpret results and solutions in written and electronic forms to different audiences

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2		2				2						
CO3		1	2				2					
CO4	2	1	2	2			1					
CO5		1	1									
CO6	2	1	1									
Avg.	1.0	1.0	1.0	0.33		0.33	0.5					

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



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Course code : BITSE605B				
Course Name : Graph Theory				
Semester /Year : 6th / 3rd				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To know various terminology of graph and types of graph
- To understand various properties of different graphs
- To know the application of graph theory to solve real life problem, engineering problems
- To learn & understand various algorithms applied on graphs
- To understand various theorems of graph theory.

COURSE CONTENTS:**UNIT 1: Introduction to Graphs****[No. of Hours: 10]**

Definition of a graph, applications of graph, finite and infinite graphs, degree of a vertex, types of graphs, isomorphism, sub-graphs, walk, path, circuit, connectedness, operations on graphs, Euler graph, Hamiltonian graph, circuits and cut-sets., Euler's polyhedron formula, Kuratowski's graphs.

UNIT 2: Trees and shortest path algorithms**[No. of Hours: 10]**

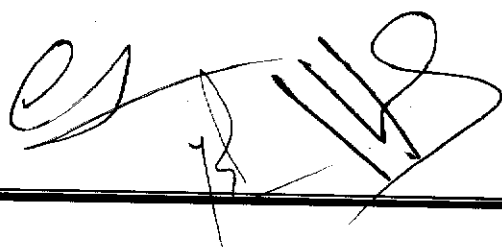
Tree Basics & Properties, pendent vertices, distance, center, diameters, radius, eccentricity, rooted and binary trees, On counting trees, Depth of Tree, spanning tree, Minimum Spanning Tree, fundamental circuits, finding all spanning trees of a graph. Shortest distance Algorithms: Algorithms of Prim's & Kruskal, Dijkstra's Algorithm.

UNIT3: Matrix representation of directed & undirected graphs**[No. of Hours: 10]**

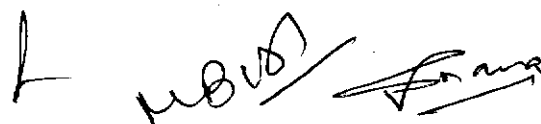
Incidence matrix of graph, sub matrices of $A(G)$, circuit matrix, fundamental circuit matrix and rank of B , cutset matrix, relationships among $A(G)$, adjacency matrices, path matrix, rank-nullity. Directed graph, Types of directed graphs, Fundamental circuit in digraph, Matrices A , B , C of digraph, adjacency matrix of digraph.

UNIT 4: Graph Coloring**[No. of Hours: 10]**

Partitioning of graph, Chromatic number, Welch-Powell Algorithm, Chromatic partitioning, Chromatic polynomials, Decomposition theorem, Edge coloring, Chromatic Index, Region coloring, Four color problem.



SL 124



TEXT BOOK:

TB1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.

TB2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.

REFERENCE BOOKS:

RB1. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.

RB2. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians" Prentice Hall of India, 1996.

RB3. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill, 1985. Rosen K.H., "Discrete Mathematics and Its Applications", Mc Graw Hill, 2007.

COURSE OUTCOMES:

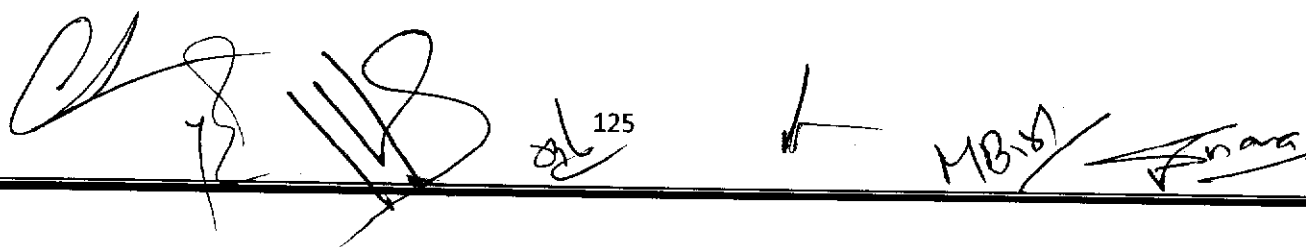
Upon successful completion of the course a student will be able to

CO	Detailed Statement of the CO
CO1	To gain knowledge of graph theory to solve real life problems
CO2	Understand and interprets various graph theory concepts including theorems.
CO3	Apply theories and concepts to test and validate intuition and independent mathematical thinking in problem solving
CO4	Analyze new networks using the main concepts of graph theory.
CO5	Evaluate Algorithms with given problem of graph theory
CO6	To design and create new Algorithms of graph theory to solve real life problems

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2								
CO2		3	1				2					
CO3	1		2			1					2	
CO4			3									
CO5	1			3					2			1
CO6	1		1				1			2		
AVG	1	0.5	1.16	0.83		0.16	0.5		0.33	0.33	0.33	0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

 125 MB-87

Course code : BITSE605C				
Course Name: Introduction to Logic				
Semester /Year : 6th / 3rd				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Understanding the nature of inferential reasoning, types of reasoning. Learning major vocabulary, analyzing the nature of arguments and the relation between truth and validity.
- Understanding the importance of symbolic logic and symbolic representation of natural language to find out the logical features, learning to compose compound statements and arguments, analyzing the nature of truth-functional compound statements and determining their truth values.
- To use truth-table method to test the validity-invalidity of arguments, understanding the formal nature of arguments and statements, their classification and determining the logical status of statement forms.
- Understanding the rules of Inference and rules of replacement and applying them to prove the validity of the arguments, to use conditional proof as a tool to check the validity of the arguments. Also proving the invalidity of without using truth tables and formal proofs.
- Understanding to employ reduction ad absurdum as method to assess the validity of the arguments and the status of the statements drawing insights from truth table technique.
- Understanding how to symbolize statements that involve quantifiers, knowing the nature and function of quantifiers, the relation between propositions involving quantifiers according to the square of opposition and comparing it with the traditional square of opposition.
- Understanding the nature of quantification rules and applying them to prove arguments involving quantifiers. Knowing to prove the invalidity of certain arguments by assigning truth-values.

COURSE CONTENTS:**UNIT 1:****[No. of Hours: 10]****Introduction:** logic, truth tables, equivalence, language to logic, applications to circuit design, Exponential growth, Semantic tableaux, problem solving with semantic tableaux.**UNIT 2:****[No. of Hours: 10]****Propositional logic:** Syntax of propositional logic, rules of natural deduction, the sequent calculus.**UNIT 3:****[No. of Hours: 10]****Predicate Logic:** Introduction on First order predicate calculus.**UNIT 4:****[No. of Hours: 10]****Resolution in propositional logic:** Normal forms, Resolving arguments, Resolution, Combinatorial search problems.**UNIT 5:****[No. of Hours: 10]****Resolution in Predicate Logic:** Predicate Logic, quantifiers, Normal Forms, Herbrand Universes, Resolution, Unification, Problem solving using resolution

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TEXT BOOKS:**TB1:** The Essence of Logic. John Kelly. Prentice-Hall International.**REFERENCE BOOKS****RB1:** Virginia Klenk, Understanding Symbolic Logic, 5/e, Pearson Education**COURSE OUTCOMES:**

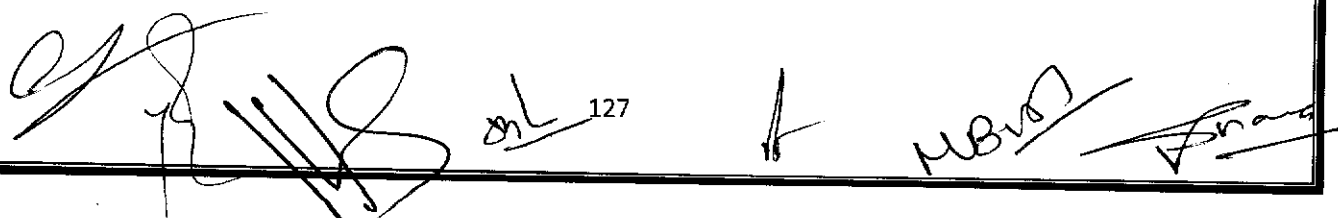
Upon successful completion of the course a student will be able to

CO	Detailed Statement of the CO
CO1	Define Logic and various Logic concepts and its application in Computer software development.
CO2	Classify, compare, and explain use of propositional logic in knowledgerepresentation and truth verification.
CO3	Make use of predicate logic in knowledge representation and truth verification.
CO4	Examine,, simplify, test the use of resolution in propositional logic.
CO5	Deduct, explain, prove use of resolution in predicate logic.
CO6	Build ,create, combine, estimate application of Logics in day to day life

CO PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3		1	1		1			
CO2	3	2		1				1		1		
CO3	3	2		1	1	1			1	1		
CO4	3	2		2				1				
CO5	3		3		1							
CO6				2								
AVG	2	1.5	0.83	1.5	0.33	0.33	0.16	0.33	0.33	0.33		

3 – Highest Correlated, 2 – Medium Correlated, 1 – Low Correlated



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Course code	: BITDSCP61			
Course Name	: Lab-C# and .NET Programming			
Semester / Year	: 6 th /3 rd			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

- To learn and understand different types of statements in C#.
- Use of data base for making dynamic websites using C# programming
- Programming concepts in .Net Framework.
- Data base connectivity using ADO.net
- Understand and use of different graphical tools for the development of web page and website using C# programming.

COURSE CONTENTS:

1. Program to generate prime numbers between 1 to 200 and also print to the console. (ex. 1,2,3,5.....199).
2. Program to print ARMSTRONG number.
3. Program using loop that examines all the numbers between 2 and 1000, and displays only Perfect numbers. (A perfect number is the one whose sum of their divisors equals the number itself). For example given the number 6, the sum of its divisors is 6(1+2+3). Hence, 6 is a perfect number.
4. Program to accept an array of integers (10) and sort them in ascending order.
5. Program to implement the concept of abstract class.
6. Program to implement the concept of sealed class.
7. Program for jagged array and display its item through for each loop.
8. Program in C Sharp using a class that gets the information about employee's such as Emp Id, First Name, Last Name, Basic Salary, Grade, Address, Pin Code and Contact Number. Write a method that calculates the Gross Salary (Basic + DA + HRA) and returns to the calling program and another method for the Net salary (Gross - (P.F + Income Tax)). Finally write a method that prints, a pay slip of an employee, containing all the above components in a proper format to the console. (Grade A = 20,000, B = 15,000 and C = 10,000) DA = 56% and HRA = 20%, Pf = 780, ITax.
9. Program to demonstrate boxing and unboxing.
10. Program to find number of digit, character, and punctuation in entered string.
11. Program using C# for exception handling.
12. Program to implement multiple inheritances using interface.
13. Program in C# using a delegate to perform basic arithmetic operations like addition, subtraction, division, and multiplication.
14. Program to get the user's name from the console and print it using different namespace.
15. Demonstrate the concept of Multithreading using locks in C Sharp

16. Program to implement Indexer.
17. Program to design two interfaces that are having same name methods how we can access these methods in another class.
18. Program to implement method overloading.
19. Program to implement method overriding
20. Program in C sharp to create a calculator in windows form.
21. Create a front end interface in windows that enables a user to accept the details of an employee like Empld ,First Name, Last Name, Gender, Contact No, Designation, Address and Pin. Create a database that stores all these details in a table. Also, the front end must have a provision to Add, Update and Delete a record of an employee.
22. Create a database named MyDb (SQL or MS Access).Connect the database with your window application to display the data in List boxes using Data Reader.
23. Program using ADO.net to insert, update, delete data in back end
24. Display the data from the table in a DataGridView control using dataset.
25. Create a registration form in ASP.NET and use different types of validation controls.
26. Display the data from the table in a Repeater control using dataset in ASP.net.

COURSE OUTCOMES (CO):

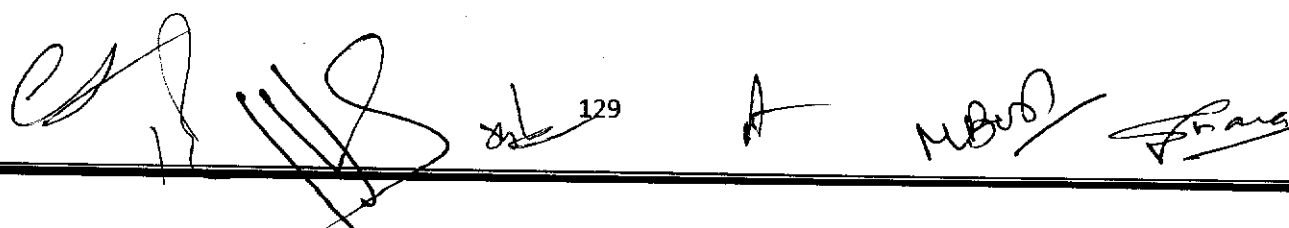
After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Remember the basics of C# programming, different graphics tools and their use.
CO2	Understand of static and dynamic web pages using standard tools and learn various properties of the tools.
CO3	Develop interactive and user friendly websites using front end and back end programming.
CO4	To develop, implement and creating Applications with ADO.NET and SQL server
CO5	Create user interactive web pages using ASP.Net.
CO6	Create console, windows and web applications

Mapping of PO and CO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1			3	1	2				
CO2	3	1	2	3		3	2	3				
CO3	3	2	3	3	1	2	2	3				
CO4	2	1	3	3	2	3	2	3				
CO5	3	1	3	1	2	3	2	3				
CO6	2	3	2	2			1	1	2	1		
AVG	2.66	1.5	2.33	2	0.83	2.33	1.66	2	0.33	0.16		

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

 129

Course code : BITPR606				
Course Name : Project and Dissertation				
Semester /Year : 6th /3rd				
	L	T	P	C
	0	0	4	2

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

In this course, the learners will be able to develop working expertise of solving complex computing problems through project based learning approach using real world case studies by implementing the concepts studied in the theory courses of this semester.

COURSE OUTCOMES:

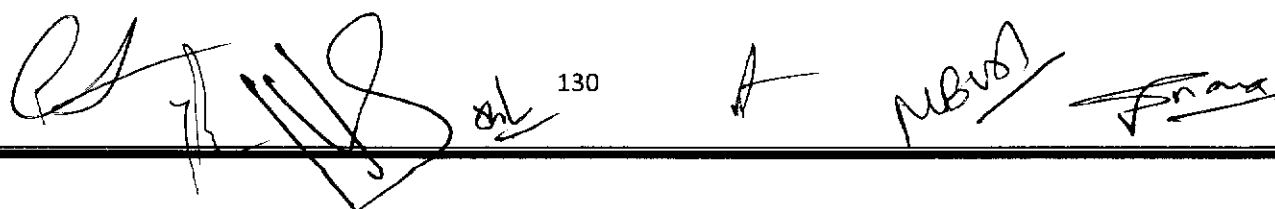
Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Identify the problem and describing it.
CO2	Understand the requirements of the chosen project.
CO3	Apply the collected requirements to describe the project in a systematic and comprehensive approach.
CO4	Analyze the technical aspects of the chosen project to find the possible solutions for development of the project.
CO5	Evaluate the effective reports and documentation for all project related activities and solutions.
CO6	Create plan for the project development.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						1	2		2	1
CO2	1	3		2	1	2			1			
CO3	1	1	3	2	1	1	1			2		1
CO4	1	1	1	1	1	1	2	1	1	2	2	3
CO5	2			1	3	1	2	1	2	1	3	1
CO6	2	3	3	3	1	1	1	3	1	1	1	1

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

 130

Course code	: BITDSC701			
Course Name	:UNIX and Shell Programming			
Semester /Year	: 7th /4th			
	L	T	P	C
	3	0	0	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

- To learn basic structure and various commands of UNIX system.
- To learn and implement various concepts of shell programming.
- To learn basic concepts of process, Inter process communication in UNIX system.
- To learn basics concepts and commands of UNIX system Administration.
- To learn various Filter and Tools of UNIX system

COURSE CONTENTS

Unit 1

[No. of Hours: 8]

Basic Unix Commands: The Unix editors and vi; Redirection, Piping, Tees and filters; The Unix Utilities grep, sed, etc. Overview of Unix Architecture: The kernel and the Shell; Processes and Time Sharing files and Directories; Peripheral Device as files.

Unit 2

[No. of Hours: 8]

Introduction the Shell Scripts: The Bourne and C-shells; Shell variables, scripts meta-characters and environment; the if and case statements; for, while and until loops. System calls and the 'C' library: Discussion of the Unix system calls and 'C' library functions, the standard I/O Package; file handling; math library; command line parameters etc.

Unit 3

[No. of Hours: 8]

The Unix 'C' interface; 'C' files and Graphics. Introduction of systems Administration under Unix: The system Manager OLE and functions.

Different Tools: Debugging language development, System development different print formatting UNIX Tools.

Unit 4

[No. of Hours: 8]

Bourne Shell: Shell meta characteristics, shell variable, scripts, facilities, commands and environments, shell archive, idea about restricted shell, ROLC program.

Unit 5

[No. of Hours: 8]

Korn Shell: Shell variables and scripts, built in EDITOR, built in integer arithmetic, string manipulation capabilities, Command Aliasing, Array Job control. **C-Shell:** Shell variables and scripts, shell facilities, history Integer Arithmetic Decision making and job control.

TEXT BOOKS:

TB1: Stephan Prata: Advanced Unix – A Programrs Guide – BPB PUB.

TB2: Kernighlan & Pike : The Unix Programming Environment – PHI.

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REFERENCE BOOKS:

RB1: Unix Shell Programming, Sumitabha Dass

RB2: Unix Shell Programming, Yashwant Kanitkar

COURSE OUTCOMES:

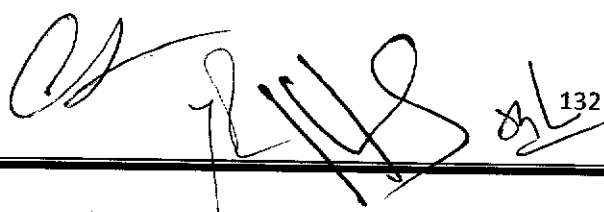
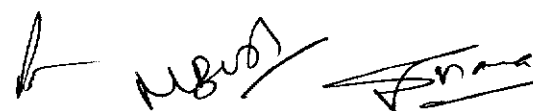
Upon successful completion of the course a student will be able to

CO1	Able to understand the basic Unix architecture, commands and utilities of the UNIX operating system and to work confidently in Unix/Linux environment and open systems.
CO2	Able to write simple and complex shell scripts to automate various tasks using shell programming.
CO3	Understand various concepts of process, IPC and process related command in UNIX.
CO4	Able to understand UNIX system administration.
CO5	Master the students in the art of usage of simple advanced filters and tools.

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		1		2	2					3
CO2	1	2	3	2	3	1	1	1			1	1
CO3	3	1		2		2	2					3
CO4	2	1	1	2	2	1	2	1				2
CO5	1	2	2	1	3	2	2				1	1

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code : BITDSE702A				
Course Name : Research Methodology				
Semester /Year : 7 th /4 th				
	L	T	P	C
	3	1	0	4

Course Objectives: The objectives of this course are

- Understand the research process and its significance in computer applications.
- Familiarize students with various research methods and designs.
- Develop skills to design research studies and formulate research questions.
- Gain proficiency in data collection, analysis, and interpretation.
- Enhance critical evaluation and interpretation of research literature.
- Develop effective research reporting and presentation skills.
- Foster ethical conduct and responsible research practices.
- Stimulate creativity in proposing innovative research directions.

Course Contents**Unit 1: Introduction to Research Methodology****[No. of Hours: 5]**

Definition and scope of research, Importance of research in computer applications, Research ethics and responsible conduct of research, Types of research (basic, applied, experimental, etc.), Components of a research study

Unit 2: Research Design and Planning**[No. of Hours: 8]**

Research problem identification and formulation, Research objectives and research questions/hypotheses, Variables and operationalization, Types of research design (exploratory, descriptive, experimental, etc.), Sampling techniques and sample size determination

Unit 3: Data Collection Methods**[No. of Hours: 8]**

Primary and secondary data, Quantitative data collection methods (surveys, experiments, observation), Qualitative data collection methods (interviews, focus groups, case studies), Questionnaire design and survey construction, Data sources and data validity and reliability

Unit 4: Data Analysis and Interpretation**[No. of Hours: 8]**

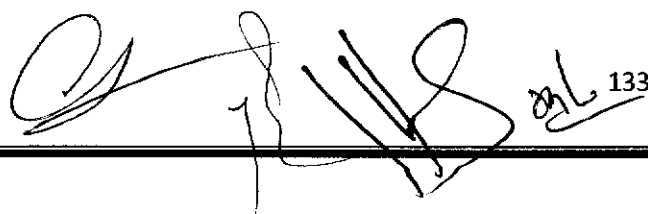
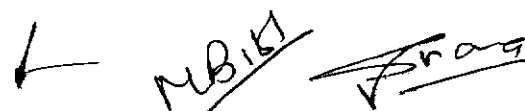
Quantitative data analysis techniques (descriptive statistics, inferential statistics), Qualitative data analysis techniques (content analysis, thematic analysis), Statistical software tools (SPSS, R, Excel), interpreting research findings and drawing conclusions

Unit 5: Research Reporting and Presentation**[No. of Hours: 6]**

Structure and components of a research report, Writing research proposals and abstracts, Formatting guidelines (APA, IEEE, etc.), Presenting research findings effectively (oral presentations, posters)

Unit 6: Critical Evaluation of Research Literature**[No. of Hours: 5]**

Reviewing and synthesizing research articles, Evaluating research quality and validity, Identifying research gaps and proposing future research directions, Academic integrity and avoiding plagiarism.

Text Books:

TB1: Bagchi, Kanak Kanti (2007) Research Methodology in Social Sciences: A Practical Guide, Delhi, Abijeet Publications.

TB2: Kothari, C.R (2004) Research Methodology: An Introduction, Delhi, New Age.

Reference Books:

RB1: Cooper, R. Donald and Pamela S. Schindler (2003) Business Research Methods, Delhi, Tata McGraw-Hill.

RB2: Flyvbjerg, Bent (2001) Making Social Science Matter: Why Social Inquiry Fails and How it can Succeed Again, United Kingdom, Cambridge University Press.

RB3: Goodde and Hatte (1952) Methods in Social Research, New York, McGraw – Hill.

Course Outcome (COs):

Upon successful completion of the course a student will be able to:

CO#	Detailed Statement of the CO
CO1	Recall the key concepts and terminology related to research methodology. Identify and describe the steps involved in the research process. Memorize ethical guidelines and principles for conducting research.
CO2	Explain the importance of research in the field of computer applications. Demonstrate an understanding of different research designs and their suitability for specific research objectives. Interpret research literature and identify the main findings and implications.
CO3	Apply appropriate research methods and techniques to collect and analyze data in the context of computer science. Design research studies and formulate research questions or hypotheses. Utilize statistical software tools to analyze quantitative research data.
CO4	Analyze research data and draw meaningful conclusions based on statistical analysis. Evaluate the validity and reliability of research findings. Critically assess the strengths and weaknesses of research methodologies used in published studies.
CO5	Evaluate the quality and credibility of research sources. Assess the ethical implications of research studies. Critique research methodologies and propose improvements or alternative approaches.
CO6	Design and develop research proposals, including clear research objectives, methodologies, and expected outcomes. Produce well-structured and properly formatted research reports or papers. Generate new research ideas and propose innovative research directions in the field of computer applications.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	1	2	1	1	1	1	1	1
CO2	2	2	2	2	2	2	2	2	1	2	2	2
CO3	1	1	2	2	2	2	2	1	1	1	1	2
CO4	1	1	2	2	2	2	2	1	1	1	1	2
CO5	1	1	1	2	2	2	2	1	1	1	1	2
CO6	1	1	2	2	2	2	2	1	1	1	1	2
AVG	1.4	1.6	1.8	2	2	2.2	2	1.4	1.2	1.4	1.4	2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITDSE702B			
Course Name	: SOFTWARE PROJECT MANAGEMENT – 1			
Semester / Year	: 7th Semester / 4th Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

- Understand the fundamental concepts and principles of software project management.
- Gain knowledge of project initiation, planning, and estimation techniques.
- Develop skills in project organization, team management, and effective communication.
- Apply project execution and monitoring methodologies, such as Waterfall and Agile.
- Analyze project risks and implement strategies for risk mitigation.
- Demonstrate the ability to create project charters, scope statements, and schedules.

COURSE CONTENTS

Unit 1: Introduction to Software Project Management

[No. of Hours: 3]

Definition and importance of SPM, Characteristics of software projects, Role of project management in software development

Unit 2: Project Initiation

[No. of Hours: 5]

Feasibility analysis, Project selection and justification, Project charter and scope statement

Unit 3: Project Planning

[No. of Hours: 12]

Work breakdown structure (WBS), Project scheduling techniques (Gantt charts, PERT/CPM), Resource allocation and leveling, Risk identification and management

Unit 4: Project Estimation

[No. of Hours: 5]

Estimation techniques (expert judgment, analogy, parametric), Function point analysis, COCOMO model

Unit 5: Project Organization and Team Management

[No. of Hours: 6]

Project roles and responsibilities, Team building and team dynamics, Communication and collaboration in project teams, Project Execution and Monitoring

Unit 6: Project Execution and Monitoring

[No. of Hours: 9]

Project execution methodologies (Waterfall, Agile, etc.), Tracking project progress, Change management, Earned value management

Text Books:

TB1: "Software Project Management: A Process-Driven Approach" by Ashfaq Ahmed

TB2: "Quality Software Project Management", Robert T. Futrell, Donald F. Shafer, and Linda I. Shafer, 2002, Pearson Education Asia.

TB3: "Managing Global Software Projects", Ramesh Gopalswamy, 2003, Tata McGraw-Hill

Reference Books:

RB1: "Software Project Management: A Unified Framework" by Walker Royce

RB2: "A Guide to the Project Management Body of Knowledge (PMBOK® Guide)" by Project Management Institute (PMI)

RB3: "Project Management: A Systems Approach to Planning, Scheduling, and Controlling" by Harold Kerzner

RB4: "Managing the Software Process" by Watts S. Humphrey

Course Outcomes (CO):

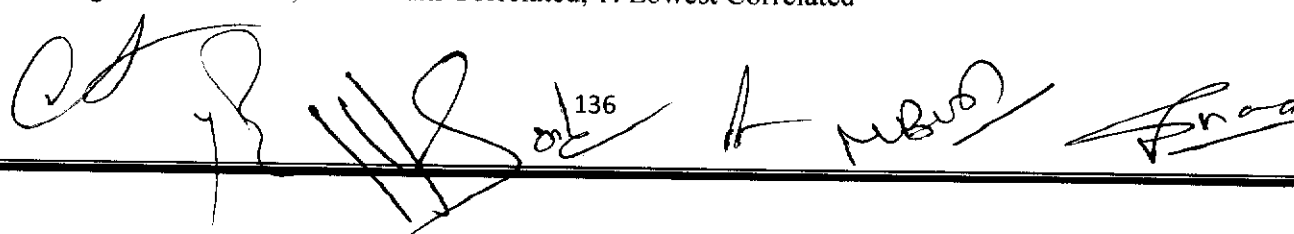
After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall the key concepts and principles of software project management. Identify the characteristics of software projects and their role in software development.
CO2	Explain the importance of project initiation and its components. Understand different project planning techniques and their application in software projects.
CO3	Apply project estimation techniques to determine resource requirements and project schedules. Apply risk management strategies to identify and mitigate potential risks in software projects.
CO4	Analyze the impact of changes in project requirements and effectively manage change requests. Analyze project progress using earned value management techniques and make informed decisions.
CO5	Evaluate the effectiveness of project communication and collaboration strategies. Evaluate the feasibility of software projects using appropriate analysis techniques.
CO6	Develop a comprehensive project charter and scope statement for a given software project. Create a project schedule using Gantt charts or PERT/CPM techniques for effective project planning.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	1	3	1	1	2	1	2	2
CO2	2	2	2	2	2	3	2	2	1	1	2	2
CO3	1	2	2	2	2	3	2	2	2	1	2	2
CO4	1	2	2	2	2	3	2	2	2	1	2	2
CO5	1	2	2	2	2	3	2	2	2	1	2	2
CO6	2	2	2	2	2	3	2	2	3	1	2	2
AVG	1.4	2	2	1.8	1.8	3	1.8	1.8	2	1	2	2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code : BITDSE702C				
Course Name : ENTREPRENEURSHIP MANAGEMENT - 1				
Semester / Year : 7th Semester / 4th Year				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

- Understand the fundamental concepts and principles of software project management.
- Gain knowledge of project initiation, planning, and estimation techniques.
- Develop skills in project organization, team management, and effective communication.
- Apply project execution and monitoring methodologies, such as Waterfall and Agile.
- Analyze project risks and implement strategies for risk mitigation.
- Demonstrate the ability to create project charters, scope statements, and schedules.

COURSE CONTENTS

Unit 1: Introduction to Entrepreneurship

[No. of Hours: 5]

Definition and characteristics of entrepreneurship, Importance and role of entrepreneurship in the economy, Entrepreneurial mindset and qualities of successful entrepreneurs

Unit 2: Idea Generation and Opportunity Identification

[No. of Hours: 9]

Creative thinking and idea generation techniques, Identifying and evaluating business opportunities, Market research and analysis for identifying target markets

Unit 3: Feasibility Analysis and Business Planning

[No. of Hours: 12]

Assessing the feasibility of business ideas, Market analysis and competition evaluation, Developing a business plan, including mission, vision, and goals

Unit 4: Legal and Regulatory Environment

[No. of Hours: 7]

Business registration and legal forms of business ownership, Intellectual property rights and protection, Understanding relevant laws and regulations for startups

Unit 5: Financing Entrepreneurial Ventures

[No. of Hours: 7]

Sources of funding for startups (e.g., bootstrapping, angel investors, venture capital), financial statements and forecasting for startups, Valuation of startup ventures

Text Books:

TB1: "Entrepreneurship: Development and Management" by Dr. C. B. Gupta

TB2: "Entrepreneurship Development and Small Business Enterprises" by Dr. Poornima M. Charantimath

TB3: "Entrepreneurship: Text and Cases" by Dr. C. B. Gupta

TB4: "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries

TB5: "The Art of the Start 2.0: The Time-Tested, Battle-Hardened Guide for Anyone Starting Anything" by Guy Kawasaki

TB6: "The Entrepreneur Mind: 100 Essential Beliefs, Characteristics, and Habits of Elite Entrepreneurs" by Kevin D. Johnson

Reference Books:

RB1: "Entrepreneurship: Theory, Process, and Practice" by Donald F. Kuratko

RB2: "Entrepreneurship and Small Business Management" by Steve Mariotti and Caroline Glackin

RB3: "Entrepreneurship: Successfully Launching New Ventures" by Bruce R. Barringer and R. Duane Ireland

RB4: "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers" by Alexander Osterwalder and Yves Pigneur

TB5: "The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company" by Steve Blank and Bob Dorf

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall the key characteristics of successful entrepreneurs. Identify the different sources of business ideas and opportunities. Remember the fundamental concepts and definitions related to entrepreneurship.
CO2	Explain the importance of entrepreneurship in the economy. Understand the process of market research and analysis for identifying target markets. Comprehend the components of a business plan and their significance.
CO3	Apply creative thinking techniques to generate innovative business ideas. Utilize feasibility analysis tools to evaluate the viability of business ideas. Apply market analysis and competition evaluation techniques to assess business opportunities.
CO4	Analyze the legal and regulatory environment for startups. Evaluate different sources of funding for startup ventures. Analyze financial statements and forecasting for startups.
CO5	Assess the effectiveness of marketing strategies for startups. Evaluate the impact of operations and supply chain management on startup success. Evaluate the importance of human resource management for startup teams.
CO6	Develop a comprehensive business plan for a startup venture. Design innovative marketing and sales strategies for a startup. Create a growth strategy and entrepreneurial leadership plan for a startup.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	1	3	1	1	1	1	2	3
CO2	1	2	2	2	2	3	1	1	1	1	2	3
CO3	2	2	3	2	2	3	1	1	1	1	2	3
CO4	1	2	2	2	2	3	1	1	1	1	2	3
CO5	1	2	2	2	2	3	1	1	1	1	2	3
CO6	2	3	3	2	3	3	1	1	1	1	2	3
AVG	1.6	2.2	2.6	1.8	2	3	1.4	1.4	1.4	1.4	2.2	3

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITDSE703A			
Course Name	: Cryptography & Network Security			
Semester /Year	: 8th / 4 th			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Understand the basic Knowledge of Network Security Concepts & the Challenges and Scope of Information Security
- Understand the basic Concept of Block Cipher & the Importance of Cryptographic Algorithms and their Uses.
- Learn and Understand Encryption Techniques & Access Control Mechanism Used for User Authentication and Authorization.
- Understand the concept of authentication of message in network by using different techniques.
- Aware and Learn the Usages of Sockets Layer (SSL), Secure Internet Protocol (IP) and HTTPS

COURSE CONTENTS:

UNIT 1: Introduction To security

[No. of Hours: 7]

Basic aspects of Network security, Attacks active & passive attacks, Types of attack, VIRUS and its categories, Conventional Encryption, Conventional Encryption Model, Substitution & transposition techniques, Bit level encryption and operations.

UNIT 2 : Introduction Block Cipher Differential & Linear Cryptanalysis

[No. of Hours: 5]

Block Cipher Design Principles, Block Cipher Modes of Operations, , steganography, Differential & Linear Cryptanalysis

UNIT 3: Conventional Encryption Algorithms

[No. of Hours: 9]

DES, DES Algorithm, DES strength, 2DES, 3 DES, Man in Middle attack, DES standard, AES, Blowfish, International Data Encryption Algorithm IDEA, RC-5, CAST-128, RSA, Key Distribution, Diffie Hellman Key Exchange Algorithm, Random Number Generation.

UNIT 4: Message Authentication & Hash Functions

[No. of Hours: 10]

Authentication Requirements, Authentication Functions, Message Authentication Codes MAC, HMAC, Hash Function, Birthday Attacks, Message Digest Algorithm: MD5 & SHA, Digital Signature, Digital Signature Standard (DSS), Proof of Digital Signature Algorithm, Digital certificate, , X.509, X.25, Secure Electronic Transaction, Authentication Protocol, Authentication Applications: Kerberos.

UNIT 5: Email, Internet Security

[No. of Hours: 6]

Secure Socket Layer, Directory Authentication Service, Electronic Mail Security, PEM, Pretty Good Privacy (PGP), IP security, S/MIME Security: Architecture, Authentication Header, Encapsulating Security Payloads, cyber laws

TEXT BOOKS:

TB1. Atul Kahate, "Cryptography and Network Security" TMH

REFERENCE BOOKS:

RB1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice hall, New Jersey

RB2. Johannes A. Buchmann, "Introduction to Cryptography" Springer-Verlag

COURSE OUTCOMES:

After completion of the course, a student will be able to

CO#	DESCRIPTION
CO1	Able to understand & remember basics of cryptography & security like active and passive attacks and encryption and decryption techniques
CO2	Able to understand and apply the concept of linear and differential crypt Analysis
CO3	Able to understand & remember basics of conventional encryption techniques like DES, Blowfish etc.
CO4	Able to understand basics of message authentication like digital signature, Authentication protocol like Kerberos etc.
CO5	Able to understand & remember the concept of SSL SET
CO6	To design and compose Email security, Authentication Header, & Encapsulating Payload etc.

CO-POMAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			1	1						
CO2	1	2	1	2	1							
CO3	2	2		2	1	1		1				
CO4	1	2	2	1		2	1					
CO5		2	1	2	1	2		1				
CO6	1	2	1	2	1	2						

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITDSE703B			
Course Name	: Multimedia System			
Semester /Year	: 7th Semester / 4th year			
	L	T	P	C
	4	0	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

- Understand the concepts and principles of transaction processing in RDBMS.
- Learn the techniques for ensuring recoverability and handling transaction failures.
- Gain knowledge of concurrency control techniques and their application in managing concurrent transactions.
- Explore the fundamentals of distributed DBMS, including data fragmentation, replication, and allocation.
- Introduce the basics of Object-Oriented DBMS (OODBMS).
- Develop critical thinking and analysis skills in evaluating and designing advanced RDBMS solutions.
- Apply acquired knowledge to real-world scenarios through practical projects and case studies.

COURSE CONTENTS:

Unit 1: Introduction to Multimedia [No. of Hours: 3]

Definition and characteristics of multimedia, Elements of multimedia systems: text, graphics, audio, video, and animation, Multimedia applications and their significance

Unit 2: Digital Media Basics [No. of Hours: 5]

Analog vs. digital signals, Sampling, quantization, and encoding, Color models and image representation

Unit 3: Graphics and Image Editing [No. of Hours: 6]

Introduction to graphics and image editing tools, Image formats and compression techniques, Basic image editing operations: cropping, resizing, enhancing, etc.

Unit 4: Audio and Sound Editing [No. of Hours: 5]

Fundamentals of audio and sound, Digital audio formats and compression algorithms, Sound editing techniques: mixing, equalization, effects, etc.

Unit 5: Video and Video Editing [No. of Hours: 5]

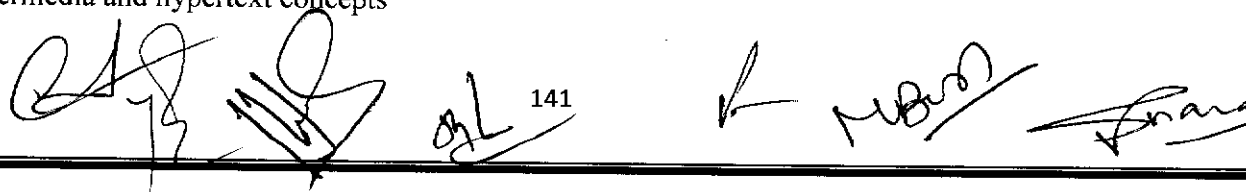
Introduction to video concepts and formats, Video editing tools and techniques, Video compression and streaming

Unit 6: Animation and 3D Graphics [No. of Hours: 6]

Principles of animation, Animation techniques and tools, Introduction to 3D graphics and modeling

Unit 7: Multimedia Authoring [No. of Hours: 6]

Introduction to multimedia authoring tools, Creating interactive multimedia presentations, Hypermedia and hypertext concepts

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Unit 8: Multimedia File Formats and Standards**[No. of Hours: 4]**

Popular multimedia file formats (JPEG, GIF, MP3, MPEG, etc.), Standards and protocols for multimedia content (HTML5, CSS, SVG, etc.), Compatibility and interoperability issues

Text Books:

TB1: "Multimedia Systems" by Buford, Addison Wesley

TB2: "Multimedia Systems" by Agrawal & Tiwari, Excel

TB3: "Introduction to Multimedia Systems" by Gaurav Bhatnagar, Shikha Mehta, Sugata Mitra

References Books:

RB1: "Multimedia: Making It Work" by Tay Vaughan

Course outcomes (COs):

Upon successful completion of the course a student will be able to

CO #	Detailed Statement of the CO
CO1	Recall and recognize fundamental concepts and terminology related to multimedia, including multimedia elements, file formats, and basic multimedia tools.
CO2	Understanding of the principles and components of multimedia systems, explain the processes involved in creating and editing multimedia content, and interpret multimedia file formats and standards.
CO3	Apply multimedia tools and techniques to create, edit, and enhance multimedia content such as images, audio, video, and animations. They will also be able to utilize multimedia authoring tools to create interactive multimedia presentations.
CO4	Analyze multimedia components, such as images, audio, and video, to evaluate their quality, relevance, and effectiveness in conveying information. They will also examine multimedia file formats and standards to assess their compatibility and interoperability.
CO5	Evaluate multimedia content, including presentations, websites, or applications, based on their design, usability, and effectiveness.
CO6	Create comprehensive multimedia projects that incorporate various multimedia elements, techniques, and tools. They will integrate text, graphics, audio, video, and animations to develop engaging and interactive multimedia applications.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	1	2	1	2	2	2	2
CO2	2	2	3	2	2	2	3	2	3	2	2	3
CO3	2	2	3	2	2	2	3	2	3	2	2	3
CO4	1	1	1	1	1	1	1	1	1	1	1	1
CO5	3	3	3	3	3	3	3	3	3	3	3	3
CO6	3	3	3	3	3	3	3	3	3	3	3	3
AVG	2.3	2.3	2.5	2.1	2.3	2.1	2.5	2.1	2.5	2.3	2.3	2.5

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code : BITDSE704A				
Course Name : DATA WAREHOUSE AND DATA MINING				
Semester /Year : 7th Semester / 4th Year				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

- Be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data warehouses and data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Master data mining techniques in various applications like social, scientific and environmental context.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

COURSE CONTENTS:

Unit 1. Introduction to Data Warehousing

[No. of Hours: 2]

Overview of data warehousing, Characteristics of data warehousing, Data warehousing architecture, Data warehousing components, Data warehouse lifecycle

Unit 2. Data Warehouse Design and Implementation

[No. of Hours: 4]

Dimensional modeling, Fact and dimension tables, Star and snowflake schema, Data warehouse modeling tools, Data extraction, transformation, and loading (ETL) process, Data warehouse implementation considerations

Unit 3. Data Warehouse Querying and Optimization

[No. of Hours: 2]

Online Analytical Processing (OLAP), OLAP operations: roll-up, drill-down, slice, and dice, Data cube technology, Multidimensional Expressions (MDX), Query optimization techniques for data warehousing

Unit 4. Data Preprocessing

[No. of Hours: 6]

Data cleaning and integration, Data transformation and reduction, Data discretization and binning, Handling missing data, Feature selection and extraction

Unit 5. Association Rule Mining

[No. of Hours: 6]

Frequent itemset mining, Apriori algorithm, Association rule generation, Rule evaluation and selection, Applications of association rule mining

Unit 6. Classification and Prediction

[No. of Hours: 8]

Classification vs. prediction, Decision tree induction, Rule-based classification, Bayesian classification, Evaluation of classification models

Unit 7. Cluster Analysis

[No. of Hours: 6]

Introduction to clustering, partitioning methods (K-means, K-medoids), Hierarchical clustering, Density-based clustering, Cluster evaluation and validation

Unit 8: Text Mining and Sentiment Analysis

[No. of Hours: 2]

Text preprocessing techniques, Text classification and clustering, Sentiment analysis methods,

Opinion mining, Applications of text mining

Text Books:

TB1: Data Mining-Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.

TB2: Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education

Reference Books:

RB1: Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.

RB2: Data Warehousing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.

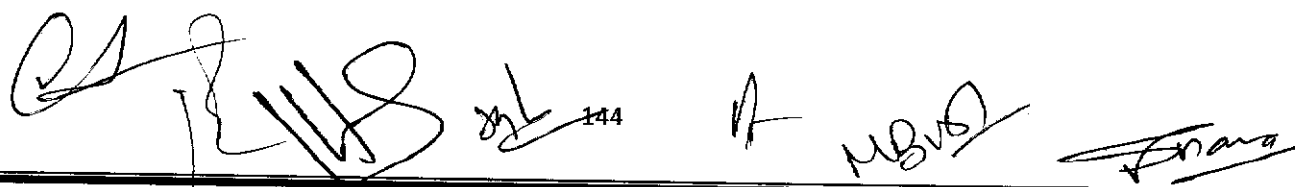
TB3: The Data Warehouse Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.

TB4: Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University.

Course outcomes (COs):

Upon successful completion of the course a student will be able to:

CO#	Detailed Statement of the CO
CO1	Recall the fundamental concepts and principles of data warehousing and data mining. Identify the components and stages involved in the data warehousing lifecycle. Recognize the key techniques and algorithms used in data preprocessing, association rule mining, classification, clustering, and text mining.
CO2	Explain the architecture and characteristics of data warehousing systems. Demonstrate comprehension of dimensional modeling and schema design for data warehouses. Interpret the results and outputs of different data mining algorithms and methods.
CO3	Apply data preprocessing techniques to clean, transform, and reduce raw data for analysis. Implement data mining algorithms for association rule mining, classification, clustering, and text mining on given datasets. Utilize data visualization tools and techniques to effectively represent and interpret patterns and insights from the mined data.
CO4	Analyze data warehouse requirements and design appropriate schemas based on business needs. Evaluate the performance and efficiency of data mining algorithms in terms of accuracy, speed, and scalability. Assess the quality and validity of patterns and associations discovered through data mining techniques.
CO5	Critically evaluate the ethical and social implications of data warehousing and data mining. Assess the strengths and limitations of different data preprocessing techniques and algorithms. Evaluate the effectiveness of data mining models and propose improvements or modifications based on evaluation results.
CO6	Design and develop a data warehouse by applying dimensional modeling techniques. Construct comprehensive data mining solutions by integrating multiple algorithms and techniques. Generate actionable insights and recommendations based on the results of data mining processes.

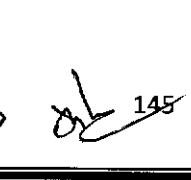
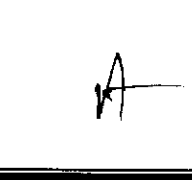
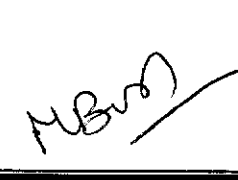
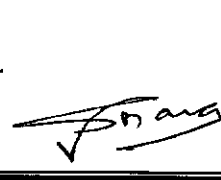


CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	3	1	1	1	2	2	2
CO2	2	2	3	2	2	3	1	1	1	2	2	2
CO3	2	2	3	2	2	3	1	1	1	2	2	2
CO4	2	2	3	2	2	3	1	1	1	2	2	2
CO5	1	2	3	2	2	3	1	1	1	1	2	2
CO6	2	2	3	2	2	3	1	1	1	2	2	2
AVG	2	2.2	3	2.2	2.2	3	1.4	1.4	1.4	2	2.2	2.2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



Course code : BITDSE704B				
Course Name :Advance DBMS				
Semester /Year : 7th /4th				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

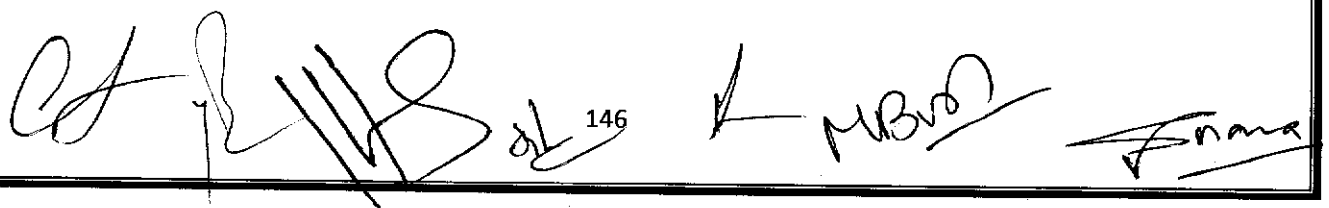
- Understand the concepts and principles of transaction processing in RDBMS.
- Learn the techniques for ensuring recoverability and handling transaction failures.
- Gain knowledge of concurrency control techniques and their application in managing concurrent transactions.
- Explore the fundamentals of distributed DBMS, including data fragmentation, replication, and allocation.
- Introduce the basics of Object-Oriented DBMS (OODBMS).
- Develop critical thinking and analysis skills in evaluating and designing advanced RDBMS solutions.
- Apply acquired knowledge to real-world scenarios through practical projects and case studies.

COURSE CONTENTS**UNIT I****[No. of Hours: 12]****Transaction Processing Concepts:** Transaction system, testing of serializability, Serializability of Schedules Conflict & view serializable schedule**UNIT II****[No. of Hours: 6]**

Recoverability, Recovery from transaction failures, log based recovery, Checkpoints, deadlock handling

UNIT III**[No. of Hours: 12]****Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version Schemes, Recovery with concurrent transaction.**UNIT IV****[No. of Hours: 8]****Distributed DBMS Concepts and design:** Introduction, functions and architecture of a DDBMS, transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database,**UNIT V****[No. of Hours: 2]**

Introduction to OODBMS.



Text Books:

Adv. DBMS by V.K. Jain, Cyber Tech Publication, 5A/13 Ansari Road, Daryaganj, N.Delhi.- 110002

Date C.J. "An Introduction to Database System". Addison Wesley

References Books:

Korth, Silbertz, Sudarshan, "Database Concepts" McGraw Hill

Elmasri, Navathe, "Fundamentals of Database Systems" Addison Wesley

Course outcomes (COs):

Upon successful completion of the course a student will be able to

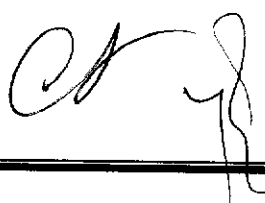
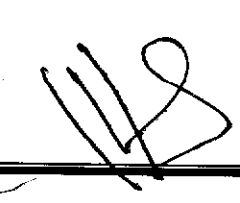
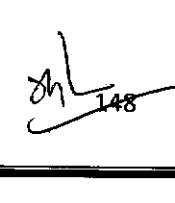
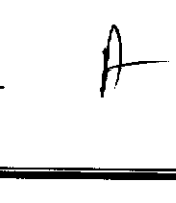
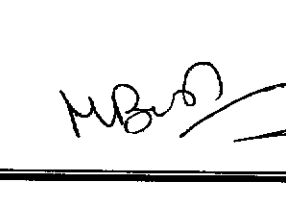
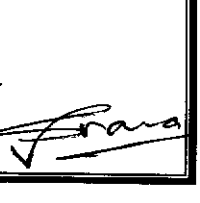
CO #	Detailed Statement of the CO
CO1	Recall the fundamental concepts of transaction processing in RDBMS. Identify the different types of serializability schedules. Memorize the techniques for recovery, concurrency control in transaction processing Recall the concept of distributed & object-oriented DBMS
CO2	Understand the concept of transaction in database and significance of serializability in transaction execution. Explain the principles and importance of recoverability and recovery in RDBMS. Comprehend the concurrency control techniques used in RDBMS. Understand the architecture and functions of a Distributed DBMS.
CO3	Apply transaction processing concepts to analyze and evaluate the serializability of given schedules. Utilize recovery techniques, such as log-based recovery and checkpoints, to ensure data consistency in case of transaction failures. Implement concurrency control techniques, including locking and timestamping protocols, to manage concurrent transactions effectively.
CO4	Apply and comparing the locking techniques for controlling concurrent transaction execution. Evaluate different data fragmentation and replication techniques in a distributed database system.
CO5	Evaluate distributed DBMS and OODBMS concepts. Assess the effectiveness of different concurrency control techniques in maintaining data consistency and ensuring transaction integrity. Evaluate the advantages and limitations of distributed database management systems. Critically analyze the applicability of various recovery strategies in different scenarios.
CO6	Case studies based on serializability and locking protocols.

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CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	3	1	1	1	1	2	2	2
CO2	2	3	3	2	3	1	1	1	1	2	2	2
CO3	2	3	3	3	3	1	1	1	1	2	2	2
CO4	2	3	3	2	3	1	1	1	1	2	2	2
CO5	2	3	3	2	3	1	1	1	1	2	2	2
CO6	2	3	3	2	3	1	1	1	1	2	2	2
AVG	2	3	3	2.4	3	1.2	1.2	1.2	1.2	2.4	2.4	2.4

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITP71			
Course Name	: UNIX LAB			
Semester	: 7th Semester / 4th Year			
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

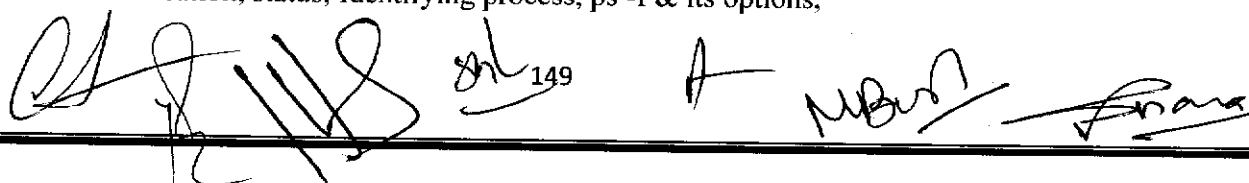
Course Objectives: The objectives of this course are

1. Describe the basic file system in Linux and its file attributes.
2. Appraise different filters, process handling, regular expressions and network handling features using suitable commands.
3. Summarize different Linux commands to write Shell Programs.

List of Experiments

PART-A

1. Introduction- Unix Architecture- Shell, Kernel, System calls.
2. Comparison between Unix/Linux and other Operating Systems, Applications of Linux Operating System.
3. Internal & External commands in Linux.
4. Internal commands- echo, type, etc.
5. External commands- ls, cp, mv, rm, cat, etc
6. Other commands – tput clear, who, cal, date, bc, man, passwd, uname (with different options).
7. Working with files & directories.
8. Know the categories of files.
9. Directory related Commands – pwd, mkdir, rmdir, cd, ls
10. Manipulating Absolute paths and Relative paths using cd command.
11. File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc
12. Basic File attributes.
13. Listing seven attributes of a file : ls and its options
14. File Permissions: Absolute and Relative permissions
15. Manipulating File permissions using chmod command
16. Manipulating File Ownership using chown command
17. Manipulating Hardlink and Softlink using ln command
18. Learn to use vi editor.
19. Three modes of vi editor.
20. Input mode commands.
21. Command mode commands.
22. Ex mode commands.
23. Simple Filters – head, tail, cut, paste, sort, uniq, tr, pr.
24. Expressions & search patterns .(dot operator), *, ^, +, ?, grep, egrep, fgrep
25. Process Management commands.
26. Process creation, status, Identifying process, ps -f & its options,

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27. Running process in background, Job control, and Process termination.
28. Changing process priority, scheduling process (Usage of sleep and wait commands)
29. Introduction to shell programming.
30. Introduction, Uses of shell script, Shell special characters, comments, command separator, escaping, quoting command substitution.
31. Creating shell script, Shell identifiers, Shell variables, Destroying a variable, Positional parameters & command line arguments.
32. Evaluating expressions, Text formatting with echo & tput script termination.
33. Shell control structures
34. if, case, for, while, relational and logical operators,
35. Advanced filter – sed and awk.
36. Unix system administration Managing file system, Disk management utilities, mounts, umount, df, du, fdisk, su, useradd etc.
37. Unix Environment Introduction, Environment variables, Command prompt system variables, Profiles, files, terminal variable stty command and its options, Command history, editing Environment variable.

PART-B

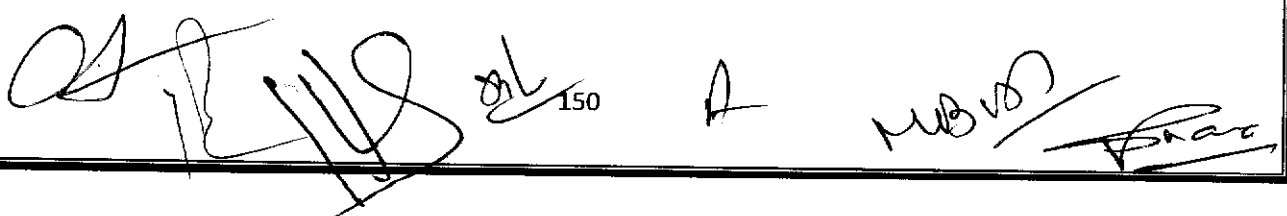
1. Write a shell script to display current date, time, username and directory.
2. Write script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument
3. Write shell script to show various system configuration like: a) Currently logged user name and his long name b) Current shell c) Your home directory
4. Write shell script to show various system configuration like: a) Your operating system type b) Your current path setting c) Your current working directory d) Show all available shells
5. Write a Shell script to accept any two file names and check their file permissions.
6. Write a Shell script to read a file name and change the existing file permissions.
7. Write a shell script to print current month calendar and to replace the current day number by '**' or '***' respectively.
8. Write a C-program to fork a child process and execute the given Linux commands.
9. Write a C-program to fork a child process, print owner process ID and its parent process ID.

TEXT BOOKS:

- TB1. "UNIX - Concepts and Applications", Sumitabha Das 4th Edition, Tata McGraw Hill, 2006.
TB2. Stephan Prata: Advanced Unix – A Programrs Guide – BPB PUB.

REFERENCE BOOKS:

- RB1. Kernighlan & Pike : The Unix Programming Environment – PHI.

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COURSE OUTCOMES:

Upon successful completion of the course a student will be able to

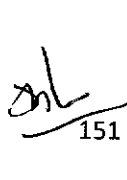
CO #	Detailed Statement of the CO
CO1	Able to understand the basic Unix architecture, commands and utilities of the UNIX operating system and to work confidently in Unix/Linux environment and open systems.
CO2	Appraise various command usage of files and directories
CO3	Show the working of vi editor in all its modes using various commands.
CO4	Manage shell and processes using various commands.
CO5	Write Shell scripts and C programs using vi editor. Demonstrate Unix administration and its environment.
CO6	To Create Shell Scripting Programs

CO-PO MAPPING:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		1		2	2					3
CO2	1	2	3	2	3	1	1	1			1	1
CO3	3	1		2		2	2					3
CO4	2	1	1	2	2	1	2	1				2
CO5	1	2	2	1	3	2	2				1	1
CO6	1		2		3			3				
AVG												

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated





A

MB101



Course code	: BITPR705A/BITPR705B/BITPR705C			
Course Name	: Dissertation on Research project/Academic /Entrepreneurship Based Project			
Semester / Year	: 8 th Semester/ 4 th Year			
	L	T	P	C
	0	0	12	6

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

In this course, the learners will be able to develop working expertise of solving complex computing problems through project-based learning approach using real world case studies by implementing the concepts studied in the theory courses of this semester.

Course outcomes (COs):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Identify the problem and describing it.
CO2	Understand the requirements of the chosen project.
CO3	Apply the collected requirements to define the describe the project in a systematic and comprehensive approach.
CO4	Analyze the technical aspects of the chosen project to find the possible solutions for development of the project.
CO5	Evaluate the effective reports and documentation for all project related activities and solutions.
CO6	Create plan for the project development.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						1	2		2	1
CO2	1	3		2	1	2			1			
CO3	1	1	3	2	1	1	1			2		1
CO4	1	1	1	1	1	1	2	1	1	2	2	3
CO5	2			1	3	1	2	1	2	1	3	1
CO6	2	3	3	3	1	1	1	3	1	1	1	1
AVG	1.7	1.8	2.3	1.8	1.4	1.2	1.5	1.5	1.4	1.5	2.0	1.4

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code :	BITDSC801			
Course Name :	ASP.NET Programming			
Semester /Year :	8th Semester / 4th Year			
	L	T	P	C
	3	0	0	3

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Understand the fundamentals of .NET framework, its definition, and its importance in various fields.
- Explore the applications of Visual Studio .NET - Using the .NET Framework in real-world scenarios.
- Gain knowledge of different types of ASP.NET Features
- Develop skills in Creating Web Controls & Creating Web Forms.

UNIT 1

[No. of Hours: 8]

Introduction to .NET framework: Managed Code and the CLR- Intermediate Language, Metadata and JITCompilation - Automatic Memory Management.

UNIT 2

[No. of Hours: 8]

Language Concepts and the CLR: Visual Studio .NET - Using the .NET Framework.

UNIT 3

[No. of Hours: 8]

The Framework Class Library: NET objects - ASP .NET - .NET web services – Windows Forms

UNIT 4

[No. of Hours: 8]

ASP.NET Features: Change the Home Directory in IIS - Add a Virtual Directory in IIS- Set a DefaultDocument for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site.

UNIT 5

[No. of Hours: 8]

Creating Web Controls: Web Controls - HTML Controls, Using Intrinsic Controls, Using Input ValidationControls, Selecting Controls for Applications - Adding web controls to a Page.

Creating Web Forms: Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

COURSE OUTCOMES:

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Acquire knowledge to remember the .NET and its framework.
CO2	Able understand how to design and develop interactive websites.
CO3	Able to apply concepts like .NET web services, windows forms etc.
CO4	Able to analyze professional websites using various ASP.NET features
CO5	Able to serve the society by creating and evaluating the websites using web controls.
CO6	Create and develop ASP.NET Application with database connectivity

CO PO MAPPING:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO1 0	PO11	PO12
CO1	3	2	3	1	1	-	1	-	2	-	-	-
CO2	2	2	3	1	-	-	1	-	1	-	-	-
CO3	1	3	3	-	-	-	-	-	2	-	-	-
CO4	2	3	3	-	-	2	-	-	-	2	-	-
CO5	3	3	1	-	-	-	-	-	-	-	3	1
CO6	1	-	1	-	-	-	1	1	1	-	-	1
AVG	2	2.16	2.33	0.33	0.16	0.33	0.5	0.16	1	0.33	0.5	0.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

CS 7/11/2023 154 A. M. B. S. / P. N. A.

Course code	: BITDSE802A
Course Name	: RESEARCH PUBLICATION ETHICS
Semester / Year	: 8 th Semester / 4 th Year

	L	T	P	C
	3	1	0	4

L - Lecture T - Tutorial P - Practical C - Credit

COURSE OBJECTIVES:

The objectives of this course are

- Understand the research publication process and its significance in computer science.
- Develop skills in academic writing, including research paper structure and citation styles.
- Recognize and avoid plagiarism while ensuring integrity in research.
- Gain knowledge of intellectual property rights, copyright, and patents in research publications.
- Explore ethical considerations in research, including human participant involvement and data handling.
- Understand the social implications of research and practice responsible conduct.
- Familiarize with databases, indexing databases, and research metrics for evaluating research impact.
- Learn about ethical guidelines and professional organizations in the field.
- Prepare for a successful research career by building a research profile and networking.

COURSE CONTENTS

Unit 1: Introduction to Research Publication

[No. of Hours: 3]

Importance of research publication in computer science, Different types of research publications (conference papers, journal articles, etc.), Overview of the research publication process

Unit 2: Academic Writing and Paper Structure

[No. of Hours: 6]

Elements of a research paper (title, abstract, introduction, methodology, results, conclusion), Literature review and referencing, Writing clear and concise research papers, Formatting guidelines and citation styles (e.g., APA, MLA)

Unit 3: Plagiarism and Intellectual Property

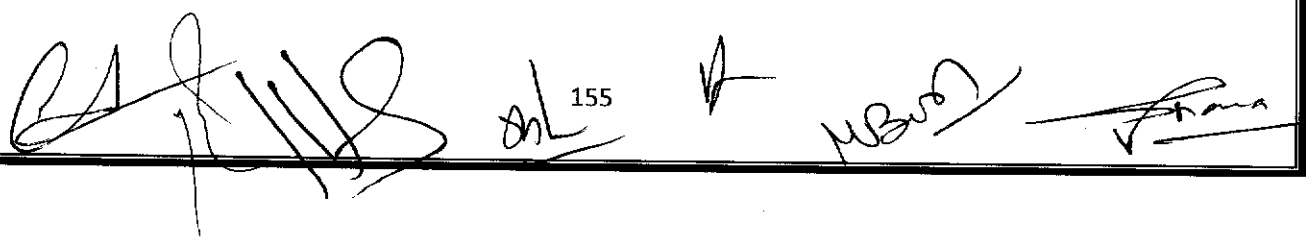
[No. of Hours: 5]

Understanding plagiarism and its consequences, Techniques to avoid plagiarism (paraphrasing, citing sources, etc.), Intellectual property rights and copyright, Patents and their role in protecting research innovations

Unit 4: Responsible Authorship and Collaboration

[No. of Hours: 5]

Guidelines for responsible authorship and contributor ship, Collaboration in research and authorship order, Handling authorship disputes and conflicts of interest, Acknowledgments and funding disclosure

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Unit 5: Research Ethics

[No. of Hours: 5]

Ethical considerations in research involving human participants, Informed consent and ethical review boards, Ethical handling of data and privacy issues, Research misconduct and ethical violations

Unit 6: Social Implications of Research

[No. of Hours: 4]

Impact of research on society and technological advancements, Responsible conduct of research in the context of social implications, Ethical considerations in emerging areas (e.g., artificial intelligence, data science, cybersecurity), Ethical considerations in publishing controversial research

Unit 7: Ethical Guidelines and Professional Organizations

[No. of Hours: 4]

Overview of ethical guidelines and codes of conduct (e.g., ACM Code of Ethics), Introduction to professional organizations and their role in promoting ethical research practices, Ethical responsibilities of researchers and professionals in computer science, Research Publication and Career Development

Unit 8: Importance of research publications in academic and professional careers

[No. of Hours: 4]

Strategies for successful publication and dissemination of research, Evaluating the quality and impact of research publications, Building a research profile and networking in the research community

Unit 9: Databases and Research Metrics

[No. of Hours: 4]

Databases, indexing databases, Citation databases: Web of Science, Scopus, etc., Research Metrics, Impact factor of journal as per journal Citation report, SNP, SJR, IPP, Cite score, Metrics: h-index, g index, i10 index, altmetrics.

Text Books:

TB1: "Research and Publication Ethics" by Wakil Kumar Yadav

TB2: "Handbook of Research and Publication Ethics" edited by Nimit Chowdhary and Sarah Hussain

TB3: "Good Practices and Ethics in Research and Publication" by Dr. Partha Pratim Ray

TB4: "Research and Publications Ethics" by Dr. S.B. Kishor, Dr. Ajay S. Kushwaha, and Dr. Gitanjali J

Reference Books:

RB1: "How to Write a Better Thesis" by David Evans, Paul Gruba, and Justin Zobel

RB2: "Publish and Flourish: Become a Prolific Scholar" by Tara Gray

Course Outcomes (COs):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall the importance of research publication in the field of computer science. Memorize the elements and structure of a research paper. Identify different types of research publications.

CO2	Explain the ethical considerations involved in research, such as plagiarism, data integrity, and conflicts of interest. Understand the process of responsible authorship and collaboration in research. Comprehend the social implications of research and the responsible conduct of research in various contexts.
CO3	Apply proper citation styles and formatting guidelines in academic writing. Demonstrate the ability to avoid plagiarism and appropriately use referencing techniques. Apply ethical principles in research design and data handling.
CO4	Analyze the social and ethical implications of research in computer science. Evaluate the credibility and reliability of research publications. Analyze authorship order and resolve authorship disputes in research collaboration.
CO5	Assess the quality and impact of research publications using research metrics and indicators. Evaluate ethical issues and considerations in controversial research areas. Critically evaluate the ethical conduct of researchers in relation to research participants and data handling.
CO6	Create well-structured research papers adhering to academic writing standards. Design and propose research projects that follow ethical guidelines and address social implications. Develop strategies to build a research profile and network in the research community.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	1	1	1	2	2	2	2
CO2	2	3	3	2	3	2	2	2	3	2	3	3
CO3	2	3	3	2	3	2	2	2	3	2	3	3
CO4	1	2	2	1	2	1	1	1	2	1	2	2
CO5	2	2	2	2	2	2	2	2	2	2	2	2
CO6	2	2	2	2	2	2	2	2	2	2	2	2
AVG	1.8	2.4	2.4	1.8	2.4	1.8	1.8	1.8	2.4	1.8	2.4	2.4

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITDSE802B			
Course Name	: SOFTWARE PROJECT MANAGEMENT – II			
Semester / Year	: 8 th Semester / 4 th Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES: The objectives of this course are

- Gain a thorough understanding of software quality assurance and testing principles.
- Learn effective software configuration management practices, including version control.
- Enhance project communication and documentation skills for successful project delivery.
- Develop expertise in identifying, analyzing, and managing project risks.
- Gain proficiency in project closure activities and conducting post-implementation reviews.
- Acquire knowledge of software project management tools and their practical applications.

COURSE CONTENTS

Unit 1: Quality Assurance and Testing

[No. of Hours: 7]

Software quality concepts, Software testing techniques, Test planning and execution

Unit 2: Software Configuration Management

[No. of Hours: 5]

Version control systems, Change management and release management, Software baselines

Unit 3: Project Communication and Documentation

[No. of Hours: 7]

Effective project communication, Project documentation (requirements, design, test cases, etc.)
Configuration management of project documents,

Unit 4: Project Risk Management

[No. of Hours: 7]

Risk assessment and prioritization, Risk mitigation strategies, Risk monitoring and control

Unit 5: Project Closure and Post-Implementation Review

[No. of Hours: 7]

Project closure activities, Lessons learned and knowledge transfer, Post-implementation review and maintenance

Unit 6: Software Project Management Tools

[No. of Hours: 7]

Introduction to project management software (e.g., Microsoft Project, JIRA), Collaboration tools and version control systems

Text Books:

TB1: "Software Project Management: A Process-Driven Approach" by Ashfaq Ahmed

TB2: "Quality Software Project Management", Robert T. Futrell, Donald F. Shafer, and Linda I. Shafer, 2002, Pearson Education Asia.

TB3: "Managing Global Software Projects", Ramesh Gopalswamy, 2003, Tata McGraw-Hill

Reference Books:

RB1: "Software Project Management: A Unified Framework" by Walker Royce

RB2: "A Guide to the Project Management Body of Knowledge (PMBOK® Guide)" by Project Management Institute (PMI)

RB3: "Project Management: A Systems Approach to Planning, Scheduling, and Controlling" by Harold Kerzner

RB4: "Managing the Software Process" by Watts S. Humphrey

Course Outcomes (CO):*After completion of the course, a student will be able to*

CO#	Detailed Statement of the CO
CO1	Recall the principles and best practices of software quality assurance and testing. Remember the key concepts of software configuration management and version control.
CO2	Understand the importance of effective project communication and documentation. Comprehend the key elements of project risk management and its impact on project success.
CO3	Apply software testing techniques to design and execute test cases for software projects. Apply configuration management practices to track and manage software versions effectively.
CO4	Analyze the effectiveness of project communication strategies and recommend improvements. Analyze and evaluate project risks, prioritize them, and develop appropriate risk mitigation strategies.
CO5	Evaluate the effectiveness of software quality assurance processes and suggest enhancements. Evaluate project closure activities and conduct post-implementation reviews for lessons learned.
CO6	Create comprehensive project documentation, including requirements, design, and test cases. Design and implement a software configuration management plan for a given project.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	2	1	1	3	1	2	2
CO2	1	2	2	2	2	2	1	1	1	1	2	2
CO3	2	2	3	2	2	3	1	1	3	1	2	2
CO4	2	2	3	2	2	3	1	1	3	1	2	2
CO5	2	2	3	2	2	3	1	1	3	1	2	2
CO6	3	3	3	3	3	3	1	1	3	1	2	3
AVG	2	2.2	2.8	2.4	2.4	2.8	1.4	1.4	2.8	1.4	2.2	2.4

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITDSE802C			
Course Name	: ENTREPRENEURSHIP MANAGEMENT - II			
Semester / Year	: 8th Semester / 4th Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are:

- Understand the fundamental concepts and principles of software project management.
- Gain knowledge of project initiation, planning, and estimation techniques.
- Develop skills in project organization, team management, and effective communication.
- Apply project execution and monitoring methodologies, such as Waterfall and Agile.
- Analyze project risks and implement strategies for risk mitigation.
- Demonstrate the ability to create project charters, scope statements, and schedules.

COURSE CONTENTS

Unit 1: Marketing and Sales for Startups

[No. of Hours: 8]

Marketing strategies and tactics for startups, Customer segmentation and targeting, Building a brand and effective sales techniques

Unit 2: Operations and Supply Chain Management

[No. of Hours: 6]

Operations management for startups, Supply chain management and logistics, Quality management and process improvement

Unit 3: Human Resource Management for Startups

[No. of Hours: 6]

Recruitment and selection of employees, Training and development of startup teams, Employee motivation and performance management

Unit 4: Innovation and Technology Management

[No. of Hours: 6]

Managing innovation and technological change in startups, Technology commercialization and intellectual property management, Digital transformation strategies for startups

Unit 5: Growth Strategies and Entrepreneurial Leadership

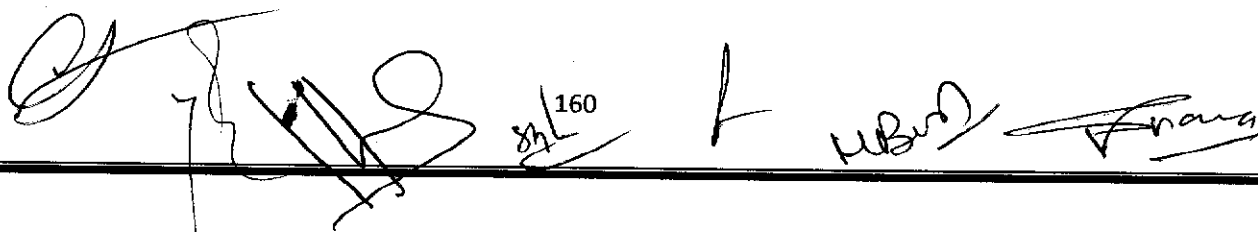
[No. of Hours: 8]

Scaling up and growth strategies for startups, Strategic planning and execution, Leadership and team management in entrepreneurial ventures

Unit 6: Entrepreneurship Ecosystem and Support Structures

[No. of Hours: 6]

Understanding the entrepreneurship ecosystem, Government policies and initiatives to support startups, Incubators, accelerators, and other support organizations for startups

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Text Books:

TB1: "Entrepreneurship: Development and Management" by Dr. C. B. Gupta

TB2: "Entrepreneurship Development and Small Business Enterprises" by Dr. Poornima M. Charantimath

TB3: "Entrepreneurship: Text and Cases" by Dr. C. B. Gupta

TB4: "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries

TB5: "The Art of the Start 2.0: The Time-Tested, Battle-Hardened Guide for Anyone Starting Anything" by Guy Kawasaki

TB5: "The Entrepreneur Mind: 100 Essential Beliefs, Characteristics, and Habits of Elite Entrepreneurs" by Kevin D. Johnson

Reference Books:

RB1: "Entrepreneurship: Theory, Process, and Practice" by Donald F. Kuratko

RB2: "Entrepreneurship and Small Business Management" by Steve Mariotti and Caroline Glackin

RB3: "Entrepreneurship: Successfully Launching New Ventures" by Bruce R. Barringer and R. Duane Ireland

RB4: "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers" by Alexander Osterwalder and Yves Pigneur

RB5: "The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company" by Steve Blank and Bob Dorf

Course Outcomes (CO):

After completion of the course, a student will be able to

CO#	Detailed Statement of the CO
CO1	Recall key concepts and theories related to marketing, operations, human resource management, innovation, growth strategies, and the entrepreneurship ecosystem.
CO2	Explain the fundamental principles and theories of marketing, operations, human resource management, innovation, growth strategies, and the entrepreneurship ecosystem. Interpret the interrelationships between different functional areas within entrepreneurial ventures.
CO3	Apply marketing strategies and tactics to develop a comprehensive marketing plan for a startup venture. Utilize operations management principles to optimize processes and enhance efficiency in a startup. Apply human resource management techniques to recruit, train, and motivate employees in a startup environment.
CO4	Analyze market research data to identify customer needs, preferences, and market opportunities for a startup venture. Evaluate the supply chain and logistics management of a startup and propose improvements. Analyze the financial statements and forecasts of a startup to assess its financial health and viability.
CO5	Evaluate different growth strategies and assess their suitability for specific startup contexts. Critically evaluate leadership styles and their impact on entrepreneurial ventures.

	Evaluate the role of government policies and support structures in fostering entrepreneurship.
CO6	Design an innovative business model for a startup venture, considering technology, market trends, and customer needs. Create a comprehensive business plan for a new entrepreneurial venture, integrating various functional areas. Generate creative solutions to overcome challenges and barriers faced by startups in a rapidly changing business environment.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2	3	1	1	1	2	2	2
CO2	2	2	3	2	2	3	1	1	1	2	2	2
CO3	2	2	3	2	2	3	1	1	1	2	2	2
CO4	1	2	2	2	2	3	1	1	1	1	2	2
CO5	1	2	3	2	3	3	1	1	1	2	2	3
CO6	2	3	3	2	3	3	1	1	1	2	3	3
AVG	1.8	2.2	2.8	2	2.4	3	1.4	1.4	1.4	1.8	2.4	2.6

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code	: BITDSE803A			
Course Name	: ARTIFICIAL INTELLIGENCE			
Semester /Year	: 8 th Semester / 4 th Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- To impart knowledge about Artificial Intelligence.
- To give understanding of the main abstractions and reasoning for intelligent systems.
- To enable the students to understand the basic principles of Artificial Intelligence in various applications.

COURSE CONTENTS**UNIT 1****[No. of Hours: 10]**

Introduction to Artificial Intelligence, Simulation of sophisticated & Intelligent Behavior in different area problem Solving in games, natural language, automated reasoning, visual perception, heuristic algorithm versus solution guaranteed algorithms.

UNIT 2**[No. of Hours: 10]**

Understanding Natural Languages. Parsing techniques, Context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammars, Shanks Conceptual Dependency, grammar free analyzers, sentence generation, and translation.

UNIT 3**[No. of Hours: 10]**

Knowledge Representation, First order predicate calculus, Horn Clauses, Introduction to PROLOG, Semantic Nets, Partitioned Nets, Minsky frames, Case Grammar Theory, Production Rules Knowledge Base, the Interface System, Forward & Backward Deduction.

UNIT 4**[No. of Hours: 5]**

Expert System Existing Systems (DENDRAL, MYCIN), Inference Engine, domain exploration MetaKnowledge, Expertise Transfer, Self Explaining System.

UNIT 5**[No. of Hours: 5]**

Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception Semantic & Model, Object Identification, Speech Recognition. Programming Language; Introduction to programming Language, LISP, PROLOG.

TEXT BOOKS:

TB1. Winston, "LISP", Addison Wesley.

TB2.Marcellous, "Expert System Programming", PHI.

TB3.Elamie, "Artificial Intelligence", Academic Press.

REFERENCE BOOKS:

RB1. Elamie, "Artificial Intelligence", Academic Press.

RB2. Winston, "LISP", Addison Wesley.

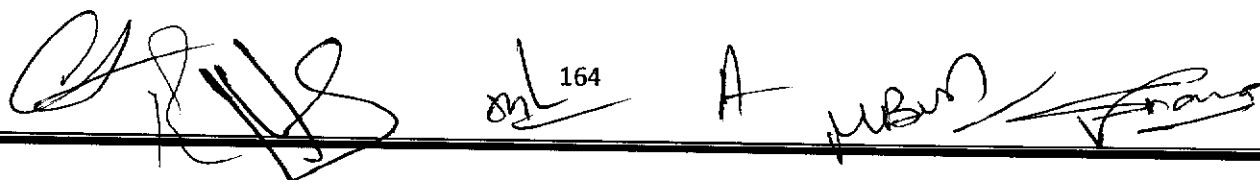
COURSE OUTCOME

CO#	DESCRIPTION
CO1	Solving basic AI problems and developing understanding of where and how AI can be used.
CO2	List the objectives and functions of modern Artificial Intelligence.
CO3	Define the concept of Artificial Intelligence.
CO4	Ability to Apply AI techniques to real-world problem solving to develop intelligent systems.
CO5	Select appropriately from a range of techniques when implementing intelligent systems.
CO6	Use classical Artificial Intelligence techniques, such as search algorithms, minmax algorithm, alpha beta pruning etc.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	1	2	3	1	3	1	3	3	3	1
CO2		1	1	1	1	2	3	1	2	3	1	1
CO3						1	3	1	2	3	1	1
CO4	3	3	3	3	3	1	3	2	2	3	2	3
CO5	3	3	3	3	3	1	2	1	3	3	3	3
CO6	3	3	3	2	2	2	3	2	2	2	2	3
AVG	1.5	2.16	1.83	1.83	2	1.33	2.8	1.33	2.33	2.83	2	2

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

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Course code : BITDSE 803B				
Course Name : Analysis and Design of Algorithms				
Semester /Year : 8th Semester / 4th Year				
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

- Understand the important concepts of algorithms design and their analysis.
- Analyze the efficiency of alternative algorithmic solutions to the problem.
- Understand different algorithm paradigms like Divide and Conquer, Greedy, Dynamic, Backtracking and Branch and Bound.
- Identify the appropriate data structures, algorithm design techniques and assess the impact on the performance of programs.

UNIT-1**(No. of Hours: 09)**

Performance Analysis of Algorithms: Algorithm Specification, Performance Analysis: Space And Time Complexity, Correctness of Algorithms, Growth of Functions, Asymptotic Notations and Types.

Recurrences: Substitution, Iteration, Master and Recurrence Tree method.

UNIT-2**(No. of Hours:10)**

Divide and Conquer Paradigm: Problem Solving, Comparative Analysis of different Sorting And Searching Techniques, Strassen's Matrix Multiplication Method.

Sorting in linear time: Counting Sort, Bucket Sort and Radix Sort. Red Black Trees, Disjoint Set and their Implementation,

UNIT -3**(No. of Hours:10)**

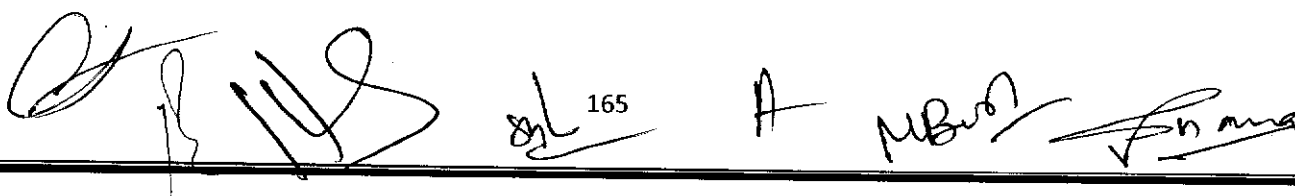
Greedy Algorithms: General Concept, Applications, Activity Selection Problem, Fractional Knapsack problem, Job Sequencing with Deadlines, Analysis and Correctness of Prim's, Kruskal Algorithm and Dijkstra Algorithm.

Dynamic Programming: General Concept, Matrix-Chain Multiplication Problem, Bellman-Ford Algorithm, Analysis and Correctness of Floyd-Warshall Algorithm, 0/1 Knapsack Problem,

UNIT-4**(No. of Hours:8)**

Backtracking: N-Queen's Problem, Hamiltonian Circuit Problem.

Branch and Bound: Assignment Problem, Travelling Salesman Problem.



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UNIT-5**(No. of Hours:6)**

Introduction to Computability, Polynomial-time Verification, NP-Completeness.

Complexity Classes: Reducibility, NP-Completeness Proof, NP-Complete & NP-Hard, Problem Classification-P, NP, NPC, NP-Hard, Vertex Cover.**TEXT BOOKS:****TB1.** T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI, 2nd Edition, 2006**TB2.** S. Dasgupta, C. Papadimitriou and U.Vazirani, "Algorithms", McGraw Hill Higher Education, 1st Edition, 2017.**TB3.** J. Kleinberg and E. Tardos, "Algorithm Design", Pearson Education, 2nd Edition, 2009.**REFERENCE BOOKS:****RB1.** T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India.**RB2.** Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press,**RB3.** Anany Levitin: Introduction to the Design & Analysis of Algorithms, 2nd Edition, Pearson Education.**RB4.** Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning.**RB5.** Baase: Computer Algorithms: Introduction to Design and Analysis, 2nd ed., Addison**COURSE OUTCOMES:**

After completion of the course, a student will be able to

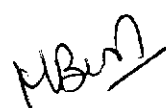
CO#	Detailed Statement of the CO
CO1	Remember the basic concepts and complexities for various algorithms. Demonstrate P and NP complexity classes of the Problem.
CO2	Understand the concepts of asymptotic notations to explain the complexities of Various algorithms.
CO3	Apply and solve various sorting and tree-based algorithms.
CO4	Finding efficient solutions using various algorithms for given problems.
CO5	Evaluate and checking innovative solutions for real-world problems using different paradigms.
CO6	Construct the solution for real-world problems using various problem solving techniques

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	2	3	3	2	-	-	-	-	-	-	-	-
CO3	3	2	3	2	1	-	-	-	-	-	-	-
CO4	2	2	2	3	2	1	-	-	-	2	-	-
CO5	2	3	2	2	3	2	1	-	2	1	2	2
CO6	2	2	2	1	-	-	1	1	1	1	-	-
AVG	2.33	2.33	2.16	1.66	1	0.5	0.33	0.16	0.5	0.66	0.33	0.33

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated




Course code	: BCADSE804A			
Course Name	: MACHINE LEARNING			
Semester / Year	: 8th Semester / 4th Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives:

- Understand the fundamentals of Machine Learning, its definition, and its importance in various fields.
- Explore the applications of Machine Learning in real-world scenarios.
- Gain knowledge of different types of Machine Learning approaches: supervised, unsupervised, and reinforcement learning.
- Develop skills in exploratory data analysis, including data preprocessing, cleaning, and visualization techniques.
- Learn and implement various supervised learning algorithms such as linear regression, logistic regression, decision trees, random forests, SVM, and Naive Bayes.
- Familiarize oneself with unsupervised learning algorithms like clustering and dimensionality reduction techniques.
- Understand the concepts of model evaluation and selection, including cross-validation, overfitting, underfitting, and hyperparameter tuning.
- Gain knowledge of ensemble learning methods, such as bagging, boosting, random forests, and AdaBoost.
- Learn feature selection and engineering techniques, including scaling, normalization, handling categorical data, and feature extraction.
- Acquire skills in evaluating and deploying Machine Learning models, including performance evaluation, model deployment, and ethical considerations.
- Study case studies and practical applications to understand real-world examples of Machine Learning implementations.
- Gain hands-on experience in implementing Machine Learning algorithms using programming languages Python along with relevant libraries such as scikit-learn..

COURSE CONTENTS:

Unit 1: Introduction to Machine Learning

[No. of Hours: 3]

Definition and importance of Machine Learning, Applications of Machine Learning, Supervised, unsupervised, and reinforcement learning

Unit 2: Exploratory Data Analysis

[No. of Hours: 4]

Data preprocessing and cleaning, Data visualization techniques, Handling missing data and outliers

Unit3: Supervised Learning Algorithms

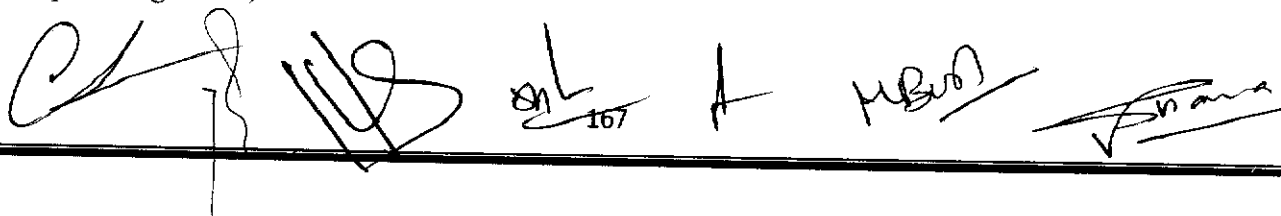
[No. of Hours: 9]

Linear regression, Logistic regression, Decision trees, Random forests, Support Vector Machines (SVM), Naive Bayes classifier, Evaluation metrics for classification and regression tasks

Unit 4: Unsupervised Learning Algorithms

[No. of Hours: 5]

Clustering algorithms (e.g., K-means, hierarchical clustering), Dimensionality reduction techniques (e.g., Principal Component Analysis, t-SNE), Association rule learning (e.g., Apriori algorithm)



Unit 5: Model Evaluation and Selection

[No. of Hours: 4]

Cross-validation techniques, Overfitting and underfitting, Bias-variance trade-off, Hyperparameter tuning

Unit 6: Ensemble Learning

[No. of Hours: 4]

Bagging and boosting techniques, Random forests, Gradient Boosting Machines (GBM), AdaBoost

Unit 7: Feature Selection and Engineering

[No. of Hours: 4]

Feature selection techniques, Feature scaling and normalization, Handling categorical data, Feature extraction

Unit 8: Evaluation and Deployment of Machine Learning Models

[No. of Hours: 3]

Model performance evaluation, Model deployment and integration into applications, Ethical considerations and bias in Machine Learning

Unit 9: Case Studies and Practical Applications

[No. of Hours: 4]

Real-world examples of Machine Learning applications. Implementation of Machine Learning algorithms using programming languages in Python, Working with popular Machine Learning libraries

Text Book:

TB1: "Understanding Machine Learning: From Theory to Algorithms" by Shai Shalev-Shwartz and Shai Ben-David

TB2: "Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili

TB3: "Machine Learning for Dummies" by John Paul Mueller and Luca Massaron

Reference Books:

RB1: "Pattern Recognition and Machine Learning" by Christopher M. Bishop

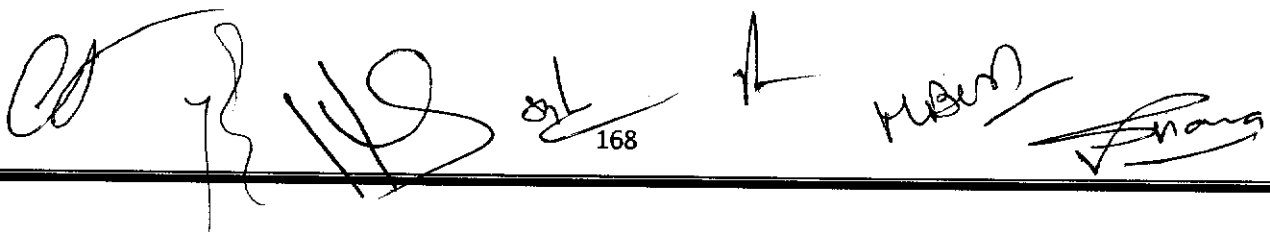
RB2: "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy

RB3: "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron

RB4: "Introduction to Machine Learning" by Ethem Alpaydin

RB5: "Machine Learning: The Art and Science of Algorithms that Make Sense of Data" by Peter Flach

RB5: "Applied Predictive Modeling" by Max Kuhn and Kjell Johnson

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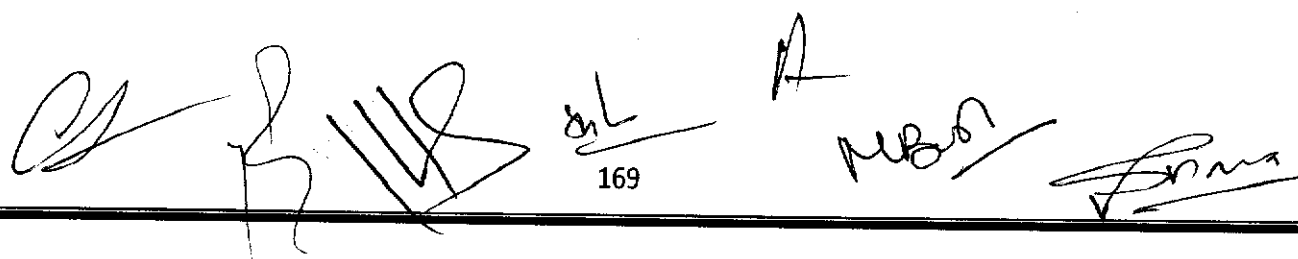
Course Outcomes (OCs)*After completion of the course, a student will be able to*

CO#	Detailed Statement of the CO
CO1	Recall the definitions and key concepts related to Machine Learning and identify different types of Machine Learning algorithms and their applications.
CO2	Explain the principles and techniques of supervised and unsupervised learning and demonstrate an understanding of evaluation metrics and model selection techniques in Machine Learning.
CO3	Apply data preprocessing and cleaning techniques to prepare data for Machine Learning algorithms and implement & apply various Machine Learning algorithms to solve classification and regression problems.
CO4	Analyze the performance of Machine Learning models using evaluation metrics and interpret the results and evaluate the impact of different hyper parameter settings on model performance.
CO5	Critically evaluate the strengths and weaknesses of different Machine Learning algorithms for specific tasks and assess the ethical implications and considerations of using Machine Learning algorithms in real-world applications.
CO6	Design and create Machine Learning models to solve complex problems and develop innovative solutions by combining different Machine Learning techniques and algorithms.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1	1	1	1	1	1	1	1	1
CO2	2	2	3	2	1	2	2	2	1	1	1	2
CO3	2	2	3	2	1	2	2	2	1	1	1	2
CO4	2	1	2	1	1	2	2	2	1	1	1	1
CO5	1	1	2	2	2	2	2	2	1	1	2	2
CO6	2	2	2	3	2	3	3	3	1	1	2	3
AVG	1.8	1.6	2.4	1.8	1.4	2	2	2	1	1	1.4	1.8

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated



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Course code	: BITDSE804B			
Course Name	: ADVANCE SOFTWARE ENGINEERING			
Semester / Year	: 8th Semester / 4th Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

1. Develop models using the UML notation.
2. Analyse requirements with use cases.
3. Create domain models.

COURSE CONTENTS:

UNIT I

[No. of Hours: 10]

Unified Modelling Language, Basic structures and modelling classes, common modelling techniques, relationships, common mechanism, class diagrams.

UNIT II

[No. of Hours: 10]

Advanced structured modelling, advanced classes and relationships, interfaces, types and roles, instances and object diagram. Basic idea of behavioural modelling.

UNIT III

[No. of Hours: 10]

Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation. Design for object – oriented systems. The system design process. Object – oriented testing – testing OOA and OOD models. The object – oriented testing strategies. Inter class testing.

UNIT IV

[No. of Hours: 10]

Technical metrics for O-O systems. Class oriented metrics and metrics for O-O projects. Advanced topics in software engineering. Component based software engineering and development. Classifying and retrieving components

Text Books:

- TB1. Object oriented Modelling and Design with UML - James Rumbaugh. Micheal Blaha (second edition)
- TB2. Object Oriented Analysis & Design, Satinger. Jackson, Burd Thomson

Reference Books:

- RB1. The Unified Modelling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson.

Course Outcomes (COs):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Define or name various analysis and design principles at different levels and various views in different domains of software systems.
CO2	Classify, compare, demonstrate or explain of the diagrams in Unified Modelling Language

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Course code	: BITDSE804B			
Course Name	: ADVANCE SOFTWARE ENGINEERING			
Semester / Year	: 8th Semester / 4th Year			
	L	T	P	C
	3	1	0	4

L - Lecture T – Tutorial P – Practical C – Credit

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COURSE CONTENTS:

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[No. of Hours: 10]

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Reference Books:

- RB1. The Unified Modelling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson.

Course Outcomes (COs):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Define or name various analysis and design principles at different levels and various views in different domains of software systems.
CO2	Classify, compare, demonstrate or explain of the diagrams in Unified Modelling Language

CO3	Identify, utilize, make use of Static and Dynamic Diagrams
CO4	Analyse, categorize, compare, design Use case diagram, Sequence diagrams, State Chart diagrams.
CO5	Explain or compare component and deployment diagrams.
CO6	Develop various UML diagrams.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		2								
CO2	2		1									
CO3	2	1		3								
CO4	3		1									
CO5	3	1		2								
CO6	2	2	2				2					
AVG	2.5	0.8	0.6	1.16			0.33					

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code : BITP81				
Course Name : ASP.NET Lab				
Semester /Year : 8th /4th				
	L	T	P	C
	0	0	2	1

L - Lecture T – Tutorial P – Practical C – Credit

COURSE OBJECTIVES:

To learn .NET framework and advance concepts of websites.

To learn the basic concepts and syntax of HTML and .NET programming.

To be able to develop programs of .NET using .NET Framework and other in-built tools.

To use the ASP.NET Features in detail.

Using web controls for better web development.

COURSE OUTCOMES:

Upon successful completion of the course a student will be able to

CO	DESCRIPTION
CO1	To acquire basic concepts of the ASP.NET and its framework.
CO2	Able to understand how to make interactive websites.
CO3	Able to Implement concepts like .NET web services, windows forms etc.
CO4	Able to analyze professional websites using various ASP.NET features
CO5	Able to evaluate the difference between web application develop in other technology and site develop in ASP.NET web development
CO6	Able to create and design ASP.NET application with database connectivity and design interactive application

CO PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	-	1	-	2	-	-	-
CO2	2	2	3	1	-	-	1	-	1	-	-	-
CO3	1	3	3	-	-	-	-	-	2	-	-	-
CO4	2	3	3	-	-	2	-	-	-	2	-	-
CO5	3	3	1	-	-	-	-	-	-	-	3	-
CO6	-	-	1	-	-	2	-	-	1	-	-	-
AVG	1.83	2.16	2.33	0.33	0.16	0.66	0.33	0	1	0.33	0.5	0.16

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

Course code	: BITPR805A/BITPR805B/BITPR805C			
Course Name	: Dissertation on Research project/Academic /Entrepreneurship Based Project			
Semester / Year	: 8th Semester/ 4th Year			
	L	T	P	C
	0	0	12	6

L - Lecture T – Tutorial P – Practical C – Credit

Course Objectives: The objectives of this course are

In this course, the learners will be able to develop working expertise of solving complex computing problems through project-based learning approach using real world case studies by implementing the concepts studied in the theory courses of this semester.

Course outcomes (COs):

Upon successful completion of the course a student will be able to

CO#	Detailed Statement of the CO
CO1	Identify the problem and describing it.
CO2	Understand the requirements of the chosen project.
CO3	Apply the collected requirements to define the describe the project in a systematic and comprehensive approach.
CO4	Analyze the technical aspects of the chosen project to find the possible solutions for development of the project.
CO5	Evaluate the effective reports and documentation for all project related activities and solutions.
CO6	Create plan for the project development.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1						1	2		2	1
CO2	1	3		2	1	2			1			
CO3	1	1	3	2	1	1	1			2		1
CO4	1	1	1	1	1	1	2	1	1	2	2	3
CO5	2			1	3	1	2	1	2	1	3	1
CO6	2	3	3	3	1	1	1	3	1	1	1	1
AVG	1.7	1.8	2.3	1.8	1.4	1.2	1.5	1.5	1.4	1.5	2.0	1.4

3: Highest Correlated, 2: Medium Correlated, 1: Lowest Correlated

P.D. Mohan

Pradeep Samuel
173

M.B. S.
Pradeep MMS
Rauthan

Sharma