NATIONAL COLLEGE
(Autonomous)
Tiruchirappalli – 620 001

Under Graduate Programme Structure
Under CBCS

B.Sc., Information Technology

(Programme Code: INTUG2008)

(Revised Syllabus from 2025-2026 Onwards)

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Eligibility:

To be eligible for a Bachelor of Science in Information Technology (BSc IT) course, the candidates must meet the following criteria:

a) Pass HSC (+2) board Examination from a recognized board with Physics, Chemistry, and Mathematics as main subjects.
b) Score at least 50% in +2 and in case of SC/ST candidates, merely pass with 40% of marks in HSC will be sufficient.

Aim:

Our aim is a high quality degree program that ensures the students will be able to integrate theory and practical to recognize the importance of abstraction and appreciate the value of efficient design created to meet the developed requirements.

Objectives:

These objectives aim to ensure that graduates are well-prepared to meet the challenges of a dynamic IT industry and contribute effectively to both technical and managerial roles.

1. **Develop Strong Technical Proficiency: Equip** students with the technical skills required to design, develop, and manage software applications, systems, and databases, including proficiency in programming languages, algorithms, and software engineering principles.

2. **Foster Problem-Solving and Critical Thinking:** Cultivate analytical thinking, enabling students to apply IT solutions effectively to solve complex real-world problems, and to innovate in fields such as artificial intelligence, cyber security, and network management.

3. **Promote Understanding of IT Infrastructure:** Provide a comprehensive understanding of the architecture and operation of modern IT systems, including networking, cloud computing, and hardware components, with a focus on their integration and management.

4. **Instill Knowledge of Ethical Practices in IT:** Encourage an awareness of ethical considerations and professional responsibility in the use of technology, including data privacy, security, and the impact of IT solutions on society.

5. **Enhance Communication and Collaboration Skills:** Strengthen students' ability to communicate complex technical concepts to both technical and non-technical stakeholders, and promote teamwork skills in collaborative, multi-disciplinary IT projects.

6. **Prepare for Career Advancement and Lifelong Learning:** Equip students with the foundational knowledge and soft skills to pursue careers in a wide range of IT fields, while also emphasizing the importance of continuous learning to keep up with rapidly evolving technology trends.

Programme Outcomes (PO's)

In a Bachelor of Science (BSc) in Information Technology program, the Program Outcomes (POs) typically reflect the knowledge, skills, and competencies students are expected to achieve by the end of the course. Here are six common Program Outcomes for a BSc in Information Technology:

PO1. **Technical Proficiency:** Graduates will have a solid understanding of the core concepts of Information Technology, including programming, databases, networking, and web technologies. They will demonstrate the ability to apply this knowledge to solve real-world IT challenges effectively.

PO2. **Problem-Solving and Analytical Skills:** Graduates will develop the ability to critically analyze complex IT problems, design appropriate solutions, and implement them efficiently. They will apply computational thinking and systematic approaches to problem-solving.

PO3. **Software Development and Design:** Graduates will be able to design, develop, test, and maintain software applications, demonstrating proficiency in programming languages, software engineering principles, and development tools.

PO4. **Communication and Teamwork:** Graduates will be able to communicate complex IT concepts clearly and effectively to both technical and non-technical audiences. They will also demonstrate the ability to work effectively within multidisciplinary teams, taking on leadership and collaborative roles as needed.

PO5. **Ethics and Professionalism:** Graduates will have a strong sense of professional responsibility, understanding the ethical, social, and legal implications of IT solutions. They will demonstrate ethical behavior in their professional practice, respecting privacy, security, and intellectual property rights.

PO6. **Lifelong Learning and Adaptability:** Graduates will recognize the need for continuous professional development in the ever-evolving field of Information Technology. They will demonstrate a commitment to lifelong learning and adaptability to new technologies, methodologies, and industry trends.

Programme Specific Outcomes (PSO's)

The Program Specific Outcomes (PSOs) for a BSc in Information Technology typically highlight the specialized skills and knowledge students are expected to gain in the field. Here are six possible PSOs for a BSc in Information Technology program:

PSO1. **Proficiency in IT Fundamentals:** Graduates will demonstrate a strong understanding of core IT concepts, including computer hardware, software development, networking, and databases, enabling them to effectively apply technical knowledge in real-world IT environments.

PSO2. **Problem-Solving and Programming Skills:** Graduates will be able to analyze, design, and implement solutions to complex problems using appropriate programming languages, frameworks, and software tools, adapting to the evolving demands of the IT industry.

PSO3. **Web and Application Development:** Graduates will have the ability to design and develop user-friendly web applications and software solutions, incorporating modern development methodologies and best practices for usability, security, and scalability.

PSO4. **Data Management and Analytics:** Graduates will be equipped with the skills to manage and analyze large datasets, using appropriate tools and technologies, to derive meaningful insights and support data-driven decision-making processes in organizations.

PSO5. **Cyber security Awareness and Practices:** Graduates will demonstrate a solid understanding of cyber security principles and practices, ensuring the protection of information assets and systems against potential threats, and following industry standards for secure IT infrastructure.

PSO6. **Effective Communication and Team Collaboration:** Graduates will be able to communicate technical information clearly and effectively, both orally and in writing, and work collaboratively in multidisciplinary teams to achieve shared goals, ensuring project success in real-world IT projects.

NATIONAL COLLEGE (AUTONOMOUS), TRICHY-620 001.
UNDER GRADUATE PROGRAMME STRUCTURE UNDER CBCS
B.SC., INFORMATION TECHNOLOGY
PROGRAM CODE: INTUG2008
REVISED SYLLABUS FROM 2025-2026 ONWARDS

YEAR and SEM	*COURSE CODE*	*PART*	*COURSE TITLE*	*COURSE TYPE*	*COURSE KIND*	*EXAM Hrs*	*INSTRU. Hrs./ WEEK*	*CREDIT*	*MARKS*		*TOTAL MARKS*
									INT (25)	*EXT (75)*	
I Year Sem-I	U25T1 \ U25H1 \ U25S1	I	Tamil-I\ Hindi-I \ Sanskrit-I	Language	Theory	3	6	3	25	75	100
	U25E1	II	English- I	Language	Theory	3	6	3	25	75	100
	U25IT1	III	Computer Fundamentals and C Programming	Core	Theory	3	5	5	25	75	100
	U25IT2P	III	C Programming Lab	Core	Practical	3	3	5	25	75	100
	U25AMSIT1	III	Allied- Mathematics-I	Allied	Theory	3	5	3	25	75	100
	U25AMSIT2	III	Allied- Mathematics-II	Allied	Theory	-	3	-	25	75	-
	U25ES	IV	Environmental Studies	Common	Theory	3	2	2	25	75	100
Papers : 6						**18**	**30**	**21**	**150**	**450**	**600**
I Year Sem-II	U25T2 \ U25H2 \ U25S2	I	Tamil-II\ Hindi-II \ Sanskrit-II	Language	Theory	3	6	3	25	75	100
	U25E2	II	English- II	Language	Theory	3	6	3	25	75	100
	U25IT3TP	III	Data Structures and Algorithms	Core	Theory and Practical	2+2	5+3	6	25 (15+10)	75 (45+30)	100
	U25AMSIT2	III	Allied- Mathematics-II	Allied	Theory	3	3	3	25	75	100
	U25AMSIT3	III	Allied- Mathematics-III	Allied	Theory	3	5	3	25	75	100
	U25ITSBE1	IV	Web Design	SBE	Theory	3	2	2	25	75	100
Papers : 6						**19**	**30**	**20**	**150**	**450**	**600**

YEAR and SEM	*COURSE CODE*	*PART*	*COURSE TITLE*	*COURSE TYPE*	*COURSE KIND*	*EXAM Hrs*	*INSTRU. Hrs./ WEEK*	*CREDIT*	*MARKS*		*TOTAL MARKS*
									INT (25)	*EXT (75)*	
II Year Sem-III	U25T3 \ U25H3 \ U25S3	I	Tamil-III \ Hindi –III \ Sanskrit–III	Language	Theory	3	6	3	25	75	100
	U25E3	II	English-III	Language	Theory	3	6	3	25	75	100
	U25IT4	III	Programming in Java	Core	Theory	3	6	5	25	75	100
	U25IT5P	III	Java Programming Lab	Core	Practical	3	3	3	25	75	100
	U25AIT4	III	Allied-Financial Accounting	Allied	Theory	3	5	3	25	75	100
	U25ITSBE2	IV	Java Script and PHP	SBE	Theory	3	2	2	25	75	100
	U25ITSBE3P	IV	HTML, Java Script and PHP Lab	SBE	Practical	3	2	2	25	75	100
Papers : 7						**21**	**30**	**21**	**175**	**525**	**700**
II Year Sem-IV	U25T4 \ U25H4 \ U25S4	I	Tamil – IV \ Hindi –IV\ Sanskrit – IV	Language	Theory	3	6	3	25	75	100
	U25E4	II	English - IV	Language	Theory	3	6	3	25	75	100
	U25IT6TP	III	Database Management Systems	Core	Theory and Practical	2 +2	4+2	6	25 (15+10)	75 (45+30)	100
	U25AIT5TP	III	Allied-Accounting Package	Allied	Theory and Practical	2 +2	2+2	3	25 (15+10)	75 (45+30)	100
	U25AIT6	III	Allied - Digital Marketing	Allied	Theory	3	4	3	25	75	100
	U25ITNME1	IV	Fundamentals of Information Technology	NME	Theory	3	2	2	25	75	100
	U25VE	IV	Value Education	Common	Theory	3	2	2	25	75	100
	U25ECCIT1	III	Big Data Analytics	ECC	Theory	3	-	4*	25	75	100*
		III	MOOC \ NPTEL	ECC	Theory	3	-	4*	25	75	100*
Papers : 7						**23**	**30**	**22**	**175**	**525**	**700**

YEAR and SEM	COURSE CODE	PART	COURSE TITLE	COURSE TYPE	COURSE KIND	EXAM Hrs	INSTRU. Hrs./ WEEK	CREDIT	MARKS		TOTAL MARKS
									INT (25)	EXT (75)	
III Year Sem-V	U25IT7	III	Python Programming	Core	Theory	3	5	5	25	75	100
	U25IT8P	III	Python Programming Lab	Core	Practical	3	6	3	25	75	100
	U25IT9	III	Operating System	Core	Theory	3	5	5	25	75	100
	U25IT10E1 U25IT10E2 U25IT10E3	III	1)Computer Graphics 2)PC Hardware and Trouble Shooting 3) Artificial Intelligence	Elective	Theory	3	5	5	25	75	100
	U25IT11E1 U25IT11E2 U25IT11E3	III	1)Internet of Things 2)Web Ethics 3) Data Mining	Elective	Theory	3	5	5	25	75	100
	U25ITNME2	IV	Introduction To ICT	NME	Theory	3	2	2	25	75	100
	U25SS	IV	Soft Skills Development	Common	Theory	3	2	2	25	75	100
		III	Machine Learning Techniques	ECC	Theory	3	-	4*	25	75	100*
Papers : 7						**21**	**30**	**27**	**175**	**525**	**700**
III Year Sem VI	U25IT12	III	Computer Networks	Core	Theory	3	6	6	25	75	100
	U25IT13	III	Mobile Application Development	Core	Theory	3	6	5	25	75	100
	U25IT14P	III	Mobile Application Development Lab	Core	Practical	3	6	5	25	75	100
	U25IT15E1 U25IT15E2 U25IT15E3	III	1)Software Engineering 2)Software project Management 3)Software Testing	Elective	Theory	3	5	5	25	75	100
	U25ITP16	III	Project Work	Core	Project	3	6	6	75	25	100
	U25GS	V	Gender Studies	Common	Theory	3	1	1	25	75	100
		V	Extension Activity	Common	-	-	-	1	-	-	-
		III	Cloud Computing.	ECC	Theory	3	-	4*	25	75	100*
Papers : 6						**21**	**30**	**29**	**200**	**400**	**600**
GRAND TOTAL						**123**	**180**	**140**	**1025**	**2875**	**3900**

1). Part I – Tamil / Hindi / Sanskrit, 2). Part II – English, 3). Part III - Core Courses and Allied Courses, 4). Part IV - ES, SBE, NME, VE and SS, 5). Part V - GS and Extension Activity.

Passed by	***Board of Studies held on 22.01.2025***
Approved by	***Academic Council Meeting held on 15.05.2025***

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	I	U25IT1	Core Course-I-Theory	3	5	5	25	75	100
Course Title	COMPUTER FUNDAMENTALS AND C PROGRAMMING								

COURSE DESCRIPTION:

The course is designed to provide students with a comprehensive understanding of the foundational concepts of computer systems and the C programming language.

COURSE OBJECTIVES:

1. To understand the basic concepts and history of computers, their classification, and system components.
2. To familiarize students with various types of software, operating systems, and programming languages.
3. To develop a strong foundation in C programming, including syntax, data types, and operators.
4. To enhance problem-solving skills using decision-making and looping constructs in C.
5. To introduce the concept of user-defined functions, structures, and unions for modular programming.
6. To understand pointers, file handling, and command-line arguments for efficient memory and file management.

UNIT I: Fundamentals of Computers: Introduction – History of Computers- Generations of Computers - Classification of Computers-Basic Anatomy of a Computer System-Input Devices, Processor-Output Devices-Memory Management – Types of Software- Overview of Operating System- Programming Languages- Translator Programs-Problem Solving Techniques.

UNIT II: Overview of C: Introduction - Character set - C tokens - keyword & Identifiers-Constants-Variables-Data types-Declaration of variables-Assigning values to variables-Defining Symbolic Constants-Reading & Writing a character- Formatted input and output - Arithmetic, Relational, Logical, Assignment, Increment and Decrement operators, Conditional, Bitwise, Special Operators - Arithmetic Expressions - Evaluation of expressions -precedence of arithmetic operators - Type conversion in expressions – operator precedence &associatively - Mathematical functions.

UNIT III: Decision Making and Branching: Introduction – If, If….Else, nesting of If…Else statements-Else If ladder–The Switch statement, The? Operator– The Go to Statement.

Decision Making and Looping: Introduction- The While statement- The Do statement – The For statement-Jumps in loops. Arrays - Character Arrays and Strings.

UNIT IV: User-Defined Functions: Introduction – Need and Elements of User- Defined Functions- Definition Return Values and their types - Function Calls – Function Declaration– Category of Functions- Nesting of Functions - Recursion – Passing Arrays and Strings to Functions - Structures and Unions.

UNIT V: Pointers: Understanding pointers - Accessing the address of a variable – Declaring and initializing pointers-Accessing a variable through its pointer-Pointer expressions - Pointers and arrays-Pointers and character strings-Pointers to functions - Pointers and structures. File Management in C-Defining and opening a file –Closing a file- Input/output operations on files - Error handling during I/O operations -Random access to files - Command line arguments.

TEXT BOOK(S):

1. E. Balagurusamy, Computing Fundamentals and C Programming, TMH, 2nd Edition Reprint 2018.

Unit-I: Chapter 1: Section-1.1, 1.5, 1.6, 1.7, 1.8. Chapter 2: 2.3, 2.4, 2.5.
Unit-II: Chapter 4: Section-4.1, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.19.
Unit-III: Chapter 4: Section-4.21, 4.23, Chapter 5: Section-5.2, 5.4.
Unit-IV: Chapter 5: Section- 5.6, 5.8.
Unit-V: Chapter 5: Section- 5.10.

2. Yashavant Kanetkar, Let us C, BPB Publications, 20th Edition, 2024.
Unit-V: Chapter 12.

REFERENCE BOOK(S):

1. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publication, 2002.
2. Henry Mullish and HuubertL.Cooper: The Spirit of C, Jaico Pub.House, 1996.

WEB RESOURCE(S):

1. https://gacbe.ac.in/pdf/ematerial/18BIT13C
2. https://www.javatpoint.com/

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the Fundamentals of Computers – Explain the history, classification, and components of a computer system, including input/output devices, memory management, and software types.	K1
CO2	Demonstrate Proficiency in C Programming Basics – Utilize C tokens, keywords, data types, operators, and expressions to develop simple programs with formatted input and output.	K2
CO3	Apply Decision-Making and Looping Constructs – Implement control structures such as if-else, switch, loops, and jumps to manage program flow effectively.	K4
CO4	Develop Programs Using Arrays and Functions – Use one-dimensional and multi-dimensional arrays, character arrays, and user-defined functions, including recursion and function nesting, to solve computational problems.	K3
CO5	Utilize Pointers and Memory Management – Implement pointer operations for variable manipulation, arrays, strings, functions, and structures to enhance program efficiency.	K5
CO6	Manage Files in C Programming – Perform file handling operations such as reading, writing, and random access, along with error handling and command-line arguments.	K4

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	1	1	1	16
CO2	9	3	1	1	1	1	16
CO3	9	9	3	3	3	1	28
CO4	3	9	9	3	3	1	28
CO5	3	3	9	9	3	3	30
CO6	3	3	9	9	9	3	36
PO Weightage	36	30	32	26	20	10	**154**
Weighted Percentage of PO's	**23.3**	**19.4**	**20.7**	**16.8**	**13**	**6.5**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2	PO3,PO4,PO5,PO6	-
CO2 / K2	PO1	PO2	PO4,PO5,PO6	-
CO3 / K3	PO1, PO2,	PO3,PO4, PO5,	PO6	-
CO4 / K4	PO2, PO3	PO1,PO4,PO5	PO6	-
CO5 / K5	PO3,PO4,	PO1,PO2,PO5,PO6	-	-
CO6/ K6	PO3,PO4,PO5	PO1,PO2,PO6 -	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT1- Computer Fundamentals and C Programming in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge

Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	I	U25IT2P	Core Course-II-Practical	3	3	5	25	75	100
Course Title	C PROGRAMMING LAB								

COURSE DESCRIPTION:

The "C Programming Lab" course is a hands-on, practical course designed to complement the theoretical concepts learned in the C programming course.

COURSE OBJECTIVES:

1. Understand the basic syntax and functionality of assignment statements in C programming.
2. Implement conditional statements using different forms of the "if" statement to handle various decision-making scenarios.
3. Apply logical operators to solve problems involving multiple conditions and Boolean expressions.
4. Demonstrate proficiency in using loops (while, do-while, and for) to repeat tasks in C programming.
5. Understand the use of switch-case constructs to handle multiple conditions in an efficient manner.
6. Gain practical experience in using functions, pointers, arrays, strings, structures, and file handling in C programming.

LIST OF EXPERIMENTS:

1. Using assignment statements.
2. Using different forms of If statement.
3. To demonstrate Logical operators
4. Using While, Do-While & For Loop
5. Using Switch.
6. To illustrate the use of Functions & Pointers
7. To make use of arrays.
8. To manipulate Strings.
9. To demonstrate structure.
10. To copy the contents of one file into another.

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Students will be able to use assignment statements effectively in C programs.	K1
CO2	Students will be able to design and implement programs using various forms of the "if" statement for different logical conditions.	K2
CO3	Students will gain the ability to solve problems using logical operators, improving their decision-making abilities in programs.	K4
CO4	Students will develop the skill to use while, do-while, and for loops to handle iterative tasks in programming.	K3
CO5	Students will demonstrate the capability to use switch-case constructs to optimize decision-making processes in their programs.	K5
CO6	Students will be proficient in applying functions, pointers, arrays, strings, structures, and file operations to build comprehensive C programs.	K4

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3), Weakly Correlated (1)

COs \ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	3	1	3	1	**20**
CO2	9	9	3	1	3	1	**26**
CO3	3	9	9	3	9	3	**36**
CO4	3	3	9	1	9	3	**28**
CO5	3	9	9	3	9	9	**42**
CO6	1	3	9	9	9	9	**40**
PO Weightage	**28**	**36**	**42**	**18**	**42**	**26**	**192**
Weighted PO Percentage	**14.58**	**18.75**	**21.88**	**9.38**	**21.88**	**13.54**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO3, PO5	PO4, PO6	-
CO2 / K2	PO1, PO2	PO3, PO5	PO4, PO6	-
CO3 / K3	PO2, PO3, PO5	PO1, PO4, PO6	-	-
CO4 / K4	PO3, PO5	PO1, PO2, PO6	PO4	-
CO5 / K5	PO2, PO3, PO5, PO6	PO1, PO4	-	-
CO6/ K6	PO3, PO4, PO5, PO6	PO2	PO1	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT2P - C Programming Lab in the B.Sc. Information Technology is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	I	U25AMSIT1	Allied-Theory	3	5	3	25	75	100
Course Title	ALLIED MATHEMATICS-I								

COURSE DESCRIPTION

This Course provides broad view on Matrix in Algebra, Differentiation of function in Calculus, Problem to solve the Integration of certain types and to solve certain types of problem on Differential equations**.**

COURSE OBJECTIVES:

1. Understand fundamental matrix concepts and operations. This includes calculating rank, eigenvalues, and eigenvectors of matrices.
2. Master differentiation techniques including product, quotient, and chain rules. The goal is to confidently calculate derivatives of complex functions.
3. Learn to compute definite integrals, integrate linear functions of x, and apply techniques such as integration by parts and Bernoulli's formula.
4. Classify and solve first-order differential equations using various methods. Focus includes variable separable, homogeneous, and linear equation types.
5. Solve linear differential equations with constant coefficients. This includes finding particular integrals for various input functions.
6. Enumerating the applications of Laplace Transforms.

UNITS

UNIT- I MATRICES (15HRS)

Fundamental Concepts - Operations -Associated Matrices - Rank of Matrix- Determinant -Characteristic roots and Characteristic vectors- Cayley-Hamilton theorem. (Problems only)

UNIT- II DIFFERENTIATION AND INTEGRATION (15HRS)

Differentiation-Standard forms - Product Rule- Quotient Rule - Function of function rule. Integration-Definite Integral - Integrals of functions containing, Linear functions of x- Integration by Parts - Bernoulli's formula.

UNIT- III DIFFERENTIAL EQUATIONS (15HRS)

Differential equations of first order - Variable Separable -Homogeneous equations – Non -homogeneous equations - Linear equation -Bernoulli's equation.

UNIT- IV LINEAR DIFFERENTIAL EQUATIONS (15HRS)

Linear Differential equations with constant co-efficient – Particular integrals for e^{kx}, sin kx, cos kx, x^n and $e^{kx}X$.

UNIT- V LAPLACE TRANSFORM (15HRS)

Laplace Transform - Definition - Some general theorems – Inverse Transform.

TEXT BOOK:

1.Allied Mathematics Paper 1, P.Kandasamy& K. Thilagavathy ,S.Chand &Company Ltd.,2010.(511.0)

2. Ancillary Mathematics Vol-II, S. Narayanan, R. HanumanthaRao, T.K. Manicavachagam Pillay, Kandaswamy-2009.(511.0)

3. Calculus Vol. I - S.Narayanan& T.K.Maicavachagam Pillay, S.Viswanathan Publishers,2008.(517.0)

4. Calculus Vol. II - S.Narayanan& T.K.Maicavachagam Pillay, S.Viswanathan Publishers,2009.(517.0)

5. Calculus Vol. III - S.Narayanan& T.K.Maicavachagam Pillay, S.Viswanathan Publishers,2009.(517.0)

Unit	Book	Chapters & Page Nos.
I	**1**	Chapter 1 - Page no: 72-101, 114-128.
II	**3** **4**	Chapter 2 - Page no: 24-41. Chapter 1 - Page no: 1-11, 74-79,99-100.
III	**2**	Chapter 4 - Sec 1-5 - Page no: 205-218.
IV	**5**	Chapter 2 - Page no.49-74
V	**2**	Chapter 7 - Sec 7.1 to 7.5- Page no: 289-308.

REFERENCES:

1. P. Kandasamy and Thilagavathy(2004),MATHEMATICS(Vol .I), S.Chand, New Delhi

2. Narayanan.S, Manicavachagom Pillay.T.K,(2006), Differential Equations, S.Viswanathan (Printers and publishers), Chennai.

DIGITAL OPEN EDUCATIONAL RESOURCES:

1.https://www.whitman.edu/mathematics/calculus/calculus_08_Techniques_of_Integration.pdf

2. http://www.math.toronto.edu/selick/B44.pdf

3. https://faculty.atu.edu/mfinan/4243/Laplace.pdf

4. https://matematika.cuni.cz/dl/pyrih/laplaceProblems/laplaceProblems.pdf

COURSE OUTCOMES :

No.	COURSE OUTCOMES	KNOWLEDGE LEVEL
CO1:	Recall fundamental concepts and definitions related to matrices, differentiation, integration, differential equations, and Laplace transforms.	**K1**
CO2:	Explain the properties of associated matrices and the methods of differentiation and integration.	**K2**
CO3:	Solve problems related to rank, characteristic roots, characteristic vectors of matrices, and apply Cayley-Hamilton theorem.	**K3**
CO4:	Examine and differentiate between various types of differential equations (Variable separable, Homogeneous, Non-homogeneous, Linear, Bernoulli's).	**K4**
CO5:	Formulate solutions for linear differential equations with constant coefficients, including finding particular integrals for various forms.	**K5**
CO6:	Judge the appropriateness of using Laplace transforms to solve differential equations and justify the choice of method.	**K6**

Mapping COs Consistency with POs: Course Articulation Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	9	3	3	1	0	0
CO2	9	9	3	3	0	1
CO3	9	3	9	3	0	1
CO4	9	3	9	1	1	0
CO5	9	3	9	3	1	0
CO6	9	3	9	3	0	1
Weightage	54	24	42	14	2	3
Weighted Percentage of Course Contribution to POs	**38.85%**	**17.27%**	**30.22.%**	**10.07%**	**1.44%**	**2.16%**

Course Outcomes Mapped with Knowledge Level (Revised Bloom's Taxonomy) And POs

CO/K-LEVEL	LEVEL OF CORRELATION			
	HIGH	MEDIUM	LOW	ZERO
CO1/K1	PO1	PO2,PO3	PO4	PO5,PO6
CO2/K2	PO1,PO2	PO3,PO4	PO6	PO5
CO3/K3	PO1,PO3	PO2,PO4	PO6	PO5
CO4/K4	PO1,PO3	PO2	PO4,PO5	PO6
CO5/K5	PO1,PO3	PO2,PO4	PO5	PO6
CO6/K6	PO1,PO3	PO2,PO4	PO6	PO5

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

K Levels	C1	C2	C3	Total Scholastic marks	Non-Scholastic Marks C4	CIA Total	%of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3		4	16%
K2	1	2	1	4		5	20%
K3	1	2	1	4		5	20%
K4	1	2	1	4		4	16%
K5		1	1	3		4	16%
K6		1	1	2		3	12%
Non Scholastic							
Total	4	10	6	20	5	25	100%

The COs and POs for the U25AMSIT1 - Allied Mathematics-I course in the B.Sc Information Technology Programme is effectively matched by the Course In-Charge.

Signature of the Course In-Charge Signature of the HOD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	I & II	U25AMSIT2	Allied-Theory	3	3 + 3	3	25	75	100
Course Title	ALLIED MATHEMATICS-II								

COURSE DESCRIPTION

Operations research helps in solving problems in different environments that needs decisions. The module covers the topics that include: linear programming, Transportation, Assignment, and CPM techniques. Analytic techniques will be used to solve problems facing business managers in decision environments. This course contains advantages, limitations and applications of O.R, formulation of Linear Programming Problems (L.P.P), methods to solve L.P.P. like graphical and simplex method. It enables the students to use the mathematical knowledge in an optimal path.

COURSE OBJECTIVES

1. To Study the Basis of Linear Programming problem.
2. To Give a detailed study on the Application to Transportation problem.
3. To study the concept of assignment problem and tactics in game theory.
4. To Understand the concept of Sequencing Problem.
5. To Exhibit an elaborate analysis of Network Problem and Evaluation of PERT and CPM
6. To use quantitate methods and techniques for effective decisions–making.
7. To apply the scientific method to the conditions under which the research is conducted.

UNITS

UNIT I- OPERATIONS RESEARCH (18 HRS)

Introduction-Basics of OR-Linear Programming formulations &graphical solution of two variables – Canonical & standard forms of LPP – Simplex Method: Simplex Method for < = constraints only.

UNIT II-TRANSPORTATION PROBLEM (18 HRS)

Finding the IBFS by North West corner rule, Least Cost method, VAM method. Optimal solution by MODI method – Degeneracy in Transportation Problem, Unbalanced transportation problem and Maximization problem.

UNIT III- ASSIGNMENT AND SEQUENCING PROBLEM (18 HRS)

Assignment algorithm – Balanced assignment problem- Unbalanced assignment problem, Travelling salesman problem. Processing of n jobs through two machines – Processing of n jobs through k machine.

UNIT IV- GAME THEORY (18 HRS)

Game theory: Introduction – saddle point (with and without)-mixed Strategy – Dominance Property.

UNIT V- NETWORK SCHEDULING (18 HRS)

Basic components of Networks – Logical Sequencing -Rules of Network construction- CPM computation -PERT computation.

TEXT BOOK:

KantiSwaroop, Gupta.P.K & Manmohan, Operations Research, Sultan Chand & Co. Twelth Edition.(517.7)

Unit	Chapters & Sections
I	Chapter 1 - Sec 1.1 to 1.8 , Chapter 2, 3 & Chapter 4 – Sec 4.1- 4.3
II	Chapter 10 - Sec 10.1-10.12
III	Chapter 11 - Sec 11.1-11.4,11.7, Chapter 12 - Sec 12.1 - 12.6
IV	Chapter 17 - Sec 17.1-17.5,17.7
V	Chapter 21 – Sec 25.1- 25.7

REFERENCES:

1. Prem Kumar Gupta and D.S. Hira, Operations Research: An Introduction, S.Chand and Co., Ltd. New Delhi,(380.3)
2. Hamdy A. Taha, Operations Research (7th Edn.), Prentice Hall of India, 2007.(517.9)

DIGITAL OPEN EDUCATIONAL RESOURCES:

1. http://www.classcentral.com/course/Sawayam-operations research-14219
2. https://www.bbau.ac.in/dept/UIET/EME-01%20Operation%20Research.pdf
3. https://nptel.ac.in/courses/111/107/111107128/

(Lectures by Prof. Kusum Deep, Dept. of Mathematics ,IIT Roorkee)

4. https://nptel.ac.in/courses/112/102/112106134/

(Lectures by Prof.G.Srinivasan, Dept. of . Management Studies IIT Madras)

5. https://www.youtube.com/watch?v=-1jpfY0zA7s (Standard and Canonical Form)
6. https://www.youtube.com/watch?v=fSuqTgnCVRg (Game therory)
7. https://www.youtubr.com/watch?v=KG5b0xZ_Ba8 (Networking theory).

COURSE OUTCOMES:

No.	COURSE OUTCOMES	KNOWLEDGE LEVEL
CO1:	Remember the features of operations research with its applications.	**K1**
CO2:	Illustrate, Recognize and solve Linear Programming Problem by Graphical and Simplex methods.	**K2**
CO3:	Compute the Basic feasible solution of Transportation problem by different methods	**K3**
CO4:	Analyze Transportation problem and evaluate its initial basic feasible solution.	**K4**
CO5:	Determine and solve the optimum solution for Assignment problems with illustrations.	**K5**
CO6:	Constructand Describe Network and compute PERT and CPM.	**K6**

Mapping COs Consistency with POs: Course Articulation Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	9	3	9	9	3	9
CO2	3	1	9	9	3	9
CO3	9	3	9	9	1	9
CO4	3	1	9	9	1	9
CO5	9	3	9	9	3	9
CO6	9	9	9	9	9	9
Weightage	42	20	54	54	20	54
Weighted Percentage of Course Contribution to POs	**17.21%**	**8.20%**	**22.13%**	**22.13%**	**8.20%**	**22.13%**

Course Outcomes Mapped with Knowledge Level (Revised Bloom's Taxonomy) And POs

CO/K-LEVEL	LEVEL OF CORRELATION			
	HIGH	MEDIUM	LOW	ZERO
CO1/K1	PO1, PO3	PO4	PO5, PO6	
CO2/K2	PO3, PO4, PO6	PO2	PO4, PO5	
CO3/K3	PO1, PO3	PO4, PO5, PO6		
CO4/K4	PO2, PO3	PO4, PO6	PO5	
CO5/K5	PO1, PO3, PO6	PO5	PO4	
CO6/K6	PO1, PO2, PO3, PO6	PO4, PO5		

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

K Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	-	2	-	2	-	3	12%
K2	1	2	1	4	-	5	20%
K3	1	2	2	5	-	4	16%
K4	1	1	1	3	-	3	12%
K5	1	2	2	5		3	12%
K6		1	-	1		2	8%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the U25AMSIT2-Allied Mathematics-II course in the B.Sc Information Technology Programme is effectively matched by the Course In-Charge.

Signature of the Course In-Charge Signature of the HOD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	II	U25IT3TP	Core Course – III – Theory and Practical	2+2	5+3	6	25 (15+10)	75 (45+30)	100
Course Title	DATA STRUCTURES AND ALGORITHMS								

COURSE DESCRIPTION

This course is designed to get sound knowledge of the concepts of data structures and algorithms.

COURSE OBJECTIVES

1. To understand the Concepts of Data Structures, Abstract Data Types, and Algorithms.
2. To implement and Apply Stacks and Queues using array implementations.
3. To implement and Analyze various types of Linked Lists.
4. To understand and Implement Binary Trees and Graph Data Structures, including Traversal Algorithms and Topological Sort.
5. To analyze and implement Sorting and Searching Algorithms, including Bubble Sort, Selection Sort, Insertion Sort, Linear Search, and Binary Search.
6. To understand and apply Algorithm Design Techniques such as Greedy Algorithms and Divide and Conquer.

UNIT I: Introduction: Data structures-Abstract data types-What is an Algorithm?-Goal of the Analysis of Algorithms-Types of Analysis- Stacks: Stack - Stack ADT- Applications – Simple array Implementation-Queue: Queue ADT–Exceptions–Applications–Simple array Implementation.

UNIT II: Linked List: Introduction-Linked Lists ADT-Arrays overview- Singly Linked Lists - Doubly Linked Lists - Circular Linked Lists.

UNIT III: Trees: Glossary –Binary Trees-Types of Binary Trees -Properties of Binary Trees - Binary Tree Traversals.Graphs:Introduction–Glossary-Applications of Graphs-Graph Representation-Graph Traversals-Topological Sort.

UNIT IV: Sorting and searching: Sorting definition-Classification of sorting algorithms-Bubble, Selection and Insertion sort-Searching Definition-Types of searching-Unordered and ordered Linear Search-Binary search

UNIT V: Algorithm design techniques-Greedy algorithm- Greedy strategy- Advantages and Disadvantages –Applications-Divide and Conquer: Introduction-strategy-Advantages and disadvantages-Applications.

TEXT BOOK(S):

1. Narasimha Karumanchi.N., Data Structures and Algorithms Made Easy,5th Edition, CareerMonk Publications, 2017.

Unit-I: Chapter 1: Section-1.3, 1.4, 1.5, 1.7, 1.12. Chapter 4: 4, 4.4, 4.5.,
Chapter 5: 5.1, 5.3, 5.4, 5.5, 5.6
Unit-II: Chapter 3: Section-3.1, 3.2, 3.4, 3.6, 3.7, 3.8.
Unit-III: Chapter 6: Section-6.1,6.2,6.3,6.4,6.5,6.6.
Chapter 9: Section-9.1, 9.2, 9.3, 9.4, 9.5, 9.6.
Unit-IV: Chapter 10: Section- 10.1,10.3,10.5,10.6,10.7.
Chapter 11: Section- 11.1, 11.3, 11.4 11.5, 11.6
Unit-V: Chapter 17: Section- 17.1,17.2,17.3,17.5,17.6.
Chapter 18: Section-18.2,18.6,18.7,18.9.

REFERENCE BOOK(S)S:

1. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,Introduction to Algorithms,4th Edition, MIT Press, 2022.

2. ISRD Group,Data Structures Using, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2009.

3. Ellis Horowitz, Sartaj Sahni and Susan and Rewson-Freed,Fundamentalsof Data Structures in C,2nd Edition, Universities Press, 2008.

WEB RESOURCE(S):

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.tutorialspoint.com/data_structures_algorithms/index.html
3. https:://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/

Practical - List of Experiments:

1. Stack Implementation.
2. Operations on Queue.
3. Linked List.
4. Binary Tree Traversal.
5. Operations of Graph.
6. Sorting.
7. Searching.
8. Greedy Method.
9. Divide and Conquer.

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand Fundamental Data Structures – Explain the concepts of abstract data types, stacks, queues, and their applications, along with simple array implementations.	K1
CO2	Implement Linked List Variants – Develop and manipulate different types of linked lists, including singly, doubly, and circular linked lists, to efficiently store and manage data.	K2
CO3	Analyze Tree and Graph Structures – Describe the properties, types, and traversal techniques of binary trees and graphs, and apply them to real-world problem-solving scenarios.	K4
CO4	Apply Sorting and Searching Techniques – Demonstrate various sorting and searching algorithms, such as bubble sort, selection sort, insertion sort, and binary search, while analyzing their efficiency.	K3
CO5	Utilize Graph Algorithms – Implement graph traversal methods, topological sorting, and different representations of graphs to solve computational problems.	K5
CO6	Implement Algorithm Design Strategies – Apply greedy algorithms and the divide-and-conquer approach to develop efficient problem-solving techniques, understanding their advantages and limitations.	K4

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	3	1	1	18
CO2	9	9	3	3	3	1	28
CO3	3	9	9	3	3	1	28
CO4	3	9	9	9	3	1	34
CO5	3	9	9	9	9	3	42
CO6	9	9	9	9	9	3	48
PO Weightage	36	48	40	36	28	10	198
Weighted Percentage of PO's	18.18	24.24	20.2	18.18	14.14	5.05	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	**Level of Correlation**			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO1	PO2, PO4	PO3, PO5, PO6	-
CO2 / K2	PO1, PO2	PO3, PO4, PO5	PO6	-
CO3 / K3	PO2, PO3	PO1, PO4, PO5	PO6	
CO4 / K4	PO2, PO3, PO4	PO1, PO5	-	
CO5 / K5	PO2, PO3, PO4, PO5	PO1, PO6	-	
CO6/ K6	PO1, PO2, PO3, PO4, PO5	PO6	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessmsent
	T1 4 Marks	**T2 10 Marks**	**Assignment 6 Marks**	**20 Marks**	**5 Marks**	**25 Marks**	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT3TP - Data Structures and Algorithms in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	II	U25AMSIT3	Allied-Theory	3	5	3	25	75	100
Course Title	ALLIED MATHEMATICS-III								

COURSE DESCRIPTION

This Course enables the students to solve the Mathematical equations through Numerical methods and understand the Statistical methods.

COURSE OBJECTIVES

1. To understand and apply various numerical methods for solving algebraic and transcendental equations.
2. To understand and implement interpolation techniques such as Newton's and Lagrange's interpolation formulas.
3. To calculate and interpret the measures of central tendency, dispersion, and skewness in descriptive statistics.
4. To understand and apply the basic principles of probability theory and related theorems in problem-solving.
5. To analyze and evaluate the relationships between variables using correlation and regression techniques.
6. To design, create, and implement solutions using the learned concepts in practical problems.

UNITS

UNIT-I ALGEBRAIC AND TRANSCENDENTAL EQUATIONS (15 HRS)

Introduction – Bisection Method – The Method of False Position – The Iteration Method – Newton -Raphson Method. (Problems only)

UNIT II INTERPOLATION (15 HRS)

Introduction-Newton's Interpolation Formulae-Lagrange's intepolation Formula . (Problems only)

UNIT- III DESCRIPTIVE STATISTICS (15 HRS)

Measures of Averages and Dispersion:Arithmetic Mean-Geometric Mean-Harmonic Mean-Median,Mode,Standard deviation-Mean deviation-Quartile deviation -Measures of Skewness and Kurtosis.

UNIT-IV CORRELATION AND REGRESSION (15 HRS)

Correlation and Regression -Properties of Simple Correlation and regression Coefficients-Simple Numerical problems only.

UNIT-V PROBABILITY (15 HRS)

Introduction-Axioms of Probability – Addition Theorem-Conditional Probability-Multiplication Theorem-Permutation – Combination – Baye's Theorem (except proof) Numerical Problems only.

TEXT BOOK:

1. S.S.Sastry ,Introductory Methods of Numerical Analysis,Fourth Edition, 2010, PHI Learning Pvt.Ltd.(517.6)
2. P.R.Vittal, Business Statistics, 2001, Margham Publications.(330.9)

Unit	Book	Chapters & Sections
I	**1**	Chapter 2 - Sec 2.1-2.5
II	**1**	Chapter 3 - Sec 3.3.1,3.3.2,3.6,3.9.1
III	**2**	Chapter 6 & 7
IV	**2**	Chapter 8 Pages 177 – 207 , Chapter 9
V	**2**	Chapter 14

REFERENCES:

1. Dr.P.Kandasamy, Dr.K.Thilagavathy, Dr.K.Gunavathi, Numerical Methods, S.Chand & Co. Pvt.Ltd, 2006 (517.6)
2. S.Arumugam,A.Thangapandi Issac,A.Somasundaram,Numerical Methods, Second Edition,SCITECH Publications(India)PVT,LTD.Chennai(517.6)
3. G.V. Shenoy, U.K.Srivastava and S.C.Sharma , Business Statistics, New Age International (P) Limited , Publishers(330.9)
4. Dr.S.RajaMohan,A.Thilagaraj,Introduction to Statistics,Learntech.Press,2010(511)
5. Statistics Theory and Practice, R.S.N.Pillai,Bagavathi,S.Chand & Company LTD(2013)(330.9)

Online Resources

E Book	https://www.scribd.com/document/378412307/S-S-Sastry-Introductory-Methods-of-Numerical-Analysis-PHI-Learning-Pvt-Ltd-2012
Swayam Course	https://onlinecourses.nptel.ac.in/noc25_ma41/preview https://onlinecourses.nptel.ac.in/noc25_mg35/preview

DIGITAL OPEN EDUCATIONAL RESOURCES:

1. **https://youtu.be/CRXgIfPtv3E**
2. **https://byjus.com**

COURSE OUTCOMES:

No.	COURSE OUTCOMES	KNOWLEDGE LEVEL
CO1:	Remember the basic concept algebraic and transcendental equations.	**K1**
CO2:	Understand numerical methods like Bisection, False Position, Iteration, and Newton-Raphson to solve algebraic and transcendental equations	**K2**
CO3:	Apply Newton's and Lagrange's interpolation formulas to solve interpolation problems.	**K3**
CO4:	Examine and interpret the measures of averages, dispersion, skewness, and kurtosis in descriptive statistics	**K4**
CO5:	Evaluate concept of probability, including the Axioms of Probability, Conditional Probability, and Baye's Theorem, to solve related problems.	**K5**
CO6:	Create solution to practical problems by integrating the correlation and regression techniques.	**K6**

Mapping COs Consistency with POs: Course Articulation Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	9	3	3	1	0	0
CO2	9	3	9	3	0	3
CO3	9	3	9	1	0	1
CO4	9	3	9	3	1	3
CO5	9	3	9	3	0	1
CO6	9	3	9	3	1	3
Weight age	54	18	48	14	2	11
Weighted Percentage of Course Contribution to POs	**100%**	**33.33%**	**88.88%**	**25.92%**	**3.70%**	**20.37%**

Course Outcomes Mapped with Knowledge Level (Revised Bloom's Taxonomy) And POs

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2,PO3	PO4	PO5,PO6
CO2 / K2	PO1,PO3	PO2,PO4,PO6	-	PO5
CO3 / K3	PO1,PO3	PO2	PO4,PO6	PO5
CO4 / K4	PO1,PO3	PO2,PO4,PO6	PO5	-
CO5 / K5	PO1,PO3	PO2,PO4	PO6	PO5
CO 6 / K6	PO1,PO3	PO2,PO4,PO6	PO5	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

K Levels	C1	C2	C3	Total Scholastic marks	Non-Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	1		2		3	12%
K2		2	1	3		3	12%
K3	1	1	1	3		4	16%
K4	1	2	1	4		5	20%
K5	1	2	1	4		5	20%
K6	1	2	1	4		5	20%
Non Scholastic							
Total	4	10	6	20	5	25	100%

The COs and POs for the U25AMSIT3-Allied Mathematics-III course in the B.Sc Information Technology Programme is effectively matched by the Course In-Charge.

Signature of the Course In-Charge Signature of the HOD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	II	U25ITSBE1	SKILL BASED ELECTIVE-Theory	3	2	2	25	75	100
Course Title	WEB DESIGN								

COURSE DESCRIPTION:

The course covers essential topics such as HTML, CSS, responsive design, and basic JavaScript, along with design principles, usability, and accessibility.

COURSE OBJECTIVE

1. To provide students with a foundational understanding of the Internet, its components, and its significance in business and communication.
2. To familiarize students with various Internet technologies, including modems, Internet addressing, and physical connections.
3. To introduce students to the basics of HTML, including its history, structure, and essential elements for creating web pages.
4. To enable students to design and format web pages using HTML, focusing on the body section and various formatting techniques.
5. To teach students how to create and manage tables and frames in HTML for effective data presentation and layout design.
6. To equip students with practical skills in using Internet browsers and HTML editors to create and publish web content.

UNIT I: Introduction to the Internet - Computers in Business, Networking, Internet, E-mail, Resource Sharing, Gopher, World Wide Web, Usenet, Telnet, Bulletin Board Service, Wide Area Information Service.

UNIT II: Internet Technologies - Modem, Internet Addressing, Physical Connections, Telephone Lines - Internet Browsers - Internet Explorer, Netscape Navigator.

UNIT III: Introduction to HTML - History of HTML, HTML Documents, Anchor Tag, Hyper Links - Head and Body Sections - Header Section - Title, Prologue, Links, Colorful Web Page, Comment Lines.

UNIT IV: Designing the Body Section - Heading Printing, Aligning the Headings, Horizontal Rule, Paragraph, Tab Settings, Lists, Unordered Lists, Ordered Lists.

UNIT V: Table Handling – Tables, Tables Creation in HTML - Frames – Frameset Definition, Frame Definition, Nested Framesets.

TEXT BOOK(S):

1. C. Xavier, World Wide Web Design with HTML, TMH, 2017.

Unit-I: Chapter 4: Section-4.1 to 4.6.
Unit-II: Chapter 5: Section-5. to 5.6. , Chapter 6: Section-6.1, 6.3.
Unit-III: Chapter 6: Section-6.4 to 6.7. Chapter 7: Section-7.1, 7.2, 7.4, 7.5.
Unit-IV: Chapter 8: Section- 8.1 to 8.6.
Unit-V: Chapter 9: Section- 9.1 to 9.7.

REFERENCE BOOK(S):

1. Thomas A. Powell, HTML& XHTML, TMH, Fourth Edition, Thirteenth Reprint, 2007.
2. N.P. Gopalan and J. Akilandeswari, Web Technology A Developer's Perspective, PHI, Second Printing, July 2008

WEB RESOURCE(S):

1.https://spoken-tutorial.org/tutorial-search/?search_foss=HTML&earch_language =English
2.https://spoken-tutorial.org/tutorial-search/?search_foss=JavaScript&search_language =English

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the Fundamentals of the Internet: Explain the role of computers in business, networking concepts, and various Internet	K1
CO2	Demonstrate Knowledge of Internet Technologies: Describe the working of modems, internet addressing, physical connections, telephone lines, and different web browsers like Internet Explorer and Netscape Navigator.	K2
CO3	Develop Basic HTML Skills: Understand the history and structure of HTML documents, including anchor tags, hyperlinks, and the head and body sections for web page creation.	K4
CO4	Design Web Page Layouts: Apply HTML formatting techniques such as headings, paragraph alignment, horizontal rules, tab settings, and list creation (ordered and unordered).	K3
CO5	Create and Manage Tables in HTML: Construct tables with various attributes, including row and column formatting, to organize data effectively on web pages.	K5
CO6	Implement Frames and Nested Framesets: Develop structured web layouts using frames, frameset definitions, and nested framesets to enhance web page navigation and usability.	K4

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	3	1	1	18
CO2	9	3	3	9	3	1	28
CO3	3	3	9	9	3	3	30
CO4	3	3	9	9	3	3	30
CO5	3	3	9	9	3	3	30
CO6	1	3	9	9	3	9	34
PO Weightage	28	18	40	48	16	20	170
Weighted PO Percentage	16.47	10.59	23.53	28.24	9.41	11.76	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	**Level of Correlation**			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO1	PO2, PO4	PO3, PO5, PO6	-
CO2 / K2	PO1, PO4	PO2, PO3, PO5	PO6	-
CO3 / K3	PO3, PO4	PO1, PO2, PO5, PO6	-	-
CO4 / K4	PO3, PO4	PO1, PO2, PO5, PO6	-	-
CO5 / K5	PO3, PO4	PO1, PO2, PO5, PO6	-	-
CO6/ K6	PO3, PO4, PO6	PO2, PO5	PO1	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessmsent
	T1 4 Marks	**T2 10 Marks**	**Assignment 6 Marks**	**20 Marks**	**5 Marks**	**25 Marks**	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25ITSBE1-Web Design in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credit	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	III	U25IT4	Core Course-IV-Theory	3	6	5	25	75	100
Course Title	PROGRAMMING IN JAVA								

COURSE DESCRIPTION:

The Programming in Java covers object-oriented programming concepts, program design, and practical application development through hands-on activities and projects.

COURSE OBJECTIVES (CO):

1. To introduce fundamental concepts of Object-Oriented Programming (OOP) and its benefits.
2. To provide an understanding of Java language features, environment, and program structure.
3. To develop skills in decision-making, looping, and control structures in Java.
4. To familiarize students with classes, objects, constructors, and inheritance mechanisms.
5. To explore Java packages, multithreading, and exception handling techniques.
6. To introduce graphics programming using AWT/Swing and database connectivity with JDBC.

UNIT I: Fundamentals of Object-Oriented Programming: Basic Concepts of Object-Oriented Programming - Benefits and Applications of OOP. Java Evolution: Java Features - Java Environment - Overview of Java Language: Java Program Structures, Statements – Implementing A Java Program – Java Virtual Machine –. Constants, Variables and Data Types: Constants- Variables – Data Types – Declaration of Variables–Giving Values to Variables – Scope of Variables– Symbolic Constants- Type Casting- Getting Values of Variables.

UNIT II: Operators and Expressions - Decision Making and Branching: Introduction - Decision making with if statement-Simple if statement -The if-else Statement- Nesting of if-else statements- The switch statement - The Conditional Operator (?:Operator) -Decision Making and Looping: While, Do, For Statement, Jump In Loops, Return Statement.

UNIT III : Classes, Objects and Methods: Defining A Class – Fields and Methods Declaration - Creating Objects – Accessing Class Members–Constructors–Method Overloading–Static Members – Nesting of Methods – Inheritance: Extending A Class – Overriding Methods – Final Variables, Methods and Classes –Abstract Methods and Classes –Visibility Control. Arrays, Strings: Creating Arrays – One- and two- Dimensional Arrays - Strings. Interfaces: Multiple Inheritance: Introduction - Defining Interfaces - Extending Interfaces-Implementation Interfaces - Accessing Interfaces Variables.

UNIT IV : Packages: Introduction - Java Packages - Using System Packages- Naming conventions - Creating packages - Accessing a package - Using a Package - Adding a class to a

package-Multithreaded Programming: Creating Threads– Extending the Thread Class – Thread- Life Cycle of Thread- Using Thread Method-Thread Priority – Synchronization – Managing Errors and Exceptions: Introduction - Types of Errors -Exceptions-Syntax of Exception Handling - Multiple Catch Statements.

UNIT V : Graphics Programming using AWT, Swing and Layout Manager: The Graphics Class-Lines and Rectangles-Circles and Ellipses-Drawing Arcs - Drawing Polygons – Introduction to AWT Package – Window Fundamentals – Layout Managers – Introduction to Swing Package – Components and Containers - Database Connectivity: Introduction–JDBC Architecture–Discussion with Example – Overview of JDBC Components.

TEXT BOOK(S)(S):

1. E. Balagurusamy, Programming with JAVA, McGraw Hill India, Sixth Edition, 2019.

Unit-I: Chapter 1: Section-1.1 to 1.5. Chapter 2: Section-2.1, 2.2, 2.9,
Chapter 3: Section-3.5, 3.7, 3.8., Chapter 4: Section-4.1 to 4.10.
Unit-II: Chapter 5: Section-5.1 to 5.9, Chapter 6: Section- 6.1 to 6.8
Chapter 7: Section-7.1 to 7.5
Unit-III: Chapter 8: Section-8.1 to 8.18. Chapter 9: Section- 9.1 to 9.5.
Chapter 10: Section- 10.1 to 10.5.
Unit-IV: Chapter 11: Section- 11.1 to 11.6., Chapter 12: Section-12.1 to 12.9.,
Chapter 13: Section- 13.1 to 13.5.
Unit-V: Chapter 15: Section- 15.1 to 15.7.

REFERENCE BOOK(S):

1. Sachin Malhotra and Saurabh Choudhary, Programming in Java, 2nd Edition, Oxford University Press,2018.
2. S.Sagayaraj, R.Denis, P.Karthik and D.Gajalakshmi, Java programming, Universities Press,2017.
3. Herbert Schildt, Java The Complete Reference, Eleventh Edition, McGraw-Hill Education Pvt. Ltd., 2019.
4. C.Muthu, Programming with Java, Vijay Nicole imprints private Limited, 2004.

WEB RESOURCE(S):

1. https://www. guru99.com/java-tutorial.html
2. https://www.javatpoint.com/java-tutorial
3. https://www.w3schools.com/java/

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Explain the fundamental concepts, benefits, and applications of Object-Oriented Programming and Java features	K2
CO2	Apply decision-making and looping constructs to solve problems using Java operators and expressions.	K3
CO3	Demonstrate the use of classes, objects, constructors, method overloading, inheritance, arrays, strings, and interfaces in Java.	K3
CO4	Develop Java programs using packages, multithreading concepts, and exception handling techniques.	K4
CO5	Design and implement graphical applications using AWT, Swing, and Layout Managers for effective user interfaces.	K5
CO6	Construct database applications using JDBC for connectivity and data manipulation.	K6

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

COs \ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**Weightage**
CO1	9	3	1	3	1	1	**18**
CO2	3	9	3	3	1	1	**20**
CO3	3	3	9	9	3	1	**28**
CO4	1	3	9	9	3	3	**28**
CO5	1	3	3	3	9	3	**22**
CO6	1	1	3	9	9	9	**32**
Total Weightage	**18**	**22**	**28**	**36**	**26**	**18**	**148**
Weightage %	**12.16**	**14.86**	**18.92**	**24.32**	**17.57**	**12.16**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K-Level	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO4	PO3, PO5, PO6	
CO2 / K2	PO2	PO1, PO3, PO4	PO5, PO6	
CO3 / K3	PO3, PO4	PO1, PO2, PO5	PO6	
CO4 / K4	PO3, PO4	PO2, PO5, PO6	PO1	
CO5 / K5	PO5	PO2, PO3, PO4, PO6	PO1	
CO6 / K6	PO4, PO5, PO6	PO3	PO1, PO2,	

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	**C1**	**C2**	**C3**	**Total scholastic marks**	**Non Scholastic Marks C4**	**CIA Total**	**% of Assessment**
	T1 **4 Marks**	**T2** **10 Marks**	**Assignment 6 Marks**	**20 Marks**	**5 Marks**	**25 Marks**	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT4 - Programming in Java in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	III	U25IT5P	Core Course-V-Practical	3	3	3	25	75	100
Course Title	JAVA PROGRAMMING LAB								

COURSE DESCRIPTION:

This course provides a comprehensive understanding of Java programming concepts and their practical implementation. The course emphasizes real-world application development using Java.

COURSE OBJECTIVES:

1. To introduce the fundamental principles of Java programming, including classes and objects.
2. To explore constructor overloading and inheritance for efficient code reuse.
3. To develop skills in string manipulation and interface implementation.
4. To understand and implement Java packages and multithreading for concurrent programming.
5. To handle exceptions effectively to build robust applications.
6. To design GUI-based applications using Swing and establish database connectivity with JDBC.

Develop a Java Program to:

1. Class and Objects.
2. Constructor Overloading.
3. Inheritance.
4. String Manipulation.
5. Interface.
6. Package.
7. Multithread.
8. Exception Handling.
9. GUI using Swing.
10. Database Connectivity using JDBC.

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Implement object-oriented programming concepts using classes and objects.	**K3**
CO2	Utilize constructor overloading and inheritance for code reusability.	**K3**
CO3	Perform string manipulations and use interfaces for modularity.	**K4**
CO4	Implement Java packages and multithreading for efficient programming.	**K4**
CO5	Apply exception handling mechanisms for robust application development	**K5**
CO6	Develop GUI applications using Swing and JDBC for database connectivity.	**K6**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	9	3	1	3	1	26
CO2	9	9	3	1	3	1	26
CO3	9	9	9	3	9	1	40
CO4	9	9	9	3	9	3	42
CO5	9	9	9	9	9	3	48
CO6	9	9	9	9	9	3	48
PO Weightage	**54**	**54**	**42**	**26**	**42**	**12**	**230**
Weighted PO Percentage	23.48	23.48	18.26	**11.3**	**18.26**	**5.22**	**100**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K-Level	High	Medium	Low	Zero
CO1 / K1	PO1, PO2	PO3, PO5	PO4, PO6	-
CO2 / K2	PO1, PO2	PO3, PO5	PO4, PO6	-
CO3 / K3	PO1, PO2, PO3, PO5	PO4	PO6	-
CO4 / K4	PO1, PO2, PO3, PO5	PO4, PO6	-	-
CO5 / K5	PO1, PO2	PO6	PO3, PO4, PO5	-
CO6 / K6	PO1, PO2	PO6	PO3, PO4, PO5	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	**C1**	**C2**	**C3**	**Total scholastic marks**	**Non Scholastic Marks C4**	**CIA Total**	**% of Assessment**
	T1 **4 Marks**	**T2** **10 Marks**	**Assignment 6 Marks**	**20 Marks**	**5 Marks**	**25 Marks**	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	**-**	**-**	**-**	**-**	**5**	**5**	**20%**
Total	**4**	**10**	**6**	**20**	**5**	**25**	**100%**

The COs and POs for the course U25IT5P- Java Programming Lab in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	III	U25AIT4	Allied-Theory	3	5	3	25	75	100
Course Title	Financial Accounting								

(Theory- 30 Marks and Problem- 45 Marks)

COURSE DESCRIPTION:

This course provides foundational knowledge in Financial Accounting, focusing on the systematic recording, classification, and summarization of financial transactions. It introduces key accounting concepts, conventions, and principles with emphasis on the double-entry system. The course covers journal and ledger preparation, subsidiary books, error rectification, depreciation methods, and preparation of final accounts. Additionally, it explores the integration of computer-based accounting and algorithms, highlighting their applications, features, and relevance in modern financial systems.

COURSE OBJECTIVES:

1. To introduce the fundamental concepts, principles, and conventions of accounting and provide a clear understanding of the double-entry system and its application through journals and ledgers.
2. To develop the ability to prepare and record transactions using subsidiary books**,** including purchase, sales, cash, and petty cash books.
3. To enable students to identify and rectify common accounting errors**,** and understand the treatment of depreciation using fixed installment and written-down value methods.
4. To equip learners with the skills to prepare basic final accounts**,** such as trading accounts, profit and loss accounts, and balance sheets, incorporating adjusting and closing entries.
5. To familiarize students with computer accounting systems**,** highlighting their application areas, features, and the advantages they offer in modern accounting practices.
6. To provide an understanding of accounting algorithms**,** their characteristics, requisites, and importance in developing effective computerized accounting systems.

UNIT-I : Meaning of accounting – concepts & conventions, principles of Double entry – Journal and ledger accounts.

UNIT-II: Subsidiary books – purchase day book, sales day book, cash book, Analytical Petty cash book.

UNIT-III: Rectification of errors – Depreciation account (Fixed installment method – Written down value method).

UNIT-IV: Preparation of Final accounts – Trading account, profit and loss account – Balance

sheet-adjusting and closing entries (simple problems only).

UNIT-V: Computer Accounting and Algorithm – Areas of application of computer in Accounting –features and advantages of computers and computer accounting Algorithm, Requisites of an effective Algorithm. Features of Algorithm.

Text Book(s)

1. T.S. Reddy and V. Murthy, Financial Accounting, Margham Publications, 2024.
2. S.P.Jain, K.L.Narang, Simmi Agrawal and Monika Sehgal, Financial Accounting, Kalyani Publishers, New Delhi, 2024.

Reference Book(s)

1. R.L.Gupta and V.K. Gupta – Financial Accounting, Sultan Chand and Sons, 2022.
2. S.N.Maheshwari and S.K. Maheshwari – Financial Accounting, Vikas Publishing House, 6th Edition, 2016.

Web Resources

1. https://www.accountingcoach.com/
1. https://www.coursera.org/
2. https://www.geeksforgeeks.org/fundamentals-of-algorithms
3. https://nptel.ac.in

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the fundamental concepts, conventions, and principles of accounting, and apply the double entry system to prepare journal and ledger entries.	K2
CO2	Record financial transactions using subsidiary books such as the purchase day book, sales day book, and various types of cash books.	K3
CO3	Detect and rectify errors in accounting, and compute depreciation using both the Fixed Installment and Written Down Value methods.	K3
CO4	Prepare Final Accounts including Trading Account, Profit and Loss Account, and Balance Sheet, incorporating adjusting and closing entries.	K4
CO5	Explain the role and benefits of computers in accounting, and describe the applications and features of computer accounting systems.	K2
CO6	Construct and evaluate a simple accounting algorithm, and identify the requisites and features of an effective algorithm in computer accounting.	K5

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3), Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	1	1	1	16
CO2	9	3	1	3	1	1	18
CO3	9	9	3	1	1	1	24
CO4	9	9	3	1	1	1	24
CO5	3	3	3	9	1	1	20
CO6	3	3	3	9	1	1	20
PO Weightage	42	30	14	24	6	6	122
Weighted Percentage of PO's	34.43	24.6	11.48	19.67	4.92	4.92	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2	PO3,PO4,PO5,PO6	-
CO2 / K2	PO1	PO2, PO4	PO3,PO5,PO6	-
CO3 / K3	PO1, PO2	PO3	PO4, PO5,PO6	-
CO4 / K4	PO1, PO2	PO3	PO4, PO5,PO6	-
CO5 / K5	PO4	PO1,PO2,PO3	PO5, PO6	-
CO6/ K6	PO4	PO1,PO2,PO3	PO5, PO6	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25AIT4- Financial Accounting in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	III	U25ITSBE2	SKILLED BASED ELECTIVE -Theory	3	2	2	25	75	100
Course Title	JAVASCRIPT AND PHP								

COURSE DESCRIPTION:
This course will cover the fundamentals of client-side scripting with JavaScript and server-side programming with PHP, enabling students to create dynamic, interactive, and data-driven web applications.

COURSE OBJECTIVES (CO):
1. To introduce JavaScript as a client-side scripting language and its role in web development.
2. To explore JavaScript variables, functions, and object-oriented features.
3. To understand window and frame management using JavaScript.
4. To develop form-handling techniques, including validation and event-driven programming.
5. To introduce PHP as a server-side scripting language and its fundamental concepts.
6. To explore session management, cookies, and object-oriented programming in PHP.

UNIT I: Introduction to Java Script: JavaScript's Role on the Web – A First JavaScript Program – Working with Variables, Functions: Variables – Defining Functions – Calling Functions – Understanding JavaScript Objects – Object Methods – Variable Scope.

UNIT II: Windows: The Window Object Model–Opening and closing Windows–Frames and Other Objects: Creating Frames–Using the TARGET Attribute–Nesting Frames–The NOFRAMES Tag.

UNIT III: Forms: Overview of Forms– The <FORM> Tag–Form Elements: Input Fields– Selection Lists– Multiline Text Fields – Validating a User's Input to a Form.

UNIT IV: PHP: Server sides scripting Language: Basic syntax–Types–Variables–Constants– Expressions– Operators–Control Structures.

UNIT V: Classes and Objects–Sessions-Cookies.

Text Book(s):

1. Don Gosselin, "JavaScript Comprehensive", 6th Edition, Vikas Publishing house, 2014.
   Unit I: chapter 1& 2 Unit II: chapter 5 Unit III: chapter 6
2. Steven Holzner "The PHP Complete Reference 5.2" – Tata McGraw – Hill Edition, 2007.
   Unit IV: Chapter 1(Sec 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7), Chapter 2
   Unit V: Chapter 4(Sec 4.1, 4.2, 4.3, 4.4)

Reference Book(s):

1. Steve Suehring, "JavaScript Step by Step", 2nd Edition, Microsoft Corporation
2. van Bayross, HTML, DHTML, Java Script, Perl, CGI, BPB, revised 3rd Edition.
3. Steven Holzer "Spring into PHP5", Tata McCraw Hill Edition.

WEB RESOURCE(S):

1. https://www.javatpoint.com/javascript-vs-php

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3), Weakly Correlated (1)

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	3	1	1	**18**
CO2	3	9	3	3	1	1	**20**
CO3	3	3	9	9	3	1	**28**
CO4	1	3	9	9	3	3	**28**
CO5	1	3	3	3	9	3	**22**
CO6	1	1	3	9	9	9	**32**
PO Weightage	**18**	**22**	**28**	**36**	**26**	**18**	**148**
Weighted PO Percentage	12.16	14.86	18.92	24.32	17.57	12.16	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K-Level	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO4	PO3, PO5, PO6	
CO2 / K2	PO2	PO1,PO3,PO4	PO5, PO6	--
CO3 / K3	PO3, PO4	PO1,PO2, PO5	PO6	--
CO4 / K4	PO3, PO4	PO2, PO5, PO6	PO1	--
CO5 / K5	PO5	PO2, PO3, PO4, PO5	PO1	--
CO6 / K6	PO4, PO5, PO6	PO3	PO1,PO2	--

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25ITSBE2- JavaScript and PHP in the B.Sc. Information Technology is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	III	U25ITSBE3P	Skill Based Elective-Practical	3	2	2	25	75	100
Course Title	HTML, Java Script and PHP LAB								

Course Description:

HTML, Java Script and PHP Lab provides students with the opportunity to apply their skills in creating dynamic, interactive, and data-driven web applications.

Course Objectives:

1. To understand the structure and functionality of HTML for web design.
2. To develop interactive web pages using JavaScript.
3. To implement form validation using JavaScript.
4. To gain hands-on experience in PHP for server-side scripting.
5. To work with session handling and cookies in PHP.
6. To integrate client-side and server-side scripting for dynamic web applications.

LIST OF EXPERIMENTS:

HTML LAB

1. (a) Creation of Vertical Frameset.

   (b) Creation of Horizontal Frameset.
2. Sending Mail.
3. Insertion of Image.
4. Application form Creation.
5. Creating an Advertisement for a Company.

JAVA SCRIPT LAB

1. Functions.
2. Frames.
3. Validation.

PHP LAB

1. Develop a PHP program using controls and functions.
2. Develop a PHP program using session.
3. Develop a PHP program using cookies.

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Design and develop structured web pages using HTML elements, frames, and multimedia components to create interactive and visually appealing layouts.	**K3**
CO2	Implement client-side interactivity through JavaScript functions, frames, and form validation to enhance user experience.	**K3**
CO3	Demonstrate the ability to handle user inputs by creating application forms and advertisements with HTML and JavaScript.	**K4**
CO4	Develop dynamic web applications using PHP controls, functions, and server-side scripting to process user data efficiently.	**K4**
CO5	Implement session management techniques using PHP sessions and cookies to maintain user-specific data across web applications.	**K5**
CO6	Integrate HTML, JavaScript, and PHP to develop interactive, functional, and dynamic web applications that meet industry standards.	**K6**

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	1	3	1	18
CO2	9	9	3	1	3	1	26
CO3	3	9	9	3	9	1	34
CO4	9	3	9	3	9	1	34
CO5	3	3	9	9	9	1	34
CO6	3	3	9	9	9	9	42
PO Weightage	**36**	**30**	**40**	**26**	**42**	**14**	**188**
Weighted PO Percentage	**19.15**	**15.96**	**21.28**	**13.83**	**22.34**	**7.45**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K-Level	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO5	PO3, PO4, PO6	-
CO2 / K2	PO1, PO2	PO3, PO5	PO4, PO6	-
CO3 / K3	PO2, PO3, PO5	PO1, PO4	PO6	-
CO4 / K4	PO1, PO3, PO5	PO2, PO4	PO6	-
CO5 / K5	PO3, PO4, PO5	PO1, PO2	PO6	-
CO6 / K6	PO3, PO4, PO5, PO6	PO1, PO2	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25ITSBE3P- HTML, Java Script and PHP Lab in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	IV	U25IT6TP	Core Course-VI – Theory and Practical	2+2	4+2	6	25	75	100
Course Title	DATABASE MANAGEMENT SYSTEMS								

COURSE DESCRIPTION

This course covers fundamental database concepts, including data modeling, normalization, SQL, PL/SQL, and an overview of hierarchical and network database systems.

COURSE OBJECTIVE

1. Understand and apply fundamental database concepts, including data modeling using the Entity-Relationship model and relational database principles.
2. Master the process of database normalization to design efficient and robust database schemas, focusing on 1NF, 2NF, 3NF, and BCNF.
3. Develop proficiency in Structured Query Language (SQL) for data retrieval, manipulation, and management, including advanced querying techniques.
4. Gain practical experience in Procedural Language/SQL (PL/SQL) to create stored procedures, functions, triggers, and manage cursors for complex database operations.
5. Analyze and compare the architectures and data models of hierarchical, network, and relational database management systems.
6. Acquire knowledge of T-SQL and object-oriented database concepts to enhance database development skills.

UNIT I: Introduction to DBMS – Advantages – DBMS Services – Relational Model -RDBMS Terminology – The Relational Data Structure – Relational Data Integrity – Codd's Rules – Database Architecture and Data Modelling: Conceptual, Physical and Logical Models. E-R Model – *Components of E-R Model* – E-R Model Symbols

UNIT II: Functional Dependencies – Introduction – Basic Definition – Trivial and Non-Trivial Dependencies – Closure of a Set of Dependencies – Nonloss Decomposition – First, Second and Third Normal Forms – Dependency Preservation – Boyce/Codd Normal Form.

UNIT II: Relational Algebraic Operations – Select – Project – Set Operations – Cartesian Product - Rename – Join – Division. SQL – Advantages – Types of SQL Commands – Creating table – Modify Table – Views – INSERT, UPDATE, and DELETE Operations – Queries – Aggregate Functions with Grouping and Having Clause.

UNIT III: Structured Query Language: Features of SQL - Select SQL Operations - Grouping the Output of the Query - Querying from Multiple Tables - Retrieval Using Set operators - Nested Queries. T-SQL.

UNIT IV: Joins Operations - Introduction to PL/SQL – Variables – Data Types – Control Structure – Cursors – Iterative Control Statement – PL/SQL Exception – Triggers – Types of Triggers

UNIT V: Introduction to SQL: Overview – Catalog – Views – Transactions Embedded SQL – Dynamic SQL and SQL/CLI-Data Definition Commands-Data Manipulation Commands.

TEXT BOOK(S):

1. Atul Kahate, "Introduction to Database Management Systems", Pearson Education Ltd, 2022.

Unit-I: Chapter 1: Section-1.1 to 1.5. Chapter 2: Section-2.1, 2.2, 2.9, Chapter 3: Section-3.5, 3.7, 8.8.
Chapter 4: Section-4.1 to 4.10.
Unit-II: Chapter 5: Section-5.1 to 5.9, Chapter 6: Section- 6.1 to 6.8 Chapter 7: Section-7.1 to 7.5
Unit-III: Chapter 8: Section-8.1 to 8.18. Chapter 9: Section- 9.1 to 9.5.
Chapter 10: Section- 10.1 to 10.5.
Unit-IV: Chapter 11: Section- 11.1 to 11.6., Chapter 12: Section-12.1 to 12.9.,
Chapter 13: Section- 13.1 to 13.5.
Unit-V: Chapter 15: Section- 15.1 to 15.7.

REFERENCE BOOK(S)(S):

1. Abraham Silberschatz, Hendry F. Korth, S Sudharshan,"Database System Concepts", 6th Edition, McGraw Hill International,2019
2. C.J. Date, "An Introduction to Database Systems" Addison Wesley, 2000.

WEB RESOURCE(S):

1. https://www.tvu.edu.in/wp-content/uploads/2019/11/final-econtent-DBMS_compressed.pdf

Practical - List of Experiments:

SQL:

1. Table Creation, Data Insertion, Deletion, Updating and Selection.
2. DML: Operators (Arithmetic, Relational, Logical).
3. SQL Functions: Single Row Function & Group Functions.
4. DML: Set operations, Join operations.
5. Nested Queries.
6. Creation and manipulation of Views.

PL/SQL:

1. PL/SQL- block.
2. Cursors.
3. Functions & Procedures.
4. Triggers and Package.

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand Database Fundamentals: Explain the fundamentals of database systems, including flat files, relational databases, and the role of a Database Administrator (DBA).	**K2**
CO2	Apply Normalization Techniques: Demonstrate an understanding of functional dependencies and normalization techniques by organizing data into 1NF, 2NF, 3NF, and BCNF for efficient database design.	**K3**
CO3	Utilize SQL for Data Retrieval: Develop SQL queries to retrieve, manipulate, and group data from multiple tables using set operators and nested queries in both SQL and T-SQL environments.	**K3**
CO4	Implement Procedural Language SQL (PL/SQL) : Design and implement PL/SQL programs, including cursor management, exception handling, stored procedures, triggers, and functions to enhance database functionality.	**K4**
CO5	Analyze Hierarchical and Network DBMS Architectures: Compare and contrast hierarchical, network, and relational database models, understanding their architectures, data structures, and manipulation techniques.	**K4**
CO6	Evaluate Different Data Models: Assess the strengths and limitations of various data models (Hierarchical, Network, and Relational) and their applicability to different types of database applications.	**K5**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3), Weakly Correlated (1)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	3	9	3	3	30
CO2	3	3	3	9	3	3	24
CO3	9	3	9	3	9	3	36
CO4	3	9	9	3	3	3	30
CO5	9	3	3	3	9	3	30
CO6	3	3	3	3	3	3	18
PO Weightage	36	24	30	30	30	18	168
Weighted PO Percentage	21.43	14.29	17.86	17.86	17.86	10.71	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO1,PO4	PO2, PO3, PO5,PO6	-	-
CO2 / K2	PO4	PO1, PO2, PO3, PO5, PO6	-	-
CO3 / K3	PO1, PO3, PO5	PO2, PO4, PO6	-	-
CO4 / K4	PO2, PO3	PO1, PO4, PO5, PO6	-	-
CO5 / K5	PO1, PO 5	PO2, PO3, PO4, PO6	-	-
CO6/ K6	-	PO1,PO2,PO3,PO4, PO5, PO6	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT6TP-Database Management Systems in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	IV	U25AIT5TP	ALLIED - Theory and Practical	2+2	2+2	3	25 (15+10)	75 (45+30)	100
Course Title	ACCOUNTING PACKAGE								

COURSE DESCRIPTION:

This course combines theoretical knowledge of accounting principles with hands-on training in using accounting software, enabling students to efficiently manage financial data and generate reports.

COURSE OBJECTIVE:

1. To understand the fundamentals of computerized accounting and its advantages over manual accounting.
2. To explore the features and functionalities of Tally software for accounting purposes.
3. To classify accounts and understand the different types of vouchers in Tally.
4. To develop skills in inventory master creation, including stock groups, godowns, and units of measurement.
5. To understand the basics of Tax Deducted at Source (TDS) and its implementation in Tally ERP 9.
6. To gain knowledge of Goods and Services Tax (GST) setup, tax computation, and reporting in Tally.

UNIT I: Fundamentals of Computerized Accounting – Principles of Accounting – Computerized Accounting Vs Manual Accounting - Features of Tally – Starting Tally.

UNIT II: Classification of Accounts –Introduction – Groups – Primary groups – Vouchers Types of vouchers - Payment voucher-Receipt Voucher-Sales Voucher-Purchase Vouchers.

UNIT III: Inventory master creation: Creating inventory masters – Creating a stock group - Creating a Godown - Creating a unit of measurement - Creating a stock item.

UNIT IV: Introduction - Basic concepts of TDS - TDS in Tally ERP 9 – Setup - TDS statutory masters- TDS reports.

UNIT V: Introduction to GST - Enabling GST and defining Tax details - Transferring input Tax credit to GST - Intrastate supply of Goods - Interstate supply - Return of goods – Outward supply of services - GST reports.

Text book(s):

1.Computer Application in Business, K.Mohan Kumar, Rajkumar, 2025
Unit 1: Chapter 1 and Chapter 5

2. Tally-Accounting software –S.Palanivel - Margham publications.
Unit 2: Chapter 4 and Chapter 5

3. Tally ERP 9 with GST, BPB Publications.
Unit 3: Chapter 7: Section-7.5.1 to 7.5.5.
Unit 4: Chapter 7: Section-7.18 to 7.22, 7.26.
Unit 5: Chapter 7: Section-7.33 to 7.40.

Reference book(s):

1) Agrawal.N. and Sharma.R, Comdex Tally ERP 9 , Dreamtech Press, 2022.

Web References:

https://tallysolutions.com/
https://help.tallysolution-s.com/

Practical - List of Exercises

1) Trial Balance
2) Stock Creation
3) Voucher Creation
4) Pay Slip Preparation
5) TDS (Tax Deducted Sources)
6) GST (Goods and Service Tax)
7) Purchase Entry
8) Sales Entry
9) Accounting Package

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the Fundamentals of Computerized Accounting – Explain the principles of accounting and compare computerized accounting with manual accounting, with a focus on Tally and its features.	**K1**
CO2	Classify and Manage Accounts Using Tally – Identify different account groups, primary groups, and voucher types, and effectively record transactions using various types of vouchers in Tally.	**K2**
CO3	Create and Manage Inventory in Tally – Develop skills in creating inventory masters, including stock groups, godowns, units of measurement, and stock items, for efficient inventory management.	**K4**
CO4	Apply TDS Concepts in Tally ERP 9 – Demonstrate knowledge of Tax Deducted at Source (TDS) by setting up statutory masters, configuring TDS in Tally, and generating TDS reports.	**K3**
CO5	Implement GST in Tally – Configure and apply GST settings in Tally, manage input tax credit, and handle intrastate and interstate supply of goods and services while generating GST reports.	**K5**
CO6	Generate and Analyze Financial Reports – Utilize Tally ERP 9 to prepare and interpret financial reports, tax reports, and statutory compliance documents for effective decision-making in business accounting.	**K4**

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	3	3	1	1	1	1	10
CO2	3	3	1	1	1	1	10
CO3	3	3	3	1	3	1	14
CO4	1	3	3	1	3	1	12
CO5	1	1	3	1	3	9	18
CO6	1	1	3	1	3	9	18
PO Weightage	12	14	14	6	14	22	82
Weighted PO Percentage	14.63	17.07	17.07	7.32	17.07	26.83	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs

CO / K - Level	Level of Correlation			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	--	PO1, PO2	PO3, PO4, PO5, PO6	--
CO2 / K2	--	PO1, PO2,	PO3, PO4, PO5, PO6	--
CO3 / K3	--	PO1, PO2, PO3	PO4, PO5, PO6	--
CO4 / K4	--	P02, PO3, PO5	PO1, PO4, PO6	--
CO5 / K5	PO6	PO3, PO5	PO1, PO2, PO4	--
CO6/ K6	PO6	PO3,PO5	PO1, PO2, PO4	--

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25AIT5TP -Accounting Package in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	IV	U25AIT6	Allied - Theory	3	4	3	25	75	100
Course Title	DIGITAL MARKETING								

COURSE DESCRIPTION:

This course is providing an overview of digital marketing strategies, including online presence development, SEO, content and emails marketing, social media engagement, and online advertising techniques.

COURSE OBJECTIVES:

1. To make the students to gain knowledge and skills in digital marketing.
2. To understand the online environment and device strategies for establishing a digital presence.
3. To apply Search Engine Optimization techniques for both on-site and off-site.
4. To know the process of content and email marketing.
5. To learn Social Media Marketing strategies and engage in social networks.
6. To assess the various formats of online advertising.

UNIT I: Introduction: Digital Marketing- Internet Users- Digital Marketing Strategies-Digital Advertising in India-Skills Required in Digital Marketing-Digital Marketing Plan.

UNIT II: Search Engine Optimization: Search engine-Concept of SEO –SEO phases-On-Page Optimization-Off-page optimization –Social Media Reach-Maintenance.

UNIT III: Email Marketing: Introduction to Email marketing-Email as a medium for direct marketing-Email as a medium for marketing messages- Email newsletters - Content marketing:

UNIT IV: Social Media Marketing:How to Build a Successful Strategy- Listen -Goal Setting-Strategy- Implementation-Measure-Improve.

UNIT-V: Online Advertising: Introduction- Programmatic advertising- Objectives and management - Online ad formats- Search advertising- Network advertising- Landing pages

Text book(s)

1. Seema Gupta., Digital Marketing, 2nd Edition, McGraw Hill Publication, 2021.
   (NCT Library No.: 00063729)
   Unit-I: Chapter 1: Section 1.1 to1.6.
   Unit-II: Chapter 10: Section-10.1 to 10.6.
   Unit-IV: Chapter 4: Section-4.1.

2. Alan Charlesworth , Digital Marketing - Practical Approach ,3rd Edition , Routledge publisher, 2018

Unit-III: Chapter 8: Section-8.1 to 8.4. Chapter 3: Section 3.7
Unit-V: Chapter 7: Section 7.1 to 7.7

Reference book(s)

1. Rochelle Grayson, Rochelle Grayson, BCCampus Victoria.B.C., Digital Marketing, Creative Commons Attribution, 2023.
2. Alan Charlesworth, Digital marketing: A practical approach, 3rd Edition, Routledge, 2018.

Web Reference (s)

https://learndigital.withgoogle.com/digitalgaragehttps://academy.hubspot.com/
https://neilpatel.com/blog/
https://www.searchenginejournal.com/

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the Online Business Environment – Explain the fundamentals of online presence development for B2C and B2B models.	**K2**
CO2	Apply Search Engine Optimization (SEO) Techniques – Demonstrate the ability to optimize websites using keyword selection, on-site and off-site SEO strategies, and paid search techniques.	**K3**
CO3	Develop Effective Content and Email Marketing Strategies – Create and manage content marketing campaigns using various content types and data-driven approaches while understanding the email marketing process, design, and delivery.	**K4**
CO4	Utilize Social Media for Marketing – Examine the impact of social networks, blogging, and viral marketing in building brand awareness and engaging online communities.	**K4**
CO5	Implement Online Advertising Techniques – Evaluate different online advertising formats, including search engine advertising, network advertising, affiliate programs, and landing page optimization.	**K5**
CO6	Integrate Digital Marketing Strategies – Formulate comprehensive digital marketing strategies that incorporate SEO, content marketing, social media, and online advertising to enhance online business performance.	**K6**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	3	9	9	1	3	3	28
CO2	3	9	1	3	9	1	26
CO3	3	3	3	9	9	1	28
CO4	3	3	3	9	9	3	30
CO5	3	3	3	9	9	1	28
CO6	3	9	3	9	3	1	28
PO Weightage	18	36	22	40	42	10	168
Weighted PO Percentage	10.71	21.43	13.09	23.81	25	5.95	100%

.

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO2,PO3	PO1,PO5,PO6	PO4	--
CO2 / K2	PO2,PO5	PO1, PO4	PO3,PO6	--
CO3 / K3	PO4,PO5	PO1,PO2, PO3	PO6	--
CO4 / K4	PO5,PO6	PO1,P02,PO3, PO4	--	--
CO5 / K5	PO4,PO5	PO1, PO2, PO3	PO6	--
CO6/ K6	PO2,PO4	PO1,PO3,PO5	PO6	--

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25AIT6- Digital Marketing in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	IV	U25ITNME1	Non Major Elective-Theory	3	2	2	25	75	100
Course Title	FUNDAMENTALS OF INFORMATION TECHNOLOGY								

COURSE DESCRIPTION:
The Fundamentals of Information Technology course provides students with a comprehensive introduction to the essential concepts, tools, and technologies that form the foundation of information technology.

COURSE OBJECTIVE:
1) To understand the basic concepts, evolution, and classification of digital computers.
2) To explore the architecture of computers, including CPU, memory, and peripheral devices.
3) To gain knowledge of different types of software, programming languages, and operating systems.
4) To learn the fundamentals of computer networks, internet technologies, and web design.
5) To examine the role of computers in various fields like education, science, and medicine.
6) To understand cyber security threats like viruses, worms, and computer security measures.

UNIT I: Introduction to Computers - Generation of Computers - Classification of Digital Computer - Anatomy of Digital Computer.

UNIT II: CPU and Memory - Secondary Story Devices - Input Devices - Output Devices.

UNIT III: Introduction to Computer Software - Programming Language - Operating Systems – Introduction to Database Management System.

UNIT IV: Computer Networks - WWW and Internet - Email - Web Design.

UNIT V: Computers at Home, Education, Entertainment, Science, Medicine and Engineering – Introduction to Computer Security - Computer Viruses, Bombs, Worms.

Text Book(S):
1) Pradeep .K. Sinha and Priti Sinha, Computer Fundamentals, 1st Edition, Bpb Publication, 2020.
Unit-I: Chapter 1, Chapter 2 and Chapter 3.
Unit-II: Chapter 7, Chapter 8 and Chapter 9.
Unit-III: Chapter 10, Chapter 12, Chapter 14 and Chapter 16.
Unit-IV: Chapter 17 and Chapter 18.
Unit-V: Chapter 19.

Reference Book(S):

1) Rajaraman.V, Fundamentals of Computers, 6th Edition, PHI Learning Pvt Ltd. 2021.

Web Resource(S):

1. https://testbook.com/learn/computer-fundamentals
2. https://www.tutorialsmate.com/2020/04/ computer-fundamentals-tutorial.html
3. https://www.javapoint.com/computer-fundamentals-tutorial

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand basic concepts and terminology of information technology, digital computers.	**k2**
CO2	Have a basic understanding of personal computers and their operations.	**K3**
CO3	Understand the concepts of how to create web pages and websites.	**K2**
CO4	Explain about on internet email WWW concepts.	**K3**
CO5	Explain the applications of Computers in various fields such as Home, Education, Entertainment, Science, Medicine and Engineering..	**K3**
CO6	Explain the information security virus and worms	**K3**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO / PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	3	1	3	1	20
CO2	9	3	9	1	3	1	26
CO3	3	3	9	3	9	1	28
CO4	3	9	3	9	9	3	36
CO5	1	3	1	3	1	9	18
CO6	3	9	1	9	1	9	32
PO Weightage	28	30	26	26	26	24	160
Weighted PO Percentage	17.5	18.75	16.25	16.25	16.25	15	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO1	PO2,,PO3,PO5	PO4,PO6	--
CO2 / K2	PO1,PO3	PO2, PO5	PO4,PO6	--
CO3 / K3	PO3,PO5	PO1,PO2, PO4	**PO6**	--
CO4 / K4	PO2,PO4 PO5,	PO1,PO3, PO6	--	--
CO5 / K5	PO6	PO2, PO4	**PO1,PO3,PO5**	--
CO6/ K6	PO2,PO4,PO6	PO1	**PO3,PO5**	--

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25ITNME1- Fundamentals of Information Technology in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT7	Core Course-VII-Theory	3	5	5	25	75	100
Course Title	PYTHON PROGRAMMING								

Course Description:

This course introduces students to the fundamentals of programming using Python, one of the most widely used and versatile programming languages. It is designed for beginners and provides a comprehensive understanding of Python's syntax, data structures, and core programming concepts.

Course Objectives:

1. To introduce the fundamental concepts of Python programming, including syntax, data types, and basic operations.
2. To familiarize students with data structures such as lists, tuples, sets, and dictionaries, and their applications.
3. To develop problem-solving skills using control structures such as loops, decision-making statements, and comprehensions.
4. To provide hands-on experience with Python libraries such as NumPy for array manipulation and mathematical operations.
5. To enable students to work with file handling, exception handling, and logging mechanisms in Python.
6. To introduce regular expressions and GUI programming using Tkinter to develop interactive applications.

UNIT I: Python Programming: An Introduction-IDLE-Python Strings-Operators- Variables and Assignment-Keywords-Script Mode-Functions: Built-in Functions-Function Definition and Call-importing User-defined Module. Control Structures: if conditional statement - Iteration Statements.

UNIT II: Strings: Strings-Slicing-Membership-Built-in Functions of Strings-String Processing Examples. Mutable and immutable Objects: List- Sets.

UNIT III: Mutable and Immutable Objects: Tuples - Dictionary. Recursion: Recursive Solutions for Problems on Numeric Data-Problems on Strings-Problems on List. Files and Exceptions: File Handling-Writing Structures to a File-Errors and Exceptions-Handling Exceptions using try-except –File Processing Example.

UNIT IV: Classes and Object Oriented Programming: Classes - Class definitions - Storing Classes in Modules. GUI Programming: Graphical User Interfaces –Using the tkinter Module - Display Text with Label Widgets - Organizing Widgets with Frames-Button Widgets and Info Dialog Boxes-Getting Input with the Entry Widget-Using Labels as Output Fields-Radio Buttons and Check Buttons.

UNIT V: Applications of Python: Sharing Data Using Sockets: Client-Server Communication on the same machine–Accessing Web Data. Managing Databases using SQL: Database Concepts – Creating Database and Tables – Inserting Data into Table– Retrieving Data from Table–Updating Data in a Table–Deleting Data from Table / Deleting Table.

TEXT BOOK(S):

1. Sheetal Taneja, Naveen Kumar, Python Programming, Pearson,12th Edition,2021

   UNIT I: Chapter 1 (Sec 1.1-1.8, 2.1- 2.3, 3.1, 3.2), Chapter 2 (Sec 2.1- 2.3)
   Chapter 3 (Sec 3.1, 3.2)
   UNIT II: Chapter 6 (Sec 6.1, 6.2) & Chapter 7 (Sec 7.1,7 .2)
   UNIT III: Chapter 7 (Sec 7.3,7 .4), Chapter 8 (Sec 8.1- 8.3) & Chapter 9 (Sec 9.1- 9.5)
   UNIT V: Chapter 18 (Sec 18.2, 18.3)

2. Tony Gaddis, Starting out with Python, Second Edition, Pearson Pvt.Ltd.,4th Edition, 2019
   UNIT IV: Chapter 13 (Sec 13.1-13.8)

REFERENCE BOOK(S):

1. MarkLutz, Programming Python, O'Reilly,4th Edition,2010.
2. Charles Severance, Python for Everybody, Kindle Edition,2016.

WEB RESOURCE(S):

1. www.docs.python.org/3/tutorial/index.html
2. www.halvorsen.blog/documents/programming/python/resources/PythonProgramming.pdf
3. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Course Outcomes and Cognitive Level Mapping

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO Number	**CO Statement**	**Cognitive Level**
CO1	Explain the basic syntax, features, and operations of Python programming.	K1
CO2	Demonstrate the use of data types, data structures, and type conversion techniques in Python.	K2
CO3	Implement control flow mechanisms, including loops and decision-making structures, for problem-solving.	K3
CO4	Utilize functions, modules, and packages to develop modular and reusable Python programs.	K4
CO5	Apply file handling techniques and exception handling concepts to manage data and errors efficiently.	K5
CO6	Design and implement applications using regular expressions and GUI programming with Tkinter.	K6

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	1	3	1	**18**
CO2	9	9	3	3	3	1	**28**
CO3	3	9	9	3	9	3	**36**
CO4	1	3	9	9	9	3	**34**
CO5	3	9	3	9	9	9	**42**
CO6	1	3	9	9	9	9	**40**
PO Weightage	**26**	**36**	**34**	**34**	**42**	**26**	**198**
Weighted Percentage of PO's	**13.13**	**18.18**	**17.17**	**17.17**	**21.21**	**13.13**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs

CO / K - Level	Level of Correlation			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO3, PO4	PO1, PO2, PO5, PO6	--	--
CO2 / K2	PO1, PO2	PO3, PO4, PO5	**PO6**	--
CO3 / K3	PO2, PO3, PO5	PO1, PO4, PO6	-	--
CO4 / K4	PO3, PO4, PO5	PO2, PO6	, PO1	-
CO5 / K5	PO2, PO4, PO5, PO6	PO1, PO3	-	-
CO6/ K6	PO3, PO4, PO5, PO6	PO2,	PO1	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	**C1**	**C2**	**C3**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	T1 **4 Marks**	**T2** **10 Marks**	**Assignment 6 Marks**	**20 Marks**	**5 Marks**	**25 Marks**	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT7- Python Programmingin the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Curse Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT8P	Core Course-VIII-Practical	3	6	3	25	75	100
Course Title	PYTHON PROGRAMMING LAB								

Course Description:

This lab-based course provides hands-on experience with Python programming, focusing on problem-solving, algorithm development, and real-world applications. Students will explore fundamental programming concepts, including data types, control structures, functions, file handling, and object-oriented programming.

Objectives:

1. To introduce students to the fundamental concepts of Python programming.
2. To develop problem-solving skills using Python's built-in data types and control structures.
3. To enhance students' ability to manipulate arrays and perform operations on data efficiently.
4. To improve coding skills by implementing functions and modular programming concepts.
5. To familiarize students with string handling, regular expressions, and file management in Python.
6. To enable students to design and develop GUI-based applications using Python.

LIST OF EXERCISES

1) Simple programs in Python
2) Data Types and Operations
3) Array Manipulations
4) Programs using Functions
5) Handling Strings
6) Programs using Lists, Tuples and Dictionaries
7) Executing Regular Expressions in Python
8) GUI Programs
9) Database Operations - Insertion and Retrieval

Course Outcomes and Cognitive Level Mapping

Each CO is mapped with its respective knowledge level from **Revised Bloom's Taxonomy** (RBT).

CO Number	CO Statement	Cognitive Level
CO1	Apply fundamental Python programming concepts to develop simple programs.	K3
CO2	Utilize various data types, operators, and expressions for computational tasks.	K3
CO3	Implement functions and use modular programming for problem-solving.	K4
CO4	Manipulate and perform operations on strings, lists, tuples, and dictionaries.	K4
CO5	Develop programs integrating regular expressions, file handling, and GUI components.	K5
CO6	Design Python-based solutions for real-world applications.	K6

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	3	1	1	1	**18**
CO2	9	9	3	3	1	1	**26**
CO3	3	9	9	9	3	1	**34**
CO4	3	9	9	9	3	3	**36**
CO5	3	3	9	3	9	9	**36**
CO6	1	3	3	3	9	9	**28**
PO Weightage	**28**	**36**	**36**	**28**	**26**	**24**	**178**
Weighted Percentage of PO's	**15.73**	**20.22**	**20.22**	**15.73**	**14.61**	**13.48**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO3	PO4, PO5, PO6	--
CO2 / K2	PO1, PO2	PO3, PO4	PO5,PO6	--
CO3 / K3	PO2, PO3, PO4	PO1, PO5	--	--
CO4 / K4	PO2, PO3, PO4	PO2, PO5, PO6	PO1	-
CO5 / K5	PO3, PO5, PO6	PO1, PO3, PO4	-	-
CO6/ K6	PO5, PO6	PO2, PO3, PO4	PO1	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT8P- Python Programming Lab in the B.Sc.Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT9	Core Course -IX- Theory	3	5	5	25	75	100
Course Title	OPERATING SYSTEMS								

Course Description:

This course provides a comprehensive introduction to the principles and concepts of operating systems. It covers fundamental topics such as process management, memory management, file systems, input/output systems, concurrency, and security. Students will explore how operating systems serve as an interface between hardware and software, enabling efficient resource allocation and multitasking.

Course Objectives (COs):

1. To understand the fundamental concepts and functions of an operating system, including different types of operating systems and their architecture.
2. To gain an understanding of process management, including processes, threads, scheduling algorithms, and inter-process communication (IPC) mechanisms.
3. To study memory management techniques, including memory hierarchy, allocation strategies, and virtual memory concepts.
4. To understand the organization of file systems, including file structures, directories, allocation methods, and file system protection mechanisms.
5. To study device management, including characteristics of I/O devices, I/O operations, device drivers, and disk scheduling algorithms.
6. To develop the ability to implement and manage OS components and efficiently troubleshoot common system issues.

UNIT I: Introduction to Operating System: Operating System-Operating System Software -A Brief History of Machine Hardware -Types of Operating Systems -Brief History of Operating System Development Object-Oriented Design of Operating System.

UNIT II: Memory Management: Early Systems: Single-User Contiguous Scheme - Fixed Partitions-Dynamic Partitions- Best-Fit versus First-Fit Allocation - Deallocation - Relocatable Dynamic Partitions. Virtual Memory: Paged Memory Allocation-Demand Paging-Page Replacement Policies and Concepts - Segmented Memory Allocation-Segmented/Demand Paged Memory Allocation – Virtual Memory – Cache Memory

UNIT III: Processor Management: Overview-About Multi-Core Technologies-Job Scheduling Versus Process Scheduling-Process Scheduler-Process Scheduling Policies-Process Scheduling Algorithms – Interrupts Deadlock-Seven Cases of Deadlock -Conditions for Deadlock-Modeling Deadlock- Strategies for Handling Deadlocks –Starvation

UNIT IV: Concurrent Processes: What is Parallel Processing? – Introduction to Multicore processors – Typical Multiprocessor configuration – Process Synchronization Software Device Management: Types of Devices-Sequential Access Storage Media Direct Access Storage Devices- Magnetic Disk Drive Access Times.

UNIT V: File Management: The File Manager -Interacting with the File Manager -File Organization - Physical Storage Allocation -Access Methods-Levels in a File Management System - Access Control Verification Module –Data Compression

TEXT BOOK(S):

1. Understanding Operating Systems, Ann McIver McHoes, Ida M. Flynn, 8th Edition, Course Technology, Cengage Learning, 2017.

   UNIT I: Chapter 1
   UNIT II: Chapters 2 & 3
   UNIT III: Chapters 4 & 5
   UNIT IV: Chapters 6 & 7
   UNIT V: Chapters 8

REFERENCE BOOK(S):

1. Operating Systems Internals and Design Principles (2018), William Stallings, 9th Edition, Prentice Hall.
2. Andrew S.Tanenebaum (2011), Operating Systems and Design Implementation, 3rd Edition, Pearson Education
3. Abraham Silberschatz , Perter Baer Galvin, Greg, (2010), Operating System Concepts, 8th Edition John Wiley & Sons.

WEB RESOURCE(S):

1. https://www.techtarget.com/whatis/definition/operating-system-OS
2. https://www.tutorialspoint.com/operating_system/os_overview.htm
3. https://archive.nptel.ac.in/courses/106/105/106105214/

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Students will be able to define the functions and architecture of an operating system, and differentiate between different types of operating systems.	**K1**
CO2	Students will gain knowledge of memory management techniques such as contiguous allocation, paging, and segmentation, and will understand the concepts of virtual memory and demand paging.	**K2**
CO3	Students will be able to describe processes, threads, scheduling algorithms, and implement inter-process communication mechanisms and deadlock handling.	**K4**
CO4	Students will be able to design file systems, including the organization of files, directories, and access control mechanisms, and will understand how file protection works.	**K3**
CO5	Students will gain knowledge about concurrent process and parallel process and its advantages.	**K4**
CO6	Students will be able to design and implement efficient operating systems with effective management of resources such as processes, memory, files, and I/O devices.	**K5**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	3	9	3	1	3	1	20
CO2	3	9	9	3	9	1	34
CO3	3	9	9	3	9	1	34
CO4	3	9	9	3	3	1	28
CO5	3	9	9	3	9	1	34
CO6	9	9	9	9	9	3	48
PO Weightage	24	54	48	22	42	08	198
Weighted Percentage of PO's	12.12	27.27	24.24	11.11	21.21	4.04	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO2	PO1, PO3, PO5	PO4, PO6	--
CO2 / K2	PO2, PO3, PO5	PO1, PO4	PO6	--
CO3 / K3	PO2, PO3, PO4	PO1, PO4	PO6	--
CO4 / K4	PO2, PO3	PO1, PO4, PO5	PO6	
CO5 / K5	PPO 2, PO3, PO5	PO1, PO4	PO6	--
CO6/ K6	PO1, PO2, PO3, PO4, PO5	PO6	--	--

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT9- Operating System in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT10E1	Elective-Theory	3	5	5	25	75	100
Course Title	COMPUTER GRAPHICS								

Course Description:
This course provides an introduction to the fundamental concepts, techniques, and applications of computer graphics. It covers both theoretical and practical aspects, including raster and vector graphics, 2D and 3D transformations, geometric modeling, rendering techniques, and animation. Students will explore various algorithms for image generation, shading, and visualization, along with an introduction to graphics programming using industry-standard tools and libraries.

Course Objective:
1. Understand the fundamentals of computer graphics and its various applications in fields such as computer-aided design, entertainment, education, and image processing.
2. Learn the operation and components of graphics systems, including display devices, graphics software, and input/output devices.
3. Master the algorithms related to drawing output primitives like points, lines, and circles, along with their respective advantages and limitations.
4. Analyze attributes of output primitives and how to manage and manipulate visual elements such as lines, fills, and characters.
5. Study two-dimensional geometric transformations and understand matrix representation and composite transformations in graphical systems.
6. Develop skills in clipping operations and window-to-viewport transformations to manage viewing and display of 2D graphical elements.

UNIT I: A survey of computer graphics: Computer aided design –Presentation graphics computer art – Entertainment – Education and training – Visualization – Image Processing – Graphical user interfaces. Overview of graphics systems: Video display devices – Raster- scan systems – Random scan systems – Graphics monitors and workstation – Input devices – Hard-copy devices–Graphics software.

UNIT II: Output primitives: Points and lines – Line-drawing algorithms – DDA algorithm – Brenham's line algorithm – Circle-generating algorithms – Filled-area primitives – Boundary-fill algorithm.

UNIT III: Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes - Bundled attributes – Inquiry functions – Antialiasing.

UNIT IV: Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Other transformations.

UNIT V: Window-to-viewport coordinate – Two-dimensional viewing functions – Clipping operations – Point clipping – Line clipping – Polygon clipping.

TEXT BOOK(S) :

1. Donald Hearn and M.Pauline Baker "Computer Graphics" C Version, 2nd Edition, Pearson Education, 2006.

   UNIT I: Chapter 1 (sec 1.1- 1.8) & Chapter 2 (sec 2.1- 2.7)

   UNIT II: Chapter 3 (sec 3.1, 3.2, 3.5, 3.11)

   UNIT III: Chapter 4 (sec 4.1, 4.4, 4.5, 4.6, 4.7, 4.8)

   UNIT IV: Chapter 5 (sec 5.1- 5.4)

   UNIT V: Chapter 6 (sec 6.4 -6.8)

REFERENCE(S) :

1) Jeffrey J. McConnell," Computer Graphics: Theory Into Practice", Jones and Barlett publishers, 2006.

2) Peter Shirley, Michael Ashikhmin, Steve Marschner "Fundamentals of Computer Graphics", CRC Press, 2009.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/106106090

2. https://archive.nptel.ac.in/courses/106/103/106103224/

3.https://www3.ntu.edu.sg/home/ehchua/programming/opengl/CG_BasicsTheory.html

4. https://www.acsce.edu.in/acsce/wp-content/uploads/2020/03/CG-Module-1.pdf

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Demonstrate understanding of the applications of computer graphics, including computer-aided design, education, and image processing.	**K1**
CO2	Explain the different types of graphics systems (raster-scan, random-scan), input/output devices, and the role of graphical software in rendering visual content.	**K1**
CO3	Implement and apply line-drawing and circle-generating algorithms such as DDA and Bresenham's line algorithms in creating accurate graphical representations.	**K2**
CO4	Identify and apply attributes of output primitives (line attributes, fill attributes, antialiasing) in improving the visual quality of graphical objects.	**K3**
CO5	Perform two-dimensional transformations using basic geometric transformations and matrix representation to modify graphics in a coordinate system.	**K4**
CO6	Implement clipping algorithms like point clipping, line clipping, and polygon clipping to optimize the display of graphical content within a defined window.	

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	3	1	9	3	28
CO2	9	3	3	3	9	3	30
CO3	3	9	9	3	3	1	28
CO4	3	9	3	1	9	1	26
CO5	9	9	9	1	3	3	34
CO6	9	9	3	3	3	1	28
PO Weightage	42	42	30	12	36	12	174
Weighted Percentage of PO's	24.14	24.14	17.24	6.9	20.69	6.9	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1, PO5	PO2, PO3, PO6	PO4	--
CO2 / K2	PO1, PO5	PO2, PO3, PO4, PO6	-	--
CO3 / K3	PO2, PO3	PO1, PO4, PO5	PO6	--
CO4 / K4	PO2, PO5	PO1, PO3	PO4, PO6	-
CO5 / K5	PO1, PO2, PO3	PO5, PO6	PO4	-
CO6/ K6	PO1, PO2	PO3, PO4, PO6	PO6	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	**C1**	**C2**	**C3**	**Total scholastic marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	T1 **4 Marks**	**T2** **10 Marks**	**Assignment 6 Marks**	**20 Marks**	**5 Marks**	**25 Marks**	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT10E1- Computer Graphics in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT10E2	Elective-Theory	3	5	5	25	75	100
Course Title	PC HARDWARE AND TROUBLE SHOOTING								

Course Description:

This course provides an in-depth understanding of personal computer (PC) hardware components, their functions, and troubleshooting techniques. Students will learn about the architecture and operation of computer systems, including processors, memory, storage devices, motherboards, power supplies, and peripheral devices.

Course Objectives:

1. Understand the fundamental components of computer hardware and their roles in system functionality, including the motherboard, CPU, memory, and storage devices.
2. Learn about the architecture and working of modern microprocessors, peripheral devices, and I/O connectors commonly used in computing systems.
3. Gain knowledge of various memory types, including primary and secondary memory, as well as memory management techniques and BIOS configuration.
4. Develop troubleshooting skills for diagnosing and resolving issues related to hardware components such as keyboards, monitors, printers, and drives.
5. Learn the methods and tools required for troubleshooting and maintaining computer hardware, including components like power supplies, cooling systems, and sound/video adapters.
6. Master installation, maintenance, and upgrade procedures for peripherals, network connections, operating systems, and PC components.

UNIT I : Introduction to Computer Hardware – Main System Unit - The Motherboard - Motherboard Components – #The Motherboard# – Architecture - Chipsets1Connectors on the Motherboard – The Processor/CPU – Architecture - Modern Microprocessors - Printer- Printer types - HardDisk Drive- Floppy Disk Drive - CD-ROM Drive - DVD-Drive – Monitor – Monitor types – MODEM - Scanner.

UNIT II: Memory–Primary Memory–Secondary Memory– Bits &Byte– RAM –ROM– Parity–ECC Memory – Physical Memory Organization – Memory Speed – Motherboard Memory Capacity – Extended Memory– BIOS -Keyboard–Keyboard Switch –Keyboard Organization –Keyboard Type–Mouse–Mouse Type–#Connecting Mouse# –Mouse Resolution–Add on cards and its types.

UNIT III : Backup Troubleshooting - BIOS Upgrade Troubleshooting - Troubleshooting CD Drives - CMOS Maintenance and Troubleshooting - Troubleshooting CPU Problems - Troubleshooting a Drive Adapter - Troubleshooting DVD Drives - Troubleshooting Cooling Problems - Floppy Drive and HDD Troubleshooting.

UNIT IV: Keyboard Maintenance and Troubleshooting - Memory Troubleshooting -

Troubleshooting Pointing Devices - Motherboard Troubleshooting - #Parallel Port Troubleshooting# - Plug-and- Play Configuration and Troubleshooting.

UNIT V: Troubleshooting Power Protection Devices - Troubleshooting Power Supplies and Power Management - Troubleshooting the SCSI System - Troubleshooting Sound Boards and Video Adapters. Installing Speakers / Headphones - Installing the Operating System -Removal and Replacement Procedures -Upgrading PC Components - Installing PC Peripherals - Installing Network/Modem Connections.

TEXT BOOK(S):

1. Manohar Lotia, Pradeep Nair, Payal Lotia, Modern Computer Hardware Course, BPB Publications, Second Revised Edition, 2006.

   Unit I: Chapters 1, 2, 3
   Unit II: Chapter 4.

2. Stephen J. Bigelow, PC Troubleshooting & Repair - The Ultimate Reference, Dreamtech, Second Edition, Reprint, 2004.

   Unit III: Chapters 4, 6, 8, 10, 12, 14, 15, 18, 19, 20
   Unit IV: Chapters 22, 23, 24, 26, 27, 28
   Unit V**:** Chapters 8, 14, 29, 30, 32, 34, 35

REFERENCE(S):

1. David Groth- Sybex, A+ Complete Study Guide, Third Edition, 1999.

WEB RESOURCE(S):

1. Intel: https://www.intel.com/content/www/us/en/homepage.html
2. AMD: https://www.amd.com/en.html
3. HDD/SSD: https://en.wikipedia.org/wiki/Hard_disk_drive

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Students will be able to identify and explain the function of key computer hardware components, including the motherboard, CPU, RAM, ROM, and storage devices.	**K2**
CO2	Students will demonstrate proficiency in managing and configuring memory, understanding differences between RAM, ROM, and other memory types, and handling BIOS settings.	**K2**
CO3	Students will develop the ability to troubleshoot various hardware problems, from malfunctioning peripherals to system-level issues like power supply failures and motherboard issues.	**K3**
CO4	Students will acquire skills in maintaining and troubleshooting peripherals such as printers, scanners, monitors, and input devices like keyboards and mice.	**K3**
CO5	Students will be able to perform hands-on tasks such as installing, upgrading, and replacing computer components, as well as configuring system settings.	**K4**
CO6	Students will gain an understanding of advanced troubleshooting and maintenance techniques, including dealing with power protection devices, troubleshooting cooling systems, and managing peripheral devices like sound cards and video adapters.	**K5**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	1	3	1	**18**
CO2	9	3	1	1	3	1	**18**
CO3	3	9	3	9	3	1	**28**
CO4	3	9	3	9	9	1	**34**
CO5	1	3	9	9	9	3	**34**
CO6	1	3	9	9	9	9	**40**
PO Weightage	**26**	**30**	**26**	**38**	**36**	**16**	**172**
Weighted Percentage of PO's	**15.12**	**17.44**	**15.12**	**22.09**	**20.93**	**9.3**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO5	PO3, PO4, PO6	--
CO2 / K2	PO1	PO2, PO5	PO3, PO4, PO6	--
CO3 / K3	PO2, PO4	PO1, PO3, PO5	PO6	--
CO4 / K4	PO2, PO4, PO5	PO1, PO3	PO6	-
CO5 / K5	PO3, PO4, PO5	PO2, PO6	PO1	-
CO6/ K6	PO3, PO4, PO5, PO6	PO2	PO1	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT10E2-PC Hardware and Trouble Shooting in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT10E3	Elective-Theory	3	5	5	25	75	100
Course Title	ARTIFICIAL INTELLIGENCE								

Course Description:

This course provides a comprehensive introduction to Artificial Intelligence (AI), covering fundamental concepts, techniques, and applications. Students will explore key AI domains, including problem-solving, knowledge representation, machine learning, neural networks, natural language processing, and computer vision.

Course Objectives:

1. To introduce the fundamental concepts of Artificial Intelligence (AI) and its historical development.
2. To explore various problem-solving and search techniques used in AI, including uninformed and informed search algorithms.
3. To understand knowledge representation methods and reasoning techniques used in AI systems.
4. To provide an overview of machine learning approaches, including supervised, unsupervised, and reinforcement learning.
5. To examine real-world applications of AI in different domains such as robotics, natural language processing, and healthcare.
6. To analyze the societal and ethical implications of AI and its impact on human life.

UNIT I: Artificial Intelligence: AI Problems – Underlying Assumption – AI Technique – Level of the Model – Criteria of Success – Some General References. Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the Design of Search Programs.

UNIT II: Heuristic Search Techniques: Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-ends Analysis. Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem.

UNIT III: Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and ISA Relationships – Computable Functions and Predicates – Resolution – Natural Deduction - Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge – Logic Programming – Forward Versus Backward Reasoning – Matching – Control Knowledge.

UNIT IV: Symbolic Reasoning under Uncertainty: Introduction to Non-monotonic Reasoning – Logics for Non-monotonic Reasoning – Implementation Issues – Augmenting a Problem-solver – Implementation Depth First Search – Implementation Breadth First Search. Statistical Reasoning: Probability and Baye's Theorem – Certainty Factors and Rule- based Systems – Bayesian Networks – Dempster-Shafer Theory – Fuzzy Logic.

UNIT V: Semantic Nets: Frames- Conceptual Dependency – Scripts – CYC. - Syntactic-Semantic Spectrum of Representation – Logic and Slot-and-Filler Structures – Other Representational Techniques.

TEXT BOOK(S):

1. Elaine Rich, Kevin Knight, Shiva Shankar B Nair, "Artificial Intelligence", Third Edition, Tata McGraw Hill, 2019.

UNIT I: Chapter 1 (Sec 1.1-1.6) & Chapter 2 (Sec 2.1-2.5)
UNIT II: Chapter 3 (Sec 3.1-3.6) & Chapter 4 (Sec 4.1- 4.4)
UNIT III: Chapter 5 (Sec 5.1-5.5) & Chapter 6 (Sec 6.1-6.5)
UNIT IV: Chapter 7 (Sec 7.1-7.6) & Chapter 8 (Sec 8.1- 8.5)
UNIT V: Chapter 9 (Sec 9.1, 9.2), Chapter 10 (Sec 10.1- 10.3), Chapter 11 (Sec 11.1-11.3)

REFERENCE BOOK(S):

1. Gerhard Welss, - Multi Agents Systems, Second Edition, 2013.
2. David L. Poole and Alan K. Mackworth, - Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

WEB RESOURCE(S):

1. https://www.udemy.com/course/learn-basics-of-artificial-intelligence/
2. https://onlinecourses.swayam2.ac.in/cec21_cs08/preview

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Define the concept of Artificial Intelligence and explain its historical evolution and applications	K1
CO2	Demonstrate the ability to formulate problems and apply appropriate search techniques for problem-solving.	K2
CO3	Apply knowledge representation and reasoning methods to design intelligent systems.	K3
CO4	Differentiate between various machine learning techniques and implement basic supervised, unsupervised, and reinforcement learning models.	K4
CO5	Identify and analyze AI applications in different domains and assess their impact on industry and society.	K5
CO6	Evaluate the ethical and societal challenges associated with AI technologies and propose responsible AI solutions.	K4

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	1	3	3	20
CO2	9	9	3	3	3	1	28
CO3	9	9	3	9	3	1	34
CO4	9	3	9	3	9	1	34
CO5	3	3	9	9	9	3	36
CO6	1	3	3	3	3	9	22
PO Weightage	**40**	**30**	**28**	**28**	**30**	**18**	174
Weighted Percentage of PO's	**22.98**	**17.24**	**16.09**	**19.09**	**17.24**	**10.34**	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO5,PO6	PO3, PO4	--
CO2 / K2	PO1, PO2	PO3, PO4, PO5	PO6	--
CO3 / K3	PO1, PO2, PO4	PO3, PO5	PO6	--
CO4 / K4	PO1, PO3, PO5	PO2, PO4	PO6	-
CO5 / K5	PO3, PO4, PO5	PO1, PO2	PO1	-
CO6/ K6	PO6	PO2, PO3, PO4, PO5	PO1	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT10E3- Artificial Intelligence in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of theHoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT11E1	Elective-Theory	3	5	5	25	75	100
Course Title	INTERNET OF THINGS								

Course Description:

The **Internet of Things (IoT)** course provides a comprehensive introduction to the concepts, technologies, and applications of IoT. It covers the fundamental architecture, communication protocols, and data processing techniques used in IoT systems. Students will learn about sensor networks, embedded systems, cloud computing, and cybersecurity in IoT environments.

Course Objectives:

1. To introduce the fundamental concepts, evolution, and impact of the Internet of Things (IoT) in various domains.
2. To familiarize students with key enabling technologies and IoT reference architectures.
3. To provide an understanding of communication protocols used in IoT, including short-range, wide-area, and M2M protocols.
4. To explore different types of sensors and actuators, their interfacing techniques, and their role in IoT systems.
5. To introduce data management concepts in IoT, including data acquisition, processing, cloud computing, and security concerns.
6. To examine real-world IoT applications in various sectors, including smart cities, healthcare, industrial automation, and future trends.

UNIT I: Introduction to Internet of Things: Introduction- Definition & Characteristics of IoT. Physical Design of IoT: Things in IoT-IoT Protocols. Logical Design of IoT: IoT Functional Blocks-IoT Communication Models-IoT Communication APIs.

UNIT II: IoT Enabling Technologies: Wireless Sensor Network- Cloud Computing Communication Protocols-Embedded Systems. IoT and M2M: Introdction- M2M -Difference between IoT and M2M: SDN and NFV for IoT -Software Defined Networking-Network Function Virtualization.

UNIT III: Domain Specific IoTs: Introduction- Home Automation Cities-Environment Retail Logistics-Industry-Health & Lifestyle.

UNIT IV: Developing Internet of Things: IoT Design Methodology. IoT Physical Devices & Endpoints-What Is an IoT Device-Exemplary Device: Raspberry Pi Linux on Raspberry Pi.

UNIT V: Python Packages of Interest for IoT: JSON- XML- HTTP Lib & URL Lib-SMTP Lib. Tools for IoT: Chef Puppet.

EXT BOOK(S):

1. Arshdeep Bahga, Vijay Madisetti. (2015). Internet of Things: A Hands-On Approach, 1st Edition Universities Press (India) Private Limited.

   Unit I: Chapter 1 (Sec 1.1.1, 1.2.1, 1.2.2, 1.3.1, 1.3.2, 1.3.3)
   Unit II: Chapter 1 (Sec 1.4) & Chapter 3 (Sec 3.1, 3.2, 3.3, 3.4)
   Unit III: Chapter 2 (Sec 2.2 -2.4, 2.6- 2.10)
   Unit IV: Chapter 5 (Sec 5.1, 5.2) & Chapter 7 (Sec 7.1, 7.2, 7.4, 7.7)
   Unit V: Chapter 6 (Sec 6.11) & Chapter 9 (Sec 9.2, 9.6)

REFERENCE BOOK(S):

1. David Hanes, Gonzalo Salgueiro, Patrick Grossette, Robert Barton, Jerome Henry. (2017). IoT Fundamentals, Networking Technologies, Protocols and Use cases for Internet of Things, Cisco Press.
2. Olivier Hersent, David Boswarthick, Omar Elloumi. (2012). The Internet of Things – Key applications and Protocols, Wiley.

WEB RESOURCE(S):

1.https://www.tutorialspoint.com/
2. https://www.guru99.com/
3. https://www.pythonforbeginners.com/

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Define the Internet of Things (IoT) and explain its evolution and key characteristics.	**K1**
CO2	Identify and describe various applications and societal impacts of IoT in different domains.	**K2**
CO3	Explain the key enabling technologies for IoT, including sensor technologies, communication protocols, and cloud computing.	**K2**
CO4	Compare and contrast different short-range communication protocols (Bluetooth, Wi-Fi, ZigBee) for IoT applications.	**K4**
CO5	Demonstrate an understanding of IoT data management, including data processing, security, privacy, and visualization techniques.	**K3**
CO6	Evaluate and propose IoT-based solutions for real-world applications in smart cities, healthcare, industrial automation, and beyond.	**K5**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	3	1	3	20
CO2	3	9	3	9	3	1	28
CO3	1	3	9	3	9	3	28
CO4	3	1	3	9	9	3	28
CO5	9	3	1	3	3	9	28
CO6	3	9	3	3	1	9	28
PO Weightage	28	28	20	30	26	28	160
Weighted Percentage of PO's	16.9	16.9	12.0	21.7	15.7	16.9	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO4,PO6	PO3	--
CO2 / K2	PO2, PO4	PO1, PO3, PO5	PO6	--
CO3 / K3	PO3, PO5	PO2, PO4, PO6	PO1	--
CO4 / K4	PO4, PO5	PO1, PO3, PO6	PO2	-
CO5 / K5	PO1, PO6	PO2, PO4, PO5	PO3	-
CO6/ K6	PO2, PO6	PO1, PO3, PO4	PO5	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT11E1- Internet of Things in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT11E2	Elective-Theory	3	5	5	25	75	100
Course Title	WEB ETHICS								

Course Description:
This course explores the ethical, legal, and social issues surrounding the use of the internet and digital technologies. Students will examine topics such as privacy, cybersecurity, intellectual property, digital rights, online harassment, misinformation, and ethical hacking. Through case studies and discussions, the course encourages critical thinking about the responsibilities of individuals, businesses, and governments in the digital age.

Course Objectives:

1. To introduce fundamental ethical theories and their relevance in the digital world.
2. To explore the impact of the internet on society and understand ethical challenges in the digital age.
3. To examine privacy concerns, data protection laws, and cybersecurity threats.
4. To analyze intellectual property rights in the digital space and ethical issues related to copyright and digital rights management.
5. To understand the ethical implications of social media, misinformation, and online harassment.
6. To evaluate emerging technologies like AI, IoT, and their ethical consequences on privacy and digital citizenship.

UNIT I: Cyber Ethics: Ethics in Cyber Society: Core Values and Virtues: Definitions, Specificities of Cyberspace, Dimensions of Cyber Ethics in Cyber Society, Core Values and Virtues, Cyber Ethics by norms, Laws and Relations, Artificial Intelligence Ethics: "AI for Good". Cyber Ethics as Business Ethics.

UNIT II: Cyber Law and Cyber Ethics: Importance of Cyber Law, The Significance of Cyber Ethics, and Cyber Crime is Unethical and Illegal, The need for Cyber Regulation. Ethics in the Information Society, Technologies Need Standards, Rules and Regulations, Technology Ethics, Legal Ethics, the Nine P's of Ethics in Information Society.

UNIT III: International Convention for Cyber Space: The Significance of International Cyber Ethics, Bilateral Agreements, From Bilateral to International Convention, Fast Growing Cybercrime, International Cyber Legal Treaty. Republican Net Neutrality: Introduction, The Relevance of the Net and its Neutrality, two sets of values underlying "Neutrality", Republican Net Neutrality.

UNIT IV: Cyber Crime: Cybercrime offences, Computer Related Offences, Content Related offences, Government Efforts in Cyber security, Cyber security in the Academic world. Critical Thinking of Citizens: Ethics in Digital Age, Acting Responsibly in the Digital World, Three Dilemmas: Ethical Intelligence in Practice.

UNIT V: Cyber Bullying: Introduction – Cyber Bullying, Peoples in Cyber Bullying, Signs of Cyber Bullying, Suicidal Tendencies, Role of Children and Duty of parents, Limiting Access of Technology, Child Bullying. Child Protection Online: Prevention through Education for Digital Literacy and Safety, Recommendations of Priority Inventions, Cyber Ethics Research Centres and Networks.

TEXTBOOK(S):

1. Christoph Stackelberger, Pavan Duggal, "Cyber Ethics 4.0: Serving Humanity with Values"

   Globethics.net Global series no 17, 2018.
   UNIT I: Chapter 1 (Sec 1.1 -1.6, 1.8, 1.10, 1.11)
   UNIT II: Chapter 2 (Sec 2.1-2.3, 2.5), Chapter 3 (Sec 3.1)
   UNIT III: Chapter 16 (Sec 16.1-16.5), Chapter 17 (Sec 17.2 -17.4)
   UNIT IV: Chapter 19 (Sec 19.2 -19.6), Chapter 22 (Sec 22.3, 22.4)
   UNIT V: Chapter 23(Sec 23.1 -23.7), Chapter 24 (Sec 24.1, 24.2)

REFERENCE(S):

1. Diane Bailey, "Cyber Citizenship and Cyber Safety: Cyber Ethics", The Rosen Publishing group, USA, 2008.
2. Kizza, Joseph Migga," Ethical and Social Issues in the Information Age" 5th edition, Springer, 2015.
3. Bynum, Terrel Ward & Rogerson, Simon, eds "Computer Ethics & Professional Responsibility: Introductory Text & Readings", Blackwell, 2004.

COURSEOUTCOMES		
Upon successful completion of this course ,the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Defineethicsandexplaindifferentethicaltheories(Utilitarianism,Deontology, Virtue Ethics).	**K1**
CO2	Identify online privacy risks, cyber security threats, and data protection measures.	**K2**
CO3	Evaluate intellectual property rights, copyright laws, and ethical concerns in digital content sharing.	**K2**
CO4	Analyze ethical and social challenges in social media, including cyber bullying, misinformation, and addiction.	**K3**
CO5	Assess the impact of AI, IoT, and emerging technologies on ethical decision-making.	**K4**
CO6	Demonstrate responsible digital citizenship and ethical leadership in the online environment.	**K5**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	3	1	1	1	18
CO2	3	9	3	3	9	1	28
CO3	3	3	9	9	3	1	28
CO4	3	3	9	3	3	9	30
CO5	9	3	3	1	3	9	28
CO6	3	3	3	3	3	9	24
PO Weightage	30	24	30	20	22	30	30
Weighted Percentage of PO's	18.75	15	18.75	12.5	13.75	18.75	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO3	PO3,PO6	-
CO2 / K2	PO2, PO5	PO1, PO3, PO4	PO6	-
CO3 / K3	PO3, PO4	PO1, PO2,PO5	PO6	-
CO4 / K4	PO3, PO6	PO1, PO2, PO4,PO5	-	-
CO5 / K5	PO1, PO6	PO2, PO3, PO5	PO4	-
CO6/ K6	PO6	PO1,PO2,PO3,PO4,PO5	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT11E2-Web Ethics in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25IT11E3	Elective-Theory	3	5	5	25	75	100
Course Title	DATA MINING								

COURSE DESCRIPTION:

This course provides a comprehensive introduction to data mining, covering fundamental techniques, tools, and applications. Students will learn how to extract meaningful patterns, trends, and knowledge from large datasets using various data mining methodologies. The course will explore key concepts such as classification, clustering, association rule mining, anomaly detection, and predictive modeling.

COURSE OBJECTIVES:

To gain the concept of data visualization

1. To introduce the fundamental concepts of data mining and its applications.
2. To understand data preprocessing techniques for effective data mining.
3. To explore classification algorithms and prediction methods for data analysis.
4. To analyze clustering techniques and their evaluation criteria.
5. To apply advanced data mining techniques in real-world applications such as social networks, text mining, and web mining.
6. To develop data visualization skills using tools like Tableau for better decision-making.

UNIT I: Introduction: Data Mining– Moving towards the Information Age-Data Mining the Evolution of Information Technology– Kinds of Data Can Be Mined – Kinds of Patterns Can Be Mined– Technologies–Applications– Major issues in Data Mining.

UNIT II: Data Preprocessing: Data Preprocessing: An Overview – Data Cleaning – Data Integration-Entity Identification Problem - Redundancy & Correlation Analysis – Data Reduction – Data Transformation and Data Discretization–Data Transformation Strategies Overview.

UNIT III: Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts – Data Warehouse Modeling-Data Cube and OLAP - Data Cube: A Multidimensional Data Model Stars, Snowflakes, and Fact Constellations: Schemas for Multidimensional Data Models - Typical OLAP Operations – Data Warehouse Design and Usage.

UNIT IV: Mining Frequent Patterns, Associations, and Correlations: Basics Concepts and Methods: Basic Concepts – Frequent Item set Mining Methods - Apriori Algorithm: Finding Frequent Item sets by Confined Candidate Generation - Generating Association Rules from Frequent Item sets - Classification: Basic Concepts: Basic Concepts–Decision Tree Induction-Decision Tree Induction–Attribute Selection Measures- Bayes Classification Methods.

UNIT V: Cluster Analysis: Basic Concepts and Methods: Cluster Analysis-Partitioning Methods– k-means– Hierarchical Methods: Agglomerative versus Divisive Hierarchical Clustering – Distance Measures in Algorithmic Method–Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods-Data Mining Trends and Research Frontiers: Data Mining Applications.

TEXT BOOK(S):

1. Jaiwei Han, Micheline Kamber (2012), Data Mining-Concepts and Techniques, Third Edition.

UNIT I: Chapter 1 (Sec 1.1, 1.2, 1.3, 1.4, 1.6, 1.7)
UNIT II: Chapter 3 (Sec 3.1, 3.2, 3.3.1, 3.3.2, 3.4, 3.5.1)
UNIT III: Chapter 4 (Sec 4.1, 4.2.1, 4.2.2, 4.2.5)
UNIT IV: Chapter 6 (Sec 6.1, 6.2.1, 6.2.2)
Chapter 8 (Sec 8.1, 8.2.1, 8.2.2, 8.3)
UNIT V: Chapter 10 (Sec 10.1, 10.2, 10.3.1, 10.3.2)
Chapter 12 (Sec 12.1, 12.2)
Chapter 13 (Sec 13.3)

REFERENCE BOOK(S):

1. Margaret H.Dunham (2003),Data Mining: Introductory and Advanced Topics, Pearson Education.
2. Arun K.Pujari (2010), Data Mining Techniques, University Press.

WEB RESOURCE(S):

1. www.tutorialspoint.com
2. https://www.techopedia.com/definition/15634/web-mining
3. https://www.expertsystem.com/data-mining-predictive-analytics-difference/
4. https://data-flair.training/blogs/text-mining/

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand basic concepts of data mining like classifications, clustering, association rule mining, prediction and related algorithms	**K1**
CO2	Apply data mining techniques to carry out simple data mining tasks	**K2**
CO3	Analyze data using data visualization with Tableau	**K2**
CO4	Design different data mining models for real world problems	**K3**
CO5	Develop predictive models using advanced Data Mining Techniques	**K4**
CO6	Evaluate the ethical implications of emerging technologies and their impact on society	**K5**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	3	1	1	18
CO2	3	9	3	9	3	1	28
CO3	3	9	9	3	9	3	36
CO4	1	3	3	9	9	3	28
CO5	3	3	1	3	9	9	28
CO6	1	1	3	3	9	9	26
PO Weightage	20	28	20	30	40	26	164
Weighted Percentage of PO's	**12.2**	**17.07**	**12.2**	**18.29**	**24.39**	**15.85**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool.

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1, PO6	PO2, PO4	PO3	-
CO2 / K2	PO2, PO4	PO1, PO3, PO5	PO6	-
CO3 / K3	PO2,PO3, PO5	PO1, PO4, PO6	PO1	-
CO4 / K4	PO4, PO5	PO2, PO3, PO6	PO2	-
CO5 / K5	PO5, PO6	PO1, PO2, PO4	PO3	-
CO6/ K6	PO5, PO6	PO3, PO4	PO1, PO2	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT11E3- Data Mining in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	U25ITNME2	Non Major Elective- Theory	3	2	2	25	75	100
Course Title	INTRODUCTION TO ICT								

Course Description:

This course provides a foundational understanding of Information and Communication Technology (ICT) and its role in modern society. It covers essential ICT concepts, including computer hardware and software, digital communication, networking, the internet, cybersecurity, and emerging technologies. Students will explore the impact of ICT in various fields such as business, education, healthcare, and entertainment.

Course Objective:

1. To understand the fundamental concepts, objectives, and importance of ICT.
2. To explore the role of social media and e-learning platforms in communication and education.
3. To gain knowledge of the history, structure, and usage of the Internet and World Wide Web.
4. To study the fundamentals of computer networks, types, architecture, and communication technologies.
5. To analyze the application of computers in various domains, including business, education, and medicine.
6. To explore recent trends in ICT, including video conferencing, interactive whiteboards, and mobile learning.

UNIT I: ICT – Concepts, Objectives, Need and Importance of ICT – Characteristics and Scope of ICT – Recent Trends in the area of ICT – Interactive Video – Interactive White Board – Video Conferencing – M-Learning.

UNIT II: Social Media – Community Radio – Gyan Darshan – Gyanvani – Sakshat Portal – e- Gyankosh – Blog – MOCC – WhatsApp, Facebook, Twitter.

UNIT III: Introduction – History of the Internet – Understanding WWW – Web Browsers – Favourites and bookmarks – Kinds of information available – Parts of Internet – Searching the net –Researching on the net.

UNIT IV: Introduction – Overview of a Network – Communication Processors – Communication Media – Types of Networks – Network Topologies – Network Architecture – Communication Satellites – Radar – Fiber Optics – ISDN.

UNIT V: Computers in Business and Industry–Computers in Home–Computers in Education and Training – Computers in Entertainment, Science, Medicine and Engineering.

TEXT BOOK(S):

1. G. Kavitha, Information and Communication Technology in Education, Saradha Publication, Chennai
   UNIT I: Chapter 1 (Sec 1.1, 1.1.1, 1.1.2, 1.1.3)
   Chapter 2 (Sec 2.1 – 2.5)
   UNIT II: Chapters 2 (Sec 2.6, 2.7.1 – 2.7.9)
   UNIT III: Chapters 6 (Sec 6.1 – 6.9)

2. Alexis Leon and Mathews Leon, Fundamentals of Information Technology, Vikas Publishing House Pvt Ltd, 2009
   UNIT IV: Chapters 18 (Sec 18.1 – 18.4, 18.7, 18.8, 18.11)
   Chapters 19 (Sec 19.6, 19.9, 19.11, 19.12)
   UNIT V: Chapters 33, 34, 35, 36

REFERENCE BOOK(S):

1. Kumar, Internet and IT, Anmol Publications Pvt Ltd, First Edition,2002.

WEB RESOURCE(S)

1) https://en.wikipedia.org/
2) https://www.techtarget.com/
3) https://scholar.google.com/

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Explain the basic concepts, characteristics, and scope of ICT	**K1**
CO2	Analyze the role of social media platforms and digital communication tools in knowledge sharing.	**K2**
CO3	Demonstrate proficiency in web browsing, online research, and information retrieval from the Internet.	**K3**
CO4	Understand different network architectures, topologies, and communication technologies.	**K4**
CO5	Evaluate the impact of computers and ICT applications in various fields such as business, education, and entertainment	**K5**
CO6	Apply emerging ICT tools like video conferencing, m-learning, and interactive technologies in real-world scenarios.	**K6**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	1	3	1	18
CO2	3	9	3	3	9	3	30
CO3	1	3	9	9	9	3	34
CO4	9	9	3	3	3	1	28
CO5	3	9	9	9	9	3	42
CO6	3	3	9	9	9	9	42
PO Weightage	28	36	34	34	42	20	194
Weighted Percentage of PO's	12.73	16.36	15.45	15.45	19.09	9.09	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO1	PO2, PO5	PO3, PO4,PO6	-
CO2 / K2	PO2, PO5	PO1, PO3, PO4, PO6	-	-
CO3 / K3	PO3, PO4, PO5	PO2,PO6	PO1	-
CO4 / K4	PO1, PO2	PO3, PO4, PO5	PO6	-
CO5 / K5	PO2, PO3, PO4, PO5	PO1, PO6	-	-
CO6/ K6	PO3, PO4, PO5, PO6	PO1, PO2	-	-

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs

Levels	**C1**	**C2**	**C3**	**Total scholastic marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	T1 **4 Marks**	**T2** **10 Marks**	**Assignment 6 Marks**	**20 Marks**	**5 Marks**	**25 Marks**	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25ITNME2 - Introduction to ICT in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	VI	U25IT12	Core Course-XII- Theory	3	6	6	25	75	100
Course Title	COMPUTER NETWORKS								

Course Description:

This course provides a comprehensive introduction to computer networks, covering fundamental concepts, architectures, protocols, and technologies used in modern networking. Students will gain an understanding of network models, data transmission, network security, and practical implementations of networking concepts.

Course Objective:

1. Understand the fundamentals of networking – Explain the role of computer networks, network architectures, and standardization models.
2. Analyze transmission media and network infrastructure – Compare guided and unguided media, wireless communication, and satellite systems.
3. Examine data link layer protocols – Understand error detection, correction mechanisms, and data transfer protocols like sliding window techniques.
4. Evaluate network layer functionalities – Study routing algorithms, congestion control, and internetworking strategies.
5. Understand transport layer services – Learn about transport protocols, their role in reliable data transfer, and end-to-end communication.
6. Explore application layer services – Analyze DNS, email protocols, and web services to understand their role in modern communication systems.

UNIT I:

Introduction: uses of computer networks - network hardware - network software – reference models - example networks - network standardization

UNIT II:

The physical layer: guided transmission media - wireless transmission – communicationsatellites – the public switched telephone network

UNIT III:

The data link layer: data link layer design issues - error detection and correction – elementary data link protocols - sliding window protocols

UNIT IV:

The network layer: network layer design issues - routing algorithms - congestion control algorithms- quality of service – internetworking

UNIT V:

The transport layer: the transport service - elements of transport protocols - a simple transport protocol the application layer: dns--domain name system - electronic mail – the World WideWeb

TEXT BOOK(S):

1. AndrewS.Tanenbaum, "Computer Networks", 6th Edition, Prentice Hall.2021.

Unit1 -Chapter 1 : 1.1 to 1.7
Unit2 -Chapter 2: 2.1 to 2.5
Unit3 -Chapter 3: 3.1 to 3.5
Unit4 -Chapter 5 : 5.1 to 5.5
Unit5 -Chapter 6: 6.1 to 6.2
Unit5- Chapter 7: 7.1 to 7.3

REFERENCE BOOK(S):

1. Forouzan, "Computer Networks",Tata McGraw Hill Education, 2012.
2. WilliamStallings,"Data and Computer Communications",6th Edition, Prentice Hall of India, 2002.

WEB RESOURCE(S):

1. EEE (Institute of Electrical and Electronics Engineers):https://www.ieee.org/- For standards related to networking technologies.
2. IETF (Internet Engineering Task Force): https://www.ietf.org/ - For standards related to the internet and internet protocols.
3. Fibre2Home: https://www.direktronik.se/globalassets/_product-images--pdf/1.-
4. network/1.1-lan/04.--mediakonverterare-02/21-167x.pdf-Forinformationonfiberoptic technology.
5. SatelliteInternet:https://www.starlink.com/-Forinformationonsatelliteinternet technology.

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the fundamentals of computer networks and networking models.	**K1**
CO2	Explain the concepts of transmission media, wireless communication, and network infrastructure.	**K2**
CO3	Analyze data link layer protocols and error detection/correction mechanisms.	**K4**
CO4	Evaluate network layer functions, routing, and congestion control algorithms.	**K3**
CO5	Understand transport layer services and protocols.	**K5**
CO6	Learn about application layer services, including DNS, email, and the web.	**K4**

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	1	3	1	**18**
CO2	9	3	3	1	3	1	**20**
CO3	9	9	3	3	3	1	**28**
CO4	9	9	9	9	3	3	**42**
CO5	9	9	3	9	3	1	**34**
CO6	9	3	3	3	9	3	**30**
PO Weightage	**54**	**36**	**22**	**26**	**24**	**10**	**172**
Weighted Percentage of PO's	**31.40**	**20.93**	**12.79**	**15.12**	**13.95**	**05.81**	**100%**

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rse

Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO5	PO3, PO4, PO6	-
CO2 / K2	PO1	PO2, PO3, PO5	PO4, PO6	-
CO3 / K3	PO1, PO2	PO3, PO4, PO5	PO6	-
CO4 / K4	PO1, PO2, PO3, PO4	PO5, PO6	-	-
CO5 / K5	PO1, PO2, PO4	PO3, PO5	PO6	-
CO6/ K6	PO1, PO5	PO2, PO3, PO4,PO6	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total Scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT12- Computer Networks in the B.Sc.Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marksfor Evaluation		
							CIA	ESE	Total
INTUG2008	VI	U25IT13	Core Course - XIII- Theory	3	6	5	25	75	100
Course Title	MOBILE APPLICATION DEVELOPMENT								

Course Description:

This course provides an in-depth exploration of mobile application development, focusing on designing, building, and deploying applications for mobile platforms. Students will learn fundamental concepts, frameworks, and best practices for developing user-friendly and efficient mobile apps. The course covers key topics such as mobile UI/UX design, data storage, networking, API integration, and performance optimization.

Course Objectives:

1. Understand the fundamentals of mobile application development.
2. Learn about different mobile platforms and the its development tools.
3. Gain expertise in a specific mobile programming language (e.g.,Java,Kotlin, Swift).
4. Develop skills in user interface design for mobile applications.
5. Apply software development methodologies to mobile application development projects.
6. Develop real-world mobile applications.

Unit1:Introduction to Mobile Application Development

Fundamentals of mobile application development, Different mobile platforms (Android, iOS, etc.), Mobile application development tools and technologies-Android Studio for Android Development – Activities, Fragments and Intents. .

Unit2:User Interface Design for Mobile Applications

Principles of user interface design for mobile applications, User experience (UX) design for mobile applications, Mobile UI design tools and techniques

Unit3:Mobile Programming Languages

Introduction to a specific mobile programming language (e.g., Java, Kotlin, Swift), Syntax and semantics of the programming language, Control flow statements, functions, and object-oriented programming concepts, developing basic mobile applications using the programming language

Unit4:Advanced Mobile Application Development

APIs and services for mobile applications, Database management for mobile applications, Security considerations in mobile application development

Unit5:Project Development

Developing a real-world mobile application project, Applying software development methodologies (e.g., Agile), Testing and deployment of the mobile application

Text book(s):

1. Bryan Sills, Brian Gardner, Kristin Marsicano and Chris Stewar, Android Programming, 5th Edition, The Big Nerd Ranch Publisher, 2022.

Unit-I: Chapter 1, Chapter 3, Chapter 9 and Chapter 16.
Unit-II: Chapter 11.
Unit-V: Chapter 1 and Chapter 2

2. Reto Meier, "Professional Android Application Development", John Wiley and Sons, 2012.
Unit-I: Chapter 1 and Chapter 2.
Unit-II: Chapter 2 and Chapter 4.
Unit-IV: Chapter 1, Chapter 2 and Chapter 6
Unit-V: Chapter 2.

3. Peter Spath, Learn Kotlin for Android Development, Apress Media Publisher, 2019.

Unit-III: Chapter 2.

REFERENCE BOOK(S)

1. J. E. DiMarzio, "Beginning Android Programming with Android Studio",4th Edition, John Wiley and Sons, 2017.
2. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", Dream Tech , 2012.
3. Kathy Sierra, Bert Bates, Trisha Gee, Head First Java, 3rd Edition, O'Reilly Media, 2022.
4. Christian Kehl and Aaron Hillegass, Swift Programming: The Big Nerd Ranch Guide, 2015.
5. Josh Skeen and David Greenhalgh , Kotlin Programming, The Big Nerd Ranch Publisher, 2018.

WEB RESOURCE(S)

1) https://www.tutorialspoint.com/android/index.htm
2) https://www.geeksforgeeks.org/android-tutorial/
3) https://www.javatpoint.com/android-tutorial
4) http://developer.android.com/develop/index.html

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Define mobile application development and explain the fundamentals of mobile app development process.	**K1**
CO2	Identify and describe different mobile platforms (Android, iOS) and their characteristics.	**K2**
CO3	Describe the various tools and technologies used in mobile application development.	**K2**
CO4	Apply the principles of user interface (UI) design to create user-friendly mobile applications.	**K3**
CO5	Evaluate the usability and effectiveness of a developed mobile application	**K5**
CO6	Explain the importance of user experience(UX) design in mobile applications.	**K4**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	1	3	1	18
CO2	3	9	9	3	9	3	36
CO3	3	3	9	3	9	3	30
CO4	1	3	3	9	9	3	28
CO5	3	3	9	3	3	9	30
CO6	1	1	3	3	9	9	26
PO Weightage	**20**	**22**	**34**	**22**	**42**	**28**	**168**
Weighted Percentage of PO's	**11.90**	**13.10**	**20.24**	**13.10**	**25**	**16.67**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO5	PO1, PO2, PO4	--
CO2 / K2	PO2, PO3, PO5	PO1, PO4, PO6	-	--
CO3 / K3	PO3, PO5	PO1, PO2, PO4, PO6	-	--
CO4 / K4	PO4, PO5	PO2, PO3, PO6	PO1	-
CO5 / K5	PO3, PO6	PO1, PO2, PO4, PO5	-	-
CO6/ K6	PO5, PO6	PO3, PO4	PO1, PO2	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total Scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the courseU25IT13- Mobile Application Development in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marksfor Evaluation		
							CIA	ESE	Total
INTUG2008	VI	U25IT14P	Core Course-XIV- Practical	3	6	5	25	75	100
Course Title	MOBILE APPLICATION DEVELOPMENT LAB								

Course Description:

The Mobile Application Development Lab provides hands-on experience in designing, developing, and deploying mobile applications for modern mobile platforms. The course covers essential concepts of mobile development, including user interface (UI) design, database integration, API communication, and performance optimization.

Course Objectives:

1. Understand and Implement Layout Managers: Learn to design and organize user interface components efficiently using various layout managers, and implement event listeners for interactive applications.
2. Manipulate Visual Properties: Develop the ability to modify and customize visual properties such as fonts and colors of UI elements, enhancing user experience and application design.
3. Build a Functional Calculator App: Gain hands-on experience in building a native calculator application, implementing basic arithmetic functionalities, and improving user interaction.
4. Create and Manage Ratings: Develop a rating application that allows users to input and submit ratings, and understand how to handle user input data effectively in a dynamic UI environment.
5. Implement Message-based Alerts: Learn to develop an application that triggers alerts based on incoming messages or notifications, improving user interaction and notification management.
6. Understand and Apply Multi-threading: Gain practical experience in multi-threading concepts by implementing applications that handle concurrent tasks, enhancing app performance and responsiveness.

Laboratory Exercises:

1) Develop an application that uses Layout Managers and event listeners.
2) Develop an application to change Font and Colors of an object.
3) Develop a native calculator App.
4) Develop a Rating App.
5) Implement an application that creates an alert up on receiving a message.
6) Implement an application that implements Multi-threading.
7) Implement Content provider for student database

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Define mobile application development and explain the fundamentals of mobile app development process.	**K1**
CO2	Identify and describe different mobile platforms (Android, iOS) and their characteristics.	**K2**
CO3	Describe the various tools and technologies used in mobile application development.	**K2**
CO4	Apply the principles of user interface (UI) design to create user-friendly mobile applications.	**K3**
CO5	Evaluate the usability and effectiveness of a developed mobile application	**K5**
CO6	Explain the importance of user experience (UX) design in mobile applications.	**K4**

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3), Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	3	1	3	1	20
CO2	9	3	9	3	3	1	28
CO3	9	9	9	3	9	3	42
CO4	3	9	9	3	9	3	36
CO5	3	9	9	9	9	3	42
CO6	3	9	9	9	9	9	48
PO Weightage	**36**	**42**	**48**	**28**	**42**	**20**	**216**
Weighted Percentage of PO's	**16.67**	**19.44**	**22.22**	**12.96**	**19.44**	**9.26**	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO3, PO5	PO4, PO6	--
CO2 / K2	PO1, PO3	PO2, PO4, PO5	PO6	--
CO3 / K3	PO1, PO2, PO3, PO5	PO4, PO6	-	--
CO4 / K4	PO2, PO3, PO5	PO1, PO4, PO6	-	-
CO5 / K5	PO2, PO3, PO4, PO5	PO1, PO6	-	-
CO6/ K6	PO2, PO3, PO4, PO5, PO6	PO1	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total Scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the courseU25IT14P-Mobile Application Development Lab in the B.Sc.Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	VI	U25IT15E1	Elective-Theory	3	5	5	25	75	100
Course Title	SOFTWAREENGINEERING								

Course Description:

This course provides a comprehensive introduction to the principles and practices of software engineering. It covers the software development lifecycle, including requirements analysis, design, development, testing, deployment, and maintenance. Students will explore methodologies such as Agile and Waterfall, software architecture, project management, and quality assurance.

Course Objectives:

1. Define software engineering and analyze key factors such as size, quality, and productivity in software development.
2. Identify problem definitions, solution strategies, and development process planning.
3. Explore different software cost factors and estimation techniques.
4. Apply fundamental design concepts, modularization criteria, and design techniques.
5. Implement quality assurance practices, walkthroughs, inspections, and static analysis.
6. Integrate software engineering processes, cost estimation, design, and verification methods in practical scenarios.

UNITI: Introduction to Software Engineering:

Definitions - Size factors – Quality and Productivity Factors – Managerial Issues. The Product: The evolving role of software – Software – characteristics - applications. The process: Software engineering: A Layered Technology – The software process – Evolutionary software process models: Spiral model.

UNITII: Planning a Software Project:

DefiningtheproblemDevelopingasolutionStrategyPlanningthedevelopmentProcess Planningan organizational structure – Other Planning Activities.

UNITIII: Software Cost Estimation:

SoftwareCostFactorsSoftwareCostEstimationTechniquesStaffingLevelEstimation.Software Requirements Definition: The Software Requirements Specification – Formal Specification Techniques.

UNITIV: Software Design:

Fundamental Design Concepts – Modules and Modularization Criteria – Design Notation – Design techniques – Design Guidelines. Implementation Issues: Structured codingtechniques – coding style – Documentation guidelines

UNITV: Verification and Validation Techniques:

Quality Assurance – Walkthroughs and inspections – Static analysis –Unit testing and debugging – System testing – Formal verification.

TEXT BOOK(S):

1) Roger S.Pressman, "Software Engineering A Practitioner's Approach", 4th Edition, McGrawHill, 2021.
   UNIT-1 Chapter 1 and Chapter-2
   UNIT-2 Chapter 5
   UNIT-3 Chapter 7
   UNIT-4 Chapter 13 and Chapter 14
   UNIT -5 Chapter 18

Reference book(s):

1) Ian Sommerville, Software Engineering, 10th Edition, Pearson Education Limited, 2016.

Web Resource(s):

1. SoftwareEngineeringInstitute(SEI):https://www.sei.cmu.edu/-Aleadingresearchanddevelopment center for software engineering.
2. IEEE(InstituteofElectricalandElectronicsEngineers):https://www.ieee.org/-Aprofessional organization that sets standards for software engineering.
3. Wikipedia:https://en.wikipedia.org/wiki/Software_engineering-Providesageneraloverviewand definitions of software engineering concepts.
4. Tutorials point: https://www.tutorialspoint.com/software_engineering/- Offers tutorials and explanations of various software engineering topics.

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the fundamentals of Software Engineering, its size, quality, and productivity factors.	**K1**
CO2	Explain the software process models and their evolution.	**K2**
CO3	Develop a structured software development plan and cost estimation.	**K2**
CO4	Analyze and apply software design concepts and modularization techniques.	**K3**
CO5	Evaluate different software verification, validation, and testing techniques.	**K3**
CO6	Create documentation and coding styles for quality assurance.	**K4**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	3	1	1	18
CO2	9	9	3	1	1	3	26
CO3	3	9	9	9	3	1	34
CO4	3	3	9	9	9	3	36
CO5	1	3	3	9	9	9	34
CO6	1	1	3	3	9	9	26
PO Weightage	26	28	28	34	32	26	174
Weighted Percentage of PO’s	14.94	16.09	16.09	19.54	18.39	14.94	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO4	PO3, PO5, PO6	-
CO2 / K2	PO1, PO2	PO3, PO6	PO4, PO5	-
CO3 / K3	PO2, PO3, PO4	PO1, PO5	PO6	-
CO4 / K4	PO3, PO4, PO5	PO1, PO2, PO6	-	-
CO5 / K5	PO4, PO5, PO6	PO2, PO3	PO1	-
CO6 / K6	PO5, PO6	PO3, PO4	PO1, PO2	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total Scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT15E1 -Software Engineering in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	VI	U25IT15E2	Elective-Theory	3	5	5	25	75	100
Course Title	SOFTWARE PROJECT MANAGEMENT								

Course Description:

Software Project Management is a comprehensive course that provides students with the knowledge and skills necessary to manage software development projects effectively. The course covers key principles, methodologies, tools, and best practices in planning, executing, monitoring, and closing software projects.

Course Objective:

1. Understand the Fundamentals of Software Project Management – Introduce the principles, methodologies, and best practices in managing software projects.
2. Develop Project Planning and Risk Management Skills – Enable students to evaluate project feasibility, choose appropriate development models, and manage risks effectively.
3. Apply Estimation Techniques and Activity Planning – Equip students with knowledge of effort estimation methods and scheduling techniques to optimize project timelines.
4. Enhance Resource Allocation and Monitoring Capabilities – Provide insights into resource distribution, progress tracking, and contract management for efficient project execution.
5. Improve Team Management and Leadership Skills – Focus on managing software development teams, communication strategies, and human resource management in software projects.
6. Ensure Software Quality and Standards Compliance – Introduce software quality models, assurance techniques, and industry-standard quality frameworks.

Unit I : Introduction To Software Project Management – Stepwise: An Overview Of Project Planning.

Unit II: Project evaluation – Selection of an appropriate project approach – Risk management.

Unit III: Software effort estimation - Activity planning.

Unit IV: Resource allocation – Monitoring and Control – Managing Contracts.

Unit V: Managing people and organizing teams – Software quality.

Text book(s):

1. Software Project Management, Hughes, McGraw Hill Education, 2011.

UNIT -1 Chapter 1 and Chapter 2: 2.1 to 2.12
UNIT-2 Chapter 3: 3.1 to 3.9 and Chapter 4: 4.1 to 4.16
UNIT-3 Chapter 5: 5.1 to 5.12
UNIT-4 Chapter 9: 9.1 to 9.11 and Chapter 10: 10.1 to 10.7
UNIT-5 Chapter 11: 11.1 to 11.10

Reference book(s):

1. Software Project Management, Mohanapatra, Cengage Learning, 2011.

COURSEOUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the fundamentals of Software Project Management and Project Planning.	**K1**
CO2	Analyze project evaluation techniques and risk management strategies.	**K2**
CO3	Apply various effort estimation and activity planning techniques.	**K3**
CO4	Evaluate resource allocation, project monitoring, and contract management strategies.	**K4**
CO5	Manage people and team organization effectively.	**K5**
CO6	Assess software quality measures and apply quality standards.	**K4**

Course Articulation Matrix (CO-PO Mapping**) with Weightage**
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**CO Weightage**
CO1	9	3	1	1	1	3	**18**
CO2	3	9	3	3	1	1	**20**
CO3	3	3	9	3	3	3	**24**
CO4	3	3	3	9	3	9	**30**
CO5	3	3	1	3	9	9	**28**
CO6	3	1	3	3	9	9	**28**
PO Weightage	**24**	**22**	**20**	**22**	**26**	**34**	**148**
Weighted Percentage of PO's	**16.22**	**14.86**	**13.51**	**14.86**	**17.57**	**22.97**	**100%**

Course oOutcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2, PO6	PO3, PO4, PO5	-
CO2 / K2	PO2	PO1, PO3, PO4	PO5, PO6	-
CO3 / K3	PO3	PO1, PO2, PO4, PO5, PO6	-	-
CO4 / K4	PO4, PO6	PO1, PO2, PO3, PO5	-	-
CO5 / K5	PO5, PO6	PO1, PO2, PO4	PO3	-
CO6 / K6	PO5, PO6	PO1, PO3, PO4	PO2	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total Scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT15E2 -Software project Management in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	VI	U25IT15E3	Elective-Theory	3	5	5	25	75	100
Course Title	SOFTWARE TESTING								

Course Description:

This course provides a comprehensive introduction to software testing principles, techniques, and tools. Students will learn about the importance of software quality assurance, test planning, test case design, automation testing, defect tracking, and performance testing. The course covers various types of testing, including unit testing, integration testing, system testing, regression testing, and user acceptance testing.

Objective:

1. To understand the software development life cycle (SDLC) models and the role of quality assurance (QA) and quality control (QC) in software development.
2. To learn about different testing techniques including white-box and black-box testing, and understand their application in real-world scenarios.
3. To gain knowledge in integration testing, scenario testing, and defect bash techniques.
4. To study system and acceptance testing, distinguishing between functional and non-functional testing.
5. To understand the methodologies and tools used for performance and regression testing.
6. To learn about test planning, management, execution, reporting, and the significance of test metrics in software testing.

Unit I : Software Development Life Cycle models: Phases of Software project – Quality Assurance, Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing –Structural Testing –Challenges in White-Box Testing.

Unit II : Black-Box Testing: What is Black-Box Testing? - Why Black-Box Testing? – When to do Black-Box Testing? – How to do Black-Box Testing? – Challenges in White Box Testing -Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase Testing – Scenario Testing – Defect Bash.

Unit III : System and Acceptance Testing: system Testing Overview – Why System testing is done? – Functional versus Non-functional Testing – Functional testing - Nonfunctional Testing – Acceptance Testing – Summary of Testing Phases.

Unit IV : Performance Testing: Factors governing Performance Testing – Methodology of Performance Testing – tools for Performance Testing – Process for Performance Testing – Challenges. Regression Testing: What is Regression Testing? – Types of Regression Testing – When to do Regression Testing – How to do Regression Testing – Best Practices in Regression Testing.

Unit V : Test Planning, Management, Execution and Reporting: Test Planning – Test Management – Test Process – Test Reporting –Best Practices. Test Metrics and Measurements: Project Metrics – Progress Metrics – Productivity Metrics – Release Metrics.

Text book(s)

1. Software Testing Principles and Practices – Srinivasan Desikan&Gopalswamy Ramesh, Pearson Education, 2014
   UNIT-1 Chapter 2 - 2.1 to 2.5 and Chapter 3- 3.1 to 3.4
   UNIT -2 Chapter 4- 4.1 to 4.4 and Chapter 5- 5.1 to 5.5
   UNIT-3 Chapter 6 -6.1 to 6.7
   UNIT-4 Chapter 7 -7.1 to 7.6 and Chapter 8 -8.1 to 8.5
   UNIT-5 Chapter 9 -9.1 to 9.11 and Chapter 17 17.1 to 17.8

Reference book(s)

1. Foundations of Software Testing, Aditya P. Mathur, Pearson Education, 2013.

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Explain Software Development Life Cycle models and their phases.	K1
CO2	Analyze White-Box and Black-Box testing methodologies and challenges.	K2
CO3	Compare different testing phases including System and Acceptance Testing.	K3
CO4	Perform Performance Testing and Regression Testing with appropriate tools and methodologies.	K4
CO5	Develop Test Plans and manage test executions effectively.	K5
CO6	Implement Test Metrics and Measurements for project tracking and improvement.	K6

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	3	1	3	1	20
CO2	3	9	3	3	3	1	22
CO3	3	3	9	3	1	3	22
CO4	1	3	3	9	9	3	28
CO5	3	1	9	3	9	9	34
CO6	3	3	3	1	9	9	28
PO Weightage	22	22	30	20	34	26	154
Weighted Percentage of PO's	14.29	14.29	19.48	12.99	22.08	16.88	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K-Level	**Level of Correlation**			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO1	PO2, PO3, PO5	PO4, PO6	-
CO2 / K2	PO2	PO1, PO3, PO4, PO5	PO6	-
CO3 / K3	PO3	PO1, PO2, PO4, PO6	PO5	-
CO4 / K4	PO4, PO5	PO2, PO3, PO6	PO1	-
CO5 / K5	PO3, PO5, PO6	PO1, PO4	PO2	-
CO6/ K6	PO5, PO6	PO1, PO2, PO3	PO4	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total Scholastic marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	3	-	4	16
K2	1	2	1	3	-	4	16
K3		2	1	3	-	3	12
K4	1	2	1	4	-	3	12
K5	1	2	1	4		3	12
K6			1	3		3	12
Non Scholastic	-	-	-	-		5	20
Total	4	10	6	20	5	25	100%

The COs and POs for the course U25IT15E3 -Software Testing in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	VI	U25ITP16	Core Course-XVI- Project	3	6	6	25	75	100
Course Title	PROJECT WORK								

Course Description:

The Project Work course is a capstone component of the BSc in Information Technology program, designed to provide students with hands-on experience in applying their technical knowledge to real-world problems. This course requires students to conceptualize, design, develop, and implement a project that showcases their understanding of various IT concepts, including software development, networking, database management, cyber security, artificial intelligence, or other emerging technologies.

Students will work individually or in teams to develop innovative IT solutions, applying principles of software engineering, programming, system analysis, and project management. They will be expected to document their work, present their findings, and demonstrate their final product through a project report, prototype, or software application.

Course Objectives

By the end of this course, students will be able to:

1. Apply IT Knowledge – Utilize theoretical and practical knowledge acquired throughout the BSc IT program to solve real-world problems through a project.

2. Develop Software Solutions – Design, develop, and implement software or IT-based solutions using appropriate technologies, tools, and programming languages.

3. Enhance Problem-Solving Skills – Analyze complex problems, formulate solutions, and apply IT methodologies to develop efficient and effective applications.

4. Project Management – Apply project planning, scheduling, and execution techniques, including Agile, SDLC, or other methodologies, to manage a project effectively.

5. Team Collaboration – Work collaboratively in a team environment, demonstrating teamwork, leadership, and communication skills to achieve project goals.

6. Research and Innovation – Conduct research on emerging IT trends, evaluate technologies, and incorporate innovative solutions into the project.

7. Technical Documentation – Prepare comprehensive project documentation, including requirements analysis, design documents, test cases, and user manuals.

8. Testing and Quality Assurance – Implement testing methodologies, debug software, and ensure quality assurance for the developed system or application.

9. Professional Ethics and Responsibility – Demonstrate ethical practices, data security considerations, and social responsibility while developing IT solutions.

10. Presentation and Demonstration – Effectively present and demonstrate the project, showcasing technical skills and justifying design and implementation choices.

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	IV	-	Extra Credit Course- Theory	3	-	4	25	75	100
Course Title	BIG DATA ANALYTICS								

COURSE DESCRIPTION:

This course introduces the fundamental concepts, technologies, and tools of Big Data Analytics, equipping learners with the ability to process, store, and analyse large-scale datasets. It covers the classification and characteristics of digital data, challenges of Big Data, and the differences between traditional Business Intelligence and modern Big Data approaches. Students will explore the Big Data technology landscape, including Hadoop, NoSQL databases, MapReduce programming, and distributed computing frameworks. The course also emphasizes practical skills with widely used tools such as Cassandra, MongoDB, Hive, and Pig, enabling learners to gain hands-on experience in data management, querying, and analytics for real-world applications**.**

COURSE OBJECTIVES:

1. Understand the fundamentals, challenges, and traits of Big Data and its role in modern analytics.
2. Differentiate between traditional BI systems, data warehouses, and Big Data environments.
3. Explore the Big Data ecosystem, including NoSQL databases, Hadoop architecture, and HDFS operations.
4. Apply MapReduce programming for data processing tasks such as searching, sorting, and resource management.
5. Perform CRUD operations and data management using Cassandra and MongoDB.
6. Utilize Hive and Pig for data querying, transformations, and large-scale data analysis.

UNIT- I : Introduction to Big Data: Classification of Digital Data, Characteristics of Data, Definition of Big Data, Challenges with Big Data, Definitional Traits of Big Data, Traditional Business Intelligence (BI) versus Big Data, Coexistence of Big Data and Data Warehouse, Realms of Big Data, Big Data Analytics, Classification of Analytics, Challenges of Big Data, Terminologies Used in Big Data Environments, Few Top Analytics Tools.

UNIT-II : The Big Data Technology Landscape: NoSQL (Not Only SQL), Types of NoSQLDatabases, SQL versus NoSQL, Introduction to Hadoop, RDBMS versus Hadoop, Dis-tributed Computing Challenges, Hadoop Overview, Hadoop Distributors, HDFS (Hadoop Distributed File System), Working with HDFS commands, Interacting with Hadoop Ecosystem.

UNIT- III : Mapreduce Programming: Processing Data with Hadoop, Mapper, Reducer, Com-biner, Partitioner, Searching, Sorting, Compression, Managing Resources and Applications with Hadoop YARN.

UNIT-IV : MONGO DB and Cassandra: Features of Mongo DB, RDBMS Vs Mongo DB, Data Types in Mongo DB, Mongo DB Query Language, CRUD Operations, Count, Limit, Sort, and Skip. **Cassandra**: Features of Cassandra, CQL Data Types, Key spaces, CRUD Operations, Collection Types, Table Operations.

UNIT-V : HIVE and PIG: HIVE: Introduction to Hive, Hive Architecture, Hive Data Types, Hive File Format, Hive Query Language (HQL): DDL, DML, Partitions. PIG: The Anatomy of Pig, Pig Philosophy, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, Relational Operators, Eval Functions, Word Count Using Pig. Pig versus Hive.

Text Book:

1. Seema Acharya, Subhashini Chellappan. Big Data and Analytics, 2ndEdition, Wiley India Private Limited, New Delhi, 2019.

Unit 1: Chapter 1, Chapter 2 and Chapter 3

Unit 2: Chapter 4, Chapter 5: Section-5.1 to 5.10 and 5.13.

Unit 3: Chapter 8, Chapter 5: Section-5.11 and 5.12.

Unit 4: Chapter 6 and Chapter 7.

Unit 5: Chapter 9 and Chapter 10.

Reference Books:

1. DT Editorial Services, "Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)", Dream tech Press edition 2016.
2. Radha Shankarmani, M Vijayalakshmi, "Big Data Analytics", Wiley Publications, first Edition 2016
3. Minelli, M., Chambers, M. & Dhiraj, A. (2014). *Big Data*. Big Analytics. Wiley.
4. Sathi, A. (2013). *Big Data Analytics: Disruptive Technologies for Changing the Game*. Elsevier.
5. Mohanty, S., Jagadeesh, M. & Srivatsa, H. (2013). *Big Bata Imperatives: Enterprise Big Data warehouse, BI implementations and Analytics*. Apress Media.
6. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman. Big Data for Dummies, John Wiley & Sons, Inc., 2013.
7. Vignesh Prajapati,"Big Data Analytics with R and Hadoop", PACKT Publishing,November 2013.

Web Resources

1. https://www.geeksforgeeks.org/basics-of-big-data/
2. https://www.ibm.com/topics/big-data
3. https://nptel.ac.in/courses/106/105/106105182/
4. https://www.tutorialspoint.com/hadoop/index.htm
5. https://cloud.google.com/bigquery/docs
6. https://www.dataversity.net/big-data-trends/
7. https://kafka.apache.org/documentation/
8. https://www.simplilearn.com/tutorials/big-data-tutorial/data-processing-in-big-data
9. https://public.tableau.com/en-us/s/

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Explain the fundamentals of Big Data, its characteristics, challenges, and differences between traditional BI and Big Data technologies.	K2
CO2	Compare SQL, NoSQL databases, and Hadoop ecosystem components for handling large-scale data.	K4
CO3	Apply MapReduce programming concepts for processing, searching, and sorting large datasets in Hadoop.	K3
CO4	Demonstrate CRUD operations and data management techniques using Cassandra and MongoDB.	K3
CO5	Utilize Hive Query Language (HQL) and Pig Latin for data analysis, querying, and transformation.	K3
CO6	Evaluate the efficiency of different Big Data tools and frameworks (HDFS, YARN, Hive, Pig, Cassandra, MongoDB) for real-world applications	K5

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	0	1	0	14
CO2	9	9	3	3	1	1	26
CO3	9	9	9	3	3	1	34
CO4	3	9	9	3	3	1	28
CO5	3	9	9	9	3	1	34
CO6	3	3	9	9	3	3	30
PO Weightage	36	42	40	27	14	7	166
Weighted Percentage of PO's	21.67	25.3	24.1	16.27	8.43	4.22	100%

Course Articulation Matrix (CO–PO Mapping)

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool.

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1	PO2	PO3, PO5	PO4, PO6
CO2 / K2	PO1, PO2	PO3, PO4	PO5, PO6	-
CO3 / K3	PO1, PO2, PO3	PO4, PO5	PO6	-
CO4 / K4	PO2, PO3	PO1,PO4,PO5	PO6	-
CO5 / K5	PO2, PO3, PO4	PO1, PO5	PO6	-
CO6/ K6	PO3, PO4	PO1,PO2, PO5, PO6	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course Big Data Analytics in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	V	-	Extra Credit Course- Theory	3	-	4	25	75	100
Course Title	MACHINE LEARNING TECHNIQUES								

COURSE DESCRIPTION:

This course provides a comprehensive introduction to machine learning, covering its fundamental principles and diverse applications. Students will explore the core concepts of supervised, unsupervised, and probabilistic learning through a variety of models and algorithms. The curriculum progresses from foundational topics like predicting and classifying data to advanced techniques such as Support Vector Machines, Artificial Neural Networks, and dimensionality reduction. A significant focus is placed on the practical aspects of machine learning, including the process of building, training, and rigorously evaluating models using key performance metrics to understand and address issues like bias and variance.

COURSE OBJECTIVES:

1. Introduce the fundamental principles, concepts, and challenges of machine learning.
2. Develop an understanding of probabilistic and stochastic models used in learning and decision-making.
3. Explore supervised learning algorithms for regression, classification, and neural networks.
4. Provide insights into unsupervised learning techniques and dimensionality reduction methods.
5. Familiarize students with model building, training, evaluation, and optimization strategies.
6. Equip learners with knowledge of machine learning applications, perspectives, and issues in real-world contexts.

UNIT - I: Introduction: Introduction, easy for human hard for machines, a simple predicting machine, classifying is not very different from predicting, training a simple classifier, one classifier is not enough, Types of machine learning, Applications of Machine Learning, Perspectives and issues in machine learning.

UNIT - II: Probabilistic and Stochastic Models: Bayesian Learning – Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naive Bayes classifier, Expectation maximization and Gaussian Mixture Models, Hidden Markov models.

UNIT - III: Supervised learning: Introduction, Regression, Linear regression, Classification: Decision trees, k-Nereast Neighbours, Support Vector Machine, Logistic regression, Random Forest. Artificial Neural Network: Introduction, Perceptrons, multi-layer networks and back propagation.

UNIT - IV: Unsupervised learning: Introduction, Supervised vs Unsupervised Cluster Analysis, K-means clustering, Hierarchical clustering. Dimension reduction: Principal Component Analysis, Linear

Discriminant Analysis.

UNIT - V: Modelling and evaluation: Building the model, Training a model, evaluating a model, improving a model. Performance metrics - accuracy, precision, recall, sensitivity, specificity, AUC, RoC, Bias Variance decomposition.

Text Book(s)

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, Pearson Education.
(Unit1: Chapter1:.4,1.5,1.7,1.9; Unit 2: Chapter 6; Unit 3: Chapter 7, 8, 10; Unit 4 Chapter 9 (9.1,9.4), Unit 5: Chapter 3;)
2. Ethem Alpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014.
(Unit2: Chapter 7, Chapter 15)

Reference Book(s)

1. Tariq Rashid, "Make your own neural network", Create Space Independent Publishing Platform, US 2016, ISBN:978-1-5308-2660-5 (Unit1, Part1)
2. Shai Shalev-Shwartz, Shai Ben-David, — Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press.
3. T. Hastie, R. Tibshirani and J. Friedman, "Elements of Statistical Learning", Springer.
4. Charu C. Aggarwal, "DATA CLUSTERING Algorithms and Applications", CRC Press, 2014.
5. C. Bishop, "Pattern Recognition and Machine Learning", Springer. 8. Sebastian Raschka and Vahid Mirjalili, "Python Machine Learning", Packt Publishing, Third Edition, 2019

WEB RESOURCE(S):

1.https://nessie.ilab.sztaki.hu/~kornai/2020/AdvancedMachineLearning/Ng_MachineLearningYearning.pdf
2.https://www.cs.ubc.ca/~murphyk/MLbook/pml-toc-1may12.pdf
3.http://www.cs.cmu.edu/~tom/files/MachineLearningTomMitchell.pdf

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Students will be able to recall the basic terminology and core concepts of machine learning, including the difference between supervised and unsupervised learning.	K1
CO2	Students will be able to explain the working principles of various probabilistic models like Naive Bayes and Hidden Markov Models.	K2
CO3	Students will be able to apply supervised learning algorithms such as decision trees, KNN, and logistic regression to solve classification and regression problems.	K4
CO4	Students will be able to analyze and compare different unsupervised learning techniques like K-means clustering and Principal Component Analysis.	K3
CO5	Students will be able to evaluate the performance of machine learning models using metrics like accuracy, precision, and recall, and understand the trade-offs.	K5
CO6	Students will be able to create a complete machine learning solution, from model selection and training to evaluation and improvement.	K6

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	3	1	1	3	1	18
CO2	9	9	3	3	3	1	28
CO3	9	9	9	3	9	1	40
CO4	9	9	3	3	9	1	34
CO5	9	9	3	9	9	1	40
CO6	9	9	9	9	9	3	48
PO Weightage	54	48	28	28	42	8	208
Weighted Percentage of PO's	25.96	23.08	13.46	13.46	20.19	3.85	**100%**

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	**Level of Correlation**			
	High	**Medium**	**Low**	**Zero**
CO1 / K1	PO1	PO2,PO5	PO3,PO4,PO6	-
CO2 / K2	PO1, PO2,	PO3,PO4, PO5,	PO6	-
CO3 / K3	PO1, PO2, PO3,PO5,	PO4	PO6	-
CO4 / K4	PO1,PO2,PO5	PO3,PO4	PO6	-
CO5 / K5	PO1, PO2, PO4,PO5,	PO3	PO6	-
CO6/ K6	PO1,PO2,PO3,PO4,PO5	PO6	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course Machine Learning Techniques in the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD

Program Code	Semester	Course Code	Course Category	Exam Hrs.	Hours/ Week	Credits	Marks for Evaluation		
							CIA	ESE	Total
INTUG2008	VI	-	Extra Credit Course-II-Theory	3	-	4	25	75	100
Course Title	CLOUD COMPUTING								

COURSE DESCRIPTION:

This course provides a comprehensive introduction to the principles and practices of cloud computing. It explores the evolution, models, and characteristics of cloud environments, as well as the key enabling technologies such as virtualization and service-oriented architecture (SOA). Students will gain insights into cloud computing architectures, deployment models, and service delivery frameworks. Emphasis is placed on cloud security, privacy, and trust issues, along with hands-on exposure to popular cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, and Google App Engine. The course also addresses application migration strategies and the challenges involved in transitioning to the cloud.

COURSE OBJECTIVES:

1. Understand the fundamentals and evolution of cloud computing, including its characteristics, benefits, challenges, and various deployment models.
2. Analyze the architecture of cloud computing systems, comparing different cloud models and understanding the roles of Identity as a Service and other architectural components.
3. Explain the concept of virtualization, its implementation techniques, and its role in efficient resource management and cloud data center operations.
4. Evaluate cloud computing security frameworks, identifying potential threats, attacks, and mitigation strategies, with a focus on emerging trends in privacy and trust.
5. Explore major cloud service platforms, such as AWS, Azure, and Google App Engine, and understand their services, features, and applications in real-world scenarios.
6. Plan and manage cloud migration processes, recognizing the motivations, challenges, and strategies for successfully transitioning applications to cloud environments.

UNIT - I: Introduction-History of Cloud Computing – Characteristics of Cloud – Cloud Computing Model – Issues and Challenges for Cloud Computing – Advantages and disadvantages of Cloud Computing – Security Privacy and Trust – Virtualization – Threats to Cloud Computing – Next Generation of Cloud computing - Cloud Computing Architecture: Cloud Architecture – Cloud Computing Models – Comparisons of Models – Deployment Models – Identity as a Service.

UNIT - II: Virtualization – Implementation of virtualization – Virtualization Support at The OS Level – Middleware Support For Virtualization – Advantages of Virtualization – Virtualization Implementation Techniques – Hardware Virtualization - Types of Virtualization – Load Balancing in Cloud Computing – Logical Cloud Computing Model – Virtualization for Data-Centre .

UNIT - III: Security Reference Architecture – Security Issues in Cloud Computing – Classification of Security issues - Types of Attacks – Security Risks in Cloud Computing – Security Threats against

Cloud Computing - Emerging trends in Security and Privacy.

UNIT - IV: Amazon Web Services – Microsoft Azure - Google App Engine – Data Security - Privacy – Service Oriented Architecture Components – Design Principle of SOA – SOA Requirements – Benefits of SOA – Web Services .

UNIT - V: Motivations for Migration – Issues in Migrating the Applications to the Cloud – Types of Migration - Planning for Migrating the application to Cloud – Migration Road Map.

Text Book(s)

1. "Cloud Computing" – V.K. Pachghare PHI Delhi Learning Private Limited, 2016. ISBN: 978-81-203-5213-1 [Unit– I: Chapter 1,2; Unit– II: Chapter 3; Unit – III: Chapter 5; Unit – IV: Chapter 7,9; Unit – V: Chapter 10]
NCT Library Accn.No: 22014311

Reference Book(s)

1. Sharma, Rishabh," Cloud Computing Fundamentals, Industry Approach and Trends", New Delhi: John Wiley, 2017.

2. Chitra, D,"Grid and Cloud Computing ", D. Chitra and A. Kaliappan, Jodhpur: Scientific Publishers, India, 2016.

3. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.

4. Michael Miller "Cloud Computing Web based application that change the way you work and collaborate online". Pearson Edition, 2008.

5. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Jones & Bartlett Learning, 2012.

Web Resource(S):

1.https://www.cloudonomics.com/
2.https://www.ibm.com/cloud/blog/hypervisor

COURSE OUTCOMES		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Describe the history, characteristics, models, advantages, and challenges of cloud computing.	K2
CO2	Explain the principles of virtualization and its implementation in cloud infrastructure and data centers.	K2
CO3	Analyze different cloud computing architectures and deployment models, including service models and identity management.	K4
CO4	Identify and classify various security threats, attacks, and privacy concerns in cloud computing environments.	K3
CO5	Compare and evaluate cloud service providers such as AWS, Azure, and Google App Engine, including their services and SOA components.	K4
CO6	Develop a strategic plan for cloud migration, addressing potential issues and creating a migration roadmap.	K5

Course Articulation Matrix (CO-PO Mapping**)** with Weightage
Correlation Levels: Strongly Correlated (9), Moderately Correlated (3),Weakly Correlated (1)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	CO Weightage
CO1	9	9	3	3	1	1	26
CO2	9	3	9	3	9	1	34
CO3	3	9	9	3	3	9	36
CO4	3	3	9	9	9	1	34
CO5	3	3	9	9	9	3	36
CO6	3	9	3	9	3	3	30
PO Weightage	30	36	42	36	34	18	196
Weighted Percentage of PO's	15.31	18.37	21.43	18.37	17.35	9.18	100%

Course Outcomes mapped with Knowledge level (Revised Bloom's Taxonomy) and POs. recommended by UGC as per Six Sigma Tool

CO / K - Level	Level of Correlation			
	High	Medium	Low	Zero
CO1 / K1	PO1, PO2	PO3,PO4	PO5,PO6	-
CO2 / K2	PO1, PO3, PO5	PO2, PO4	PO6	-
CO3 / K3	PO2, PO3,PO6	PO1,PO4, PO5,	-	-
CO4 / K4	PO3, PO4,, PO5	PO1, PO2	PO6	-
CO5 / K5	PO3, PO4, PO5	PO1, PO2, ,PO6	-	-
CO6/ K6	PO2, PO4	PO1,PO3 , PO5, PO6	-	-

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure:

Levels	C1	C2	C3	Total scholastic marks	Non Scholastic Marks C4	CIA Total	% of Assessment
	T1 4 Marks	T2 10 Marks	Assignment 6 Marks	20 Marks	5 Marks	25 Marks	
K1	1	2	1	4	-	4	16%
K2	1	2	1	4	-	4	16%
K3	1	2	2	5	-	5	20%
K4	1	2	1	4	-	4	16%
K5		2	1	3		3	12%
Non Scholastic	-	-	-	-	5	5	20%
Total	4	10	6	20	5	25	100%

The COs and POs for the course Cloud Computing the B.Sc. Information Technology Programme is effectively matched by the Course In-charge.

Signature of the Course In-charge Signature of the HoD