COURSE STRUCTURE AND DETAILED SYLLABUS

For

B.Tech-Four Year Degree Programme
(MR22 Regulations)

Effective from the Academic Year 2022-23 onwards

Department of Information Technology
MALLA REDDY ENGINEERING COLLEGE

(UGC Autonomous Institution, Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad). Accredited 3rd time by NAAC with 'A++' Grade, Maisammaguda(H), Medchal-Malkajgiri,Secunderabad, Telangana–500100.
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Department of Information Technology

VISION OF THE INSTITUTE

To be a premier center of professional education and research, offering quality programs in a socio- economic and ethical ambience.

MISSION OF THE INSTITUTE

M1. To impart knowledge of advanced technologies using state-of-the-art infrastructural facilities.

M2. To inculcate innovation and best practices in education, training and research.

M3. To meet changing socio-economic needs in an ethical ambience.

DEPARTMENT VISION

To Attain Global Standards in the Teaching, Training, and Research of the IT Industry that Strike a Balance between the Rising Needs of the Sector and the Socio-Economic and Ethical Needs of the Society..

DEPARTMENT MISSION

M1. To impart quality education and research to undergraduate and postgraduate students inInformation Technology (IT).

M2. To train students in advanced technologies using state-of-the-art facilities.

M3. To develop knowledge, skills and aptitude to function in the IT domain based on ethicalvalues and social relevance.

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To Outshine In Professional Career With Sound Problem Solving Ability For Providing IT Solutions By Proper Plan, Analysis, Design, Implementation And Validation.

PEO 2: To pursue training, advance study and research using scientific, technical and communication base to cope with the evolution in the technology.

PEO 3: To utilize the acquired technical skills and knowledge for the benefit of society

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1: Identify the mathematical abstractions and algorithm design techniques together with emerging Software Tools to solve complexities indulged in efficient programming.

PSO 2: Apply the core concepts of current technologies in the hardware, software mains in accomplishing IT enabled services to meet out societal needs.

PSO 3: Practice modern computing techniques by continual learning process with ethical concerns in establishing innovative career path

PROGRAMME OUTCOMES (POs)

PO 1	**Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem Analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The Engineer and Society**: Apply reasoning informed by the contextual knowledge toassesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and Team Work**: Function effectively as an individual and as a member orleader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-Long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Department of Information Technology
Course Structure
(MR22 Regulations-Effective from the Academic Year 2022–23 onwards)

S. No	Course Category	Course Code	Name of the Course	L	T	P	Credits
			I YEAR I SEMESTER				
1.	HSMC	C0H01	English	3	-	-	3
2.	BSC	C0B01	Linear Algebra and Numerical Methods	3	1	-	4
3.	ESC	C0501	Programming for Problem Solving	3	-	-	3
4.	ESC	C0201	Basic Electrical and Electronics Engineering	3	-	-	3
5.	ESC	C0502	Programming for Problem Solving Lab	-	-	2	1
6.	HSMC	C0H02	English Language and Communication Skills Lab	-	-	2	1
7.	ESC	C1201	Engineering and IT Workshop	-	1	2	2
8.	ESC	C0202	Basic Electrical and Electronics Engineering Lab	-	-	2	1
			Total	12	2	8	18
			Total Contact Hours		22		

S. No	Course Category	Course Code	Name of the Course	L	T	P	Credits
			I YEAR II SEMESTER				
1.	BSC	C0B17	Engineering Chemistry	3	1	-	4
2.	ESC	C0305	Engineering Drawing	2	-	2	3
3.	BSC	C0B09	Semiconductor Physics	3	1	-	4
4.	BSC	C0B02	Probability and Statistics	3	-	-	3
5.	ESC	C0504	Python Programming	3	1	-	4
6.	BSC	C0B11	Applied Physics Lab	-	-	2	1
7.	BSC	C0B18	Engineering Chemistry Lab	-	-	2	1
8.	ESC	C0506	Python Programming Lab	-	1	2	2
			Total	14	4	8	22
			Total Contact Hours		26		

MALLA REDDY ENGINEERING COLLEGE

Department of Information Technology
Course Structure
(MR22 Regulations-Effective from the Academic Year 2022–23 onwards)

			II Year I Semester				
S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week			Credits
				L	T	P	
1	PCC	C0507	Discrete Mathematics	3	-	-	3
2	PCC	C0509	Computer Organization and Architecture	3	-	-	3
3	PCC	C0510	Data Structures	3	-	-	3
4	PCC	C0511	Object Oriented Programming Through Java	3	-	-	3
5	PCC	C1202	Introduction to IOT	3	-	-	3
6	PCC	C0512	Data Structures Lab	-	-	3	1.5
7	PCC	C1203	Object Oriented Programming Lab	-	-	3	1.5
8	PCC	C0514	Data Visualization/Power BI	-	1	2	2
9	MC	C00M1	Gender Sensitization	-	-	2	-
			Total	**15**	**1**	**10**	**20**
			Total Contact Hours / Credits	**26**			

			II Year II Semester				
S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week			Credits
				L	T	P	
1	BSC	C0B07	Applied Statistics and Optimization Techniques	4	-	-	4
2	PCC	C0515	Database Management Systems	3	-	-	3
3	PCC	C0516	Operating Systems	3	-	-	3
4	PCC	C0517	Design & Analysis of Algorithms	3	-	-	3
5	PCC	C1204	Web Technologies	3	-	-	3
6	PCC	C0519	Database Management Systems Lab	-	-	2	1
7	PCC	C1205	Design & Analysis of Algorithms Lab	-	-	2	1
8	PCC	C12P1	Real Time Research Project / Field Based Research Project	-	-	2	1
9	PCC	C0522	Node JS/React JS/ Django	-	-	2	1
10	MC	C00M2	Environmental Science	2	-	-	-
			Total	**18**	**-**	**8**	**20**
			Total Contact Hours / Credits	**26**			

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S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week L	Contact Hours/Week T	Contact Hours/Week P	Credits
III Year I Semester						
1	HSMC	C0H08	Business Economics & Financial Analysis	3	-	-	3
2	PCC	C6637	Artificial Intelligence	3	-	-	3
3	PCC	C1206	Software Engineering	3	-	-	3
4	PCC	C6201	Computer Networks	3	-	-	3
Professional Elective-I						
5	PEC-I	C1207	Biometrics	3	-	-	3
		C0526	Principles of Programming Languages				
		C0527	Image Processing				
		C0524	Advance Computer Architecture				
		C0523	Quantum Computing				
6	PCC	C1208	Software Engineering & Computer Networks Lab	-	1	2	2
7	PCC	C6638	Artificial Intelligence Lab	-	1	2	2
8	PCC	C0530	UI Design-Flutter Lab	-	-	2	1
9	MC	C00M3	Quantitative Aptitude and Verbal Reasoning-I	2	-	-	-
10	MC	C00M5	Constitution of India	2	-	-	-
\multicolumn{4}{r}{Total}	19	-	6	20
\multicolumn{4}{r}{Total Contact Hours}	\multicolumn{3}{c}{25}	

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S.No	Course Category	Course Code	Name of the Course	L	T	P	Credits
			III Year II Semester				
				Contact Hours/Week			
1	PCC	C1209	Automata Theory and Compiler Design	3	-	-	3
2	PCC	C6625	Machine Learning	3	-	-	3
			Professional Elective-II				
3	**PEC-II**	C0525	Computer Graphics	3	-	-	3
		C6711	Data Analytics				
		C1210	Information Retrieval				
		C0529	Distributed Databases				
		C1211	Pattern Recognition				
			Professional Elective-III				
4	**PEC-III**	C0533	Full Stack Development	3	-	-	3
		C1212	Data Mining				
		C0534	Scripting Languages				
		C0535	Mobile Application Development				
		C6917	Internet of Things				
5	**OEC-I**		**Open Elective-I**	3	-	-	3
6	HSMC	C0H03	Advanced English Communication Skills Lab	-	-	2	1
7	PCC	C6626	Machine Learning Lab	-	-	2	1
			Professional Elective-III Lab				
8	PE-III Lab	C0538	Full Stack Development Lab	-	-	2	1
		C1213	Data Mining Lab				
		C0539	Scripting Languages Lab				
		C0540	Mobile Application Development Lab				
		C6918	Internet of Things Lab				
9	PROJ	C00P1	Industrial Oriented Mini Project / Internship/ Skill Development Course (Big Data-Spark)	2	-	-	2
10	MC	C00M4	Quantitative Aptitude & Verbal Reasoning-II	2	-	-	-
11	MC	C00M6	Intellectual Property Rights	2			-
			Total	21	0	8	20
			Total Contact Hours		29		

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S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week			Credits
				L	T	P	
IV Year I Semester							

S.No	Course Category	Course Code	Name of the Course	L	T	P	Credits
1	HSMC	COH09	Organizational Behavior	3	-	-	3
2	PCC	C1214	Information Security	3	-	-	3
3	PCC	C0544	Cloud Computing	3			3
Professional Elective-IV							
4	**PEC-IV**	C7320	Semantic Web	3	-	-	3
		C1215	High Performance Computing				
		C0536	Software Testing Methodologies				
		C0544	Advanced Operating Systems				
		C0547	Ad-hoc & Sensor Networks				
5	**OEC-II**	--	**Open Elective-II**	3	-	-	3
6	PCC	C1216	Information Security Lab	-	-	2	1
7	PCC	C0560	Cloud Computing Lab	-	-	2	1
8	PROJ	C00P2	Project Stage-I	-	-	6	3
			Total	15	0	10	**20**
			Total Contact Hours		25		

S.No	Course Category	Course Code	Name of the Course	Contact Hours /Week			Credits
				L	T	P	
IV Year II Semester							

S.No	Course Category	Course Code	Name of the Course	L	T	P	Credits
1	**PEC-V**	C1217	Intrusion Detection Systems	3	-	-	3
		C1218	Real Time Systems				
		C6610	Deep Learning				
		C0558	Human Computer Interaction				
		C0550	Software Process &Project Management				
Professional Elective-VI							
2	**PEC-VI**	C6608	Natural Language Processing	3	-	-	3
		C0557	Distributed Systems				
		C1219	Augmented Reality & Virtual Reality				
		C1220	Web Security				
		C0548	Blockchain Technology				
3	OEC-III	--	**Open Elective-III**	3	-	-	3
4	PROJ	C0P03	Project Stage-II including Seminar	-	-	22	9+2
			Total	9	0	22	20

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech. I Semester**		
Code:C0H01	**English**	**L**	**T**	**P**
Credits: 3	(Common for CE, EEE, ME, ECE, CSE, CSE (CS), CSE (AIML), CSE (DS), CSE (IOT), AI, IT and Mi.E)	**3**	**-**	**-**

Course Objectives:

The objective of this course is to improve the English Language and Literary competence of the students. The course provides requisite insights into grammar, vocabulary, prose, and short stories. Further, it also helps in developing the skills of Reading and Writing. The course also equips students to study their academic subjects more effectively using the theoretical and practical components of the English language and literature.

Module – I

Speech	: "Go Kiss the World" by Subroto Bagchi
Poem	: "Leisure" by W. H. Davies
Vocabulary	: Formation of Words, Roots, Prefixes, Suffixes
Grammar	: Articles and Prepositions
Reading	: Skimming and Scanning
Writing	: Introduction to Writing Skills, Characteristics of Effective Writing

Module – II

Short story	: "Gift of Magi" by O' Henry
Poem	: "No Man is an Island" by John Donne
Vocabulary	: One Word Substitutions; Synonyms and Antonyms
Grammar	: Degrees of Comparison, Active and Passive Voice
Reading	: Intensive Reading and Extensive Reading
Writing	: Paragraph Writing- Cohesive devices; Jumbled Sentences; Punctuation

Module – III

Essay	: "Lucidity, Simplicity, Euphony" by W. Somerset Maugham
Poem	: "We wear the Mask" by Paul Laurence Dunbar
Grammar	: Tense and Aspect
Vocabulary	: Homonyms, Homophones, Homographs
Reading	: Reading for Topic and Theme
Writing	: Letter Writing

Module – IV

Short story	: "The Night Train at Deoli" by Ruskin Bond
Poem	: "Gift of India" by Sarojini Naidu
Grammar	: Question Tags; Concord
Vocabulary	: Idiomatic Expressions; Phrasal Verbs
Reading	: Reading for Interpretation
Writing	: Essay Writing, Describing, Defining and Classifying

Module – V

Essay	: "Toasted English" by R. K. Narayan
Poem	: "If" by Rudyard Kipling
Grammar	: Direct and Indirect Speech, Misplaced Modifiers
Vocabulary	: Redundancies and Clichés

Reading   **:** Reading for Specific Purposes, Reading Comprehension practice

Writing   **:** Paraphrasing & Summarizing,

Reference Books:

1. Azar, Betty and <u>Stacy A, Hagen</u>. *Understanding and Using English Grammar*. 4th edition, Foundation Books, 2009.
2. Chaudhuri, Santanu S. *Learn English: A Fun Book of Functional Language, Grammar and Vocabulary.* Tata McGraw Hill Education, New Delhi, 2013.
3. Eastwod, John. <u>*Oxford Guide to English Grammar.*</u> 4th edition, Oxford University Press, 1994.
4. Field, Marion**.** *Improve Your Written English*. 5th Edition. How to Books, UK, 2009.
5. Leech, Geoffrey and Svartvik, J. *A Communicative Grammar of English*. 3rd edition, Routledge, 2013.

Related Websites:

1. http://www.slideshare.net/aszardini/word-formationroot-words-prefixes-and-suffixes
2. http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd.
3. http://www.zsme.tarnow.pl/jezykiobce/wp-content/uploads/2013/11/writing-letters1.pdf.

Course Outcomes:

After completion of the course, students will be able to:

CO's	Statement	Blooms Taxonomy Level
CO1	Use written and spoken English considerably well for academic purposes.	Understand
CO2	Communicate in Enrich accurately and fluently	Understand
CO3	Employ extensive and intensive reading skills	Understand
CO4	Gain confidence in writing for academic and real life situations	Understand
CO5	Use standard grammar, punctuation, and spelling in technical documents	Understand

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
CO's	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	-	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-
CO3	-	1	-	1	-	-	-	-	-	2	-	2	-	-	-
CO4	-	-	-	-	1	1	-	-	1	2	-	2	-	-	-
CO5	-	-	-	1	1	-	-		1	2	-	2	-	-	-

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech. I Semester**		
Code:C0B01	**Linear Algebra and Numerical Methods** (Common For CSE, IT, CSE (AI&ML, DS, CS, IOT), B.Tech (AI&ML)	**L**	**T**	**P**
Credits: 4		3	1	-

Prerequisites: NIL

Course Objectives:

1. To learn types of matrices, Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if exist.
2. To learn concept of Eigen values and Eigen vectors of a matrix, diagonalization of a matrix, Cayley Hamilton theorem and reduce a quadratic form into a canonical form through a linear transformation.
3. To learn various methods to find roots of an equation.
4. To learn Concept of finite differences and to estimate the value for the given data using interpolation.
5. To learn Solving ordinary differential equations and evaluation of integrals using numerical techniques.

MODULE I: Matrix Algebra   [12 PERIODS]

Vector Space, basis, linear dependence and independence (Only Definitions)
Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew- Hermitian; orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; solving system of Homogeneous and Non-Homogeneous linear equations, LU – Decomposition Method.

MODULE II: Eigen Values and Eigen Vectors   [12 Periods]

Eigen values , Eigen vectors and their properties; Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem.

Quadratic forms: Nature, rank, index and signature of the Quadratic Form, Linear Transformation and Orthogonal Transformation, Reduction of Quadratic form to canonical forms by Orthogonal Transformation Method. Singular Value Decomposition.

MODULE III: Algebraic &Transcendental equations   [12 Periods]

(A) Solution of Algebraic and Transcendental Equations: Introduction-Errors, types of errors. Bisection Method, Method of False Position, Newton-Raphson Method.
 (B) The Iteration Method ,Ramanujan's method to find smallest root of Equation. Jacobi's Iteration method for solving system of linear equations. Gauss seidel Iteration method for solving system of linear equations.

MODULE IV: Interpolation   [12 Periods]

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences-Central differences - Symbolic relations and separation of symbols. Differences of a polynomial-Newton's formulae for interpolation; Central difference

interpolation Formulae – Gauss Central Difference Formulae ; Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

MODULE-V: Numerical solution of Ordinary Differential Equations and Numerical Integration **[12 Periods]**

Numerical Integration: Trapezoidal Rule, Simpson's 1/3rd Rule, Simpson's 3/8 Rule.

Numerical solution of Ordinary Differential Equations : Introduction-Solution of Ordinary Differential Equation by Taylor's series method - Picard's Method of successive Approximations - Euler's Method-Modified Euler's Method – Runge-Kutta Methods.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. M . K Jain, S R K Iyengar, R.K Jain, Numerical Methods for Scientific and Engineering Computation, New age International publishers.
5. S.S.Sastry, Introductory Methods of Numerical Analysis,5th Edition, PHI Learning Private Limited
6. Richard Bellman, Introduction to matrix Analysis, Siam, second Edition.

REFERENCES

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
3. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, AffiliatedEast–West press, Reprint 2005.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

E – RESOURCES

1. https://www.youtube.com/watch?v=sSjB7ccnM_I (Matrices – System of linear Equations)
2. https://www.youtube.com/watch?v=h5urBuE4Xhg (Eigen values and Eigen vectors)
3. https://www.youtube.com/watch?v=9y_HcckJ96o (Quadratic forms)
4. https://www.youtube.com/watch?v=3j0c_FhOt5U (Bisection Method)
5. https://www.youtube.com/watch?v=6vs-pymcsqk (Regula Falsi Method and Newton Raphson Method)
6. https://www.youtube.com/watch?v=1pJYZX-tgi0 (Interpolation)
7. https://www.youtube.com/watch?v=Atv3IsQsak8&pbjreload=101 (Numerical Solution of ODE)
8. https://www.youtube.com/watch?v=iviiGB5vxLA (Numerical Integration)

NPTEL

1. https://www.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy_2iUCG87BLKl8eISe4fHKdE2_j2B_T&index=5 (Matrices – System of linear Equations)
2. https://www.youtube.com/watch?v=wrSJ5re0TAw (Eigen values and Eigen vectors)

3. https://www.youtube.com/watch?v=yuE86XeGhEA (Quadratic forms)
4. https://www.youtube.com/watch?v=WbmLBRbp0zA (Bisection Method)
5. https://www.youtube.com/watch?v=0K6olBTdcSs (Regula Falsi and Newton Raphson Method)
6. https://www.youtube.com/watch?v=KSFnfUYcxoI (Interpolation)
7. https://www.youtube.com/watch?v=QugqSa3Gl-w&t=2254s (Numerical Solution of ODE)
8. https://www.youtube.com/watch?v=NihKCpjx2_0&list=PLbMVogVj5nJRILpJJO7KrZa 8Ttj4_ZAgl (Numerical Solution of ODE)
9. https://www.youtube.com/watch?v=hizXlwJO1Ck (Numerical Integration)

Course Outcomes:
After completion of the course, students will be able to:

CO's	Statement	Blooms Taxonomy Level
CO1	Find rank of a matrix and analyze solutions of system of linear equations.	Analyze
CO2	Find Eigen values and Eigen vectors of a matrix, diagonalization a matrix, verification of Cayley Hamilton theorem and reduce a quadratic form into a canonical form through a linear transformation	Apply
CO3	Find the root of a given equation by various methods	Understand
CO4	Estimate the value for the given data using interpolation	Apply
CO5	Find the numerical solutions for a given ODE's and evaluations of integrals using numerical techniques	Analyze

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes (POs)**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	2	2	3	3				2			1
CO2	2	2	2	3	2				2			1
CO3	2	2	2	3	2				2			1
CO4	3	2	2	3	3				2			2
CO5	2	2	2	3	3				2			2

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: C0501	**Programming for Problem Solving**		**L**	**T**	**P**
Credits: 3	(Common for CE, EEE, ME, ECE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI, IT and Mi.E)	**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:

Understand the basic terminology, write, compile and debug programs in computer programming

Implement different control statements for solving problems.

Understand the concept of structured program and arrays.

Implement the idea of strings and pointers.

Analyse the usage of structures and different file operations.

MODULE I: Fundamentals and Introduction to 'C' Language   [10 Periods]

Introduction Fundamentals– Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to 'C' Language: – Background, C-tokens- Keywords, Identifiers, Basic data types, Variables, Constants, Preprocessor directives-include, define, Managing   Input / Output functions - formatted input / output functions, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Simple C Programming examples.

MODULEII: Conditional Statements and Repetition Statements   [09 Periods]

Conditional Statements: Simple if statement, if-else statement, if-elseif- ladder, nested if-else, Dangling else problem, switch statements.

Repetition statements – while, for, do-while statements, nested looping, other statements related to looping – break, continue, goto, Simple C Programming examples.

MODULE III: Designing Structured Programs and Arrays   [10 Periods]

Designing Structured Programs-Introduction to function, Advantages, user defined functions, inter function communication-call by value, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion – recursive functions-Towers of Hanoi problem.

Arrays: Basic Concepts, Types of arrays, applications- Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods, arrays and functions.

MODULE IV: Strings and Pointers   [09 Periods]

Strings: Concepts, String Input / Output functions, arrays of strings, string manipulation functions, string conversion, C program examples.

Pointers – Basic Concepts, Pointers for inter function communication-call by reference, pointers to pointers, Pointer arithmetic, array of pointers, pointers to array, applications, pointers to void, pointers to functions, Dynamic memory allocation functions.

MODULE V: Structures and File Handling   [10 Periods]

Structures – Declaration, definition and initialization of structures, accessing structure elements, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, difference between structures and union, typedef, bit fields, enumerated types, C programming examples.

Files – Basic Concept of a file, file input / output operations, text files and binary files, file status functions (error handling), Random file access functions, command –line arguments.
C program examples.

Textbooks

1. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, PHI/Pearson Education

References

1. C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
2. C for Engineers and Scientists, H. Cheng, Mc. Graw-Hill International Edition
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

E–RESOURCES

1. http://oxford university press.ac.in/eBooks/ Programming in C.
2. https://www.journals.elsevier.com/science-of-computer-programming
3. http://www.ejournalofsciences.org
4. http://onlinecourses.nptel.ac.in/iiitk_cs-101
5. http://onlinevideolecture.com/ebooks/?subject=C-Programming

Course Outcomes:

At the end of the course, students will be able to

CO's	Statement	Blooms Taxonomy Level
CO1	Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language)..	Analyze
CO2	Apply different types of control structures to code and test a given logic in C programming language	Apply
CO3	Decompose a problem into functions and to develop modular reusable code and Use arrays to formulate algorithms and programs for Searching and sorting problems	Understand
CO4	Develop programs that make use of concepts such as strings, pointers	Apply
CO5	Analyze structures, file operations and command line arguments	Analyze

CO- PO, PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										1	3	2	2
CO2	3	2	1									1	3	2	1
CO3	3	3	1									1	3	2	1
CO4	3	1										2	3	2	1
CO5	3	3	1									2	3	2	1

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		**B.Tech. I Semester**	
Code:C0201	**Basic Electrical and Electronics Engineering** (Common for all branches)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Nil

Course Objectives: To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

MODULE I: DC Circuits **9 Periods**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws - Series, parallel, series-parallel, star-to-delta and delta-to-star transformation-analysis of simple circuits with dc excitation. Superposition, Thevenin's and Maximum Power Transfer Theorems with DC excitation.

MODULE II: AC Circuits **9 Periods**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

MODULE III: Introduction to Electrical Machines **10 Periods**

A: DC Machines: Construction & Principle of Operation of DC Generators – E.M.F Equation. Principle of operation DC Motors – Back E.M.F. - Torque equation – Brake Test -Characteristics.

B: AC Machines: Construction and Principle of operation of Transformer- EMF Equation. Construction and Principle of Operation of 3 Phase Induction Motors - Brake test on 3-Phase Induction Motor – Applications.

MODULE IV: P-N Junction Diode **10 Periods**

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator.

Rectifiers : P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier.

Filters : Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

MODULE V: Bipolar Junction Transistor (BJT): **10 Periods**

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CC configurations

Junction Field Effect Transistor and MOSFET: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.

Text Books

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, **" Basic Electrical and Electronics Engineering"**, S.Chand and Company Limited, New Delhi, 1st Edition, 2017.

2. R.L.Boylestad and Louis Nashlesky, **"Electronic Devices & Circuit Theory"**, Pearson Education, 2007.

References

1. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S.Chand & Co., 2009.

2. Jacob Milliman, Christos C .Halkias, Satyabrata Jit (2011), "Electronic Devices and Circuits", 3 rd edition, Tata McGraw Hill, New Delhi.
3. Thomas L. Floyd and R. P. Jain, "Digital Fundamentals", Pearson Education, 2009.
4. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 2008.
5. Nagrath I.J. and D. P. Kothari, "Basic Electrical Engineering", Tata McGraw Hill, 2001.
6. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Education, New Delhi, 2nd Edition, 2005.

E - Resources
1. https://www.electrical4u.com/ohms-law-equation-formula-and-limitation-of-ohms-law/
2. https://www.eeweb.com/passives
3. http://nptel.ac.in/courses/108108076/
4. http://nptel.ac.in/downloads/108105053/

Course Outcomes:
At the end of the course, students should be able to

CO	Statement	Blooms Taxonomy Level
CO1	Apply KCL, KVL and network theorems to analyse DC circuit	Apply
CO2	Analyze the single-phase AC Circuits, the representation of alternating quantities and determining the power and power factor in these circuits.	Analyze
CO3	Comprehend the construction and Operation of DC and AC machines	Understand
CO4	Understand the operation of PN Junction diode and its application in rectifier circuits	Understand
CO5	Compare the different configurations of BJT and draw the V-I characteristics of BJT, JFET and MOSFET	Understand

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					1					2		2			
CO2										1		2			
CO3		1		1						2		2		1	
CO4					1	1			1	2		2			
CO5				1	1				1	2		2			

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0502	**Programming for Problem Solving Lab** (Common for CE, EEE, ME, ECE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI, IT and Mi.E)	L	T	P
Credits: 1		-	-	2

Prerequisites: NIL

Course Objectives:
1. Understand the various steps in Program development
2. Identify syntax and semantics of C Programming Language
3. Illustrate the usage of structured programming approach in solving problems.
4. Develop programs that make use of arrays, strings and pointers in C language
5. Analyse structures and different file operations

Software Requirements: C

List of Programs:
1. a. Practice various Internal and External DOS Commands.
   b. Write sample examples of C programs to implement basic operations.
2. a. Write a C program to find smallest and largest of given three numbers.
   b. Write a C program to find the roots of a quadratic equation.
   c. Write a C program to check whether given character is alphabet, digit or special symbol
3. a. Write a C program to find the sum of individual digits of a positive integer.
   b. Write a C program to generate the first 'n' terms of the sequence.
      [A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.]
4. a. Write a C program to find whether the given number is palindrome, perfect, Armstrong or strong.
   b. Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.
5. Write C programs that use both recursive and non-recursive functions
   a. To find the factorial of a given integer.
   b. To find the GCD (greatest common divisor) of two given integers.
6. a. Write a C program to find both the largest and smallest number in a list of integers.
   b. Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search.
   c. Write a C program that uses recursive and non -function to search for a Key value in a given sorted list of integers using Binary search.

7. a. Write a C program that implements the Bubble sort method to sort a given array of integers in ascending order.
    b. Write a C program that implements the Selection sort method to sort a given list of names in ascending order.
8. Write a C program to perform the following:
    a. Addition of Two Matrices
    b. Multiplication of Two Matrices.
9. Write a C program that uses functions to perform the following operations:
    a. To insert a sub-string into given main string from a given position.
    b. To delete n characters from a given position in a given string.
    c. To find substring in a given string
10. a. Write a C program to determine if the given string is a palindrome or not
    b. Write a C program to count the lines, words and characters in a given text.
11.
    a. Write a C program to swap two numbers, which implement call by value and call by reference.
    b. Write a C program to display the below student details using structures

Roll Number	Name	Gender	Branch	Attendance percentage
501	John	Male	CSE	77.3
502	Alice	Male	ECE	80.5
503	Sam	Female	IT	90.7

    c. Write a C program to find grade of a student using structures.
12.
    a. Write a C program which copies one file to another
    b. Write a C program to find sum of two numbers using command line arguments
13.
    a. Develop a mini project which implement the Library Management System
    b. Develop a mini project which implement the Student Record System

TEXT BOOKS:

a. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press
b. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
c. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:

a. C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
b. C for Engineers and Scientists, H. Cheng, Mc. Graw-Hill International Edition
c. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

Course Outcomes:

At the end of the course, students will be able to

CO	Statement	Blooms Taxonomy Level
CO1	Make use various programming constructs and to develop C programs	Understand
CO2	Implement different Operations on arrays, strings, functions, pointers in C programming language	Apply
CO3	Analyze structures, unions and file in C language to develop Programs	Analyze

COS	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										1	3	2	
CO2	3	2	1									1	3	3	1
CO3	2	3	1									1	3	2	1

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I / I Semester	
Code: C0H02	**English Language and Communication Skills Lab**	**L**	**T**	**P**
Credits: 1	**(Common for CE, EEE, ME, ECE, CSE, CSE(CS), CSE (AI and ML), CSE (DS), CSE (IOT), AI, IT and Min.E)**	**-**	**-**	**2**

The Language Lab focuses on the production and practice of sounds of language and familiarizes
the students with the use of English in everyday situations and contexts.

Course Objectives:

The course aims to develop students' intelligibility in their pronunciation of English – speech Sounds, word accent, intonation and rhythm. It also helps to improve the fluency in spoken English and make them aware of nuances of major skills, namely, listening and speaking skills. It also trains students to understand nuances of both verbal and non-verbal communication During all activities. The course enables the learners to develop their confidence levels so as to Participate in discussions, debates and public speaking. Listening Skills:

Objectives:
1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.
   • Listening for general content
   • Listening to fill up information
   • Intensive listening
   • Listening for specific information

Speaking Skills:
Objectives:
1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

• Oral practice
• Describing objects/situations/people
• Just A Minute (JAM) Sessions.

Syllabus: English Language and Communication Skills Lab has two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab
The following course content is prescribed for the English Language Communication Skills Lab

Module - I:

CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking activity and JAM session; Listening: listening for sounds in context, for ideas; Speaking: ideation and translation of ideas into sentences.

Module - II:
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette; Listening: listening for specific purposes, for details; Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

Module - III:
CALL Lab: Word accent and Listening Comprehension-reading aloud meaningfully.
ICS Lab: Descriptions- Narrations- Giving Directions and guidelines; Listening: listening for intelligible English; Speaking: formal and informal conversations, register.

Module - IV:
CALL Lab: Intonation and Common errors in Pronunciation- reading aloud (evaluating through recording).
ICS Lab: Extempore- Public Speaking, Oral Presentation Skills; Listening: note taking and listening for speaker's tone/attitude; Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

Module - V:
CALL Lab: Reduction of Mother Tongue Interference and Conversation Practice
ICS Lab: Information Transfer, Debate
Minimum requirement of infrastructural facilities for EL Lab:
1. Computer Assisted Language Learning (CALL) Lab:
The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.
System Requirement (Hardware component):
Computer network with Lan with minimum 60 multimedia systems with the following specifications:
a) P – IV Processor   b) Speed – 2.8 GHZ   c) RAM – 512 MB Minimum
d) Hard Disk – 80 GB   e) Headphones of High quality
2. Interactive Communication Skills (ICS) Lab: The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.
Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the textbook which are loaded on the systems):
Prescribed Lab Manual:
Rani, Sudha. *English Language Communication Skills Laboratory*. 5th edition, Pearson Publication, 2014.

Reference Books:
1. Roach, Peter. English Phonetics and Phonology. 4th edition, Cambridge University Press, 2009.
2. Hughes, John and Mallett, Andrew. *Successful Presentations DVD and Student's Book Pack*. Oxford University Press, 2013.

3. Hancock, Mark. *English Pronunciation in Use* (Intermediate). 2nd edition, Cambridge University Press, 2009.

4. Karia, Akash. *Public Speaking Mastery: Speak Like a Winner*. Kindle edition, 2013.

5. Lucas, Stephen. *The Art of Public Speaking.* 11th edition, Tata McGraw Hill, 2011.

Websites:
1. http://www.mindtools.com/CommSkll/ActiveListening.htm
2. http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
3. http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b73542683807 27a22/An%20article%20for%20Monika%20(2010).pdf

Course Outcomes:
After completion of the course, students will be able to:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the nuances of language through audio- visual experience and group activities.	Understand
CO2	Hone the accent for intelligibility	Apply
CO3	Realize the importance of listening skills and speaking skills and their application in real life situations	Analyze
CO4	Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions	Understand
CO5	Speak with clarity and confidence; thereby enhance employability skills of the students	Understand

COS	CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programme Outcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1				1		1	2	2		1			
CO2										1		1			
CO3						1		1	2		2				
CO4							1	1	2		2				
CO5									2		2				

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: C1201	Engineering and IT Workshop (Common for CSE and IT)	**L**	**T**	**P**
Credits:2		**-**	**1**	**2**

Pre requisites: NIL

Course Objectives:

- To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.
- The IT Workshop is a training lab course to get training on PC Hardware, Internet & World Wide Web, and Productivity tools for documentation, Spreadsheet computations, and Presentation.
- To introduce to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers, hardware and software level troubleshooting process.
- To introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, newsgroups and discussion forums. To get knowledge in awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks.
- To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools and LaTeX.

Engineering Workshop:

Problem 1: Trades for Exercises

At least two exercises from each trade

1. House-wiring
2. Soldering

Problem 2: Trades for Demonstration & Exposure

1. Carpentry
2. Wood working lathe

PC Hardware: The students should work on working PC to disassemble and assemble to working condition and install operating system like Linux or any other on the same PC. Students are suggested to work similar tasks in the laptop scenario wherever possible.

Problem 3:

Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

Problem 4:

Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

Problem 5:

Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Problem 6:

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. Internet & World Wide Web.

Productivity tools: LaTeX and Word Word Orientation: An overview of LaTeX and Microsoft (MS) office / equivalent (FOSS) tool word should be learned: Importance of LaTeX and MS office / equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that should be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Problem 7: Using LaTeX and Word to create project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Problem 8: Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Problem 9: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs in word.

Problem 10: Spreadsheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler: -Gridlines, Format Cells, Summation, auto fill, Formatting Text

Problem 11: Calculating GPA -. Features to be covered: -Cell Referencing, Formulae in spreadsheet –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, Sorting, Conditional formatting.

Problem 12: Creating Power Point: Student should work on basic power point utilities and tools in Latex and MS Office/equivalent (FOSS) which help them create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and Charts

Reference Books:
1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion –Leslie Lamport, PHI/Pearson.
3. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
4. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme.–CISCO Press, Pearson Education.
5. PC Hardware and A+ Handbook –Kate J. Chase PHI (Microso

Course Outcomes:

At the end of the course, students will be able to

CO	Statement	Blooms Taxonomy Level
CO1	Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish work assignments along with the understanding of house wiring components.	Analyze
CO2	Apply knowledge for computer assembling and software installation and ability how to solve the trouble shooting problems and connecting the PC on to effective use of internet.	Apply
CO3	To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools and LaTeX	Understand

<table>
<tr><td colspan="16" align="center">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12" align="center">Programme Outcomes (POs)</td><td colspan="3" align="center">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td><td>1</td><td></td></tr>
<tr><td>CO2</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CO3</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td>2</td><td>1</td></tr>
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2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: C0202	**Basic Electrical And Electronics Engineering Lab** (Common for all branches)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Course Objectives:

To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyze the performance of DC Motors, AC Motors and Transformers.

List of Experiments:

1. Verification of Kirchhoff's Laws.
2. Verification of Maximum Power Transfer Theorem.
3. Determination of Phase Angle for RC series circuit.
4. Brake Test on DC-Shunt Motor. Determination of Performance curves
5. Load Tests on Single Phase Transformer
6. Brake Test on Three Phase Induction Motors. Determination of Performance curves
7. V-I Characteristics of PN junction Diode
8. V-I Characteristics of Zener Diode
9. Half Wave Rectifier and Full Wave rectifier.
10. Input and Output characteristics of BJT with CE configuration
11. Input and Output characteristics of BJT with CB configuration
12. Input and Output Characteristics of JFET.

Course Outcomes:

At the end of the course, students will be able to

1. Experimentally verify the basic circuit theorems, KCL and KVL
2. Measure power, power factor and phase angle in RC circuits experimentally.
3. Acquire hands on experience of conducting various tests on dc shunt motor, single phase transformers and three phase induction motors and obtaining their performance indices using standard analytical as well as graphical methods
4. Draw the characteristics of different semiconductor devices like PN junction Diode, Zener Diode, BJT and JFET by conducting suitable experiments.
5. Experimentally verify the working of half and full wave rectifier by using PN Junction diodes.

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2		2		1	1	2	1	1	1	3	1	1
CO2	3		2		2		2	1	2	1	1	1	3	1	1
CO3	3	2	2	2	2		2	1	2	1	1	1	3	1	1
CO4	3	1	2		2		1	1	2	1	1	1	3	1	1
CO5	3	1	2		2		2	1	2	1	1	1	3	1	1

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech II Semester		
Code:C0B17	Engineering Chemistry	L	T	P
Credits: 4	(Common for ALL)	3	1	-

Course objectives:

The purpose of this course is to emphasize the relevance of fundamentals of chemical sciences in the field of engineering and to provide basic knowledge on atomic- molecular orbital's, electrochemistry, batteries, corrosion and the role of water as an engineering material in domestic-industrial use. They will also impart the knowledge of stereochemistry, understanding the chemical reaction pathway mechanisms and synthesis of drugs. Listing out various types of fuels and understanding the concept of calorific value and combustion.

Module I: Water and its treatment [10 Periods]

Introduction to water, hardness of water, causes of hardness, expression of hardness, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale &Sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment - Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization.Desalination by Reverse osmosis and its significance.

Module II: Molecular structure and Theories of Bonding: [10 Periods]

Introduction to Molecular orbital Theory. Linear Combination of Atomic Orbital's (LCAO), significance of bonding and anti-bonding molecular orbital, Conditions for the formation of molecular orbital's. Molecular orbital energy level diagrams of diatomic molecules -, $N_2,O_2$and F_2. Introduction to coordination compounds-ligand-coordination number (CN) - spectrochemical series. Salient features of crystal field theory, Crystal field splitting of transition metal complexes in octahedral ($[CoF_6]^{3-}$ and $[Co(CN)_6]^{3-}$) and tetrahedral ($[NiCl_4]^{2-}$ and $[Ni (CO)_4]$) fields - magnetic properties of complexes. Band structure of solids and effect of doping on conductance.

Module III: Electrochemistry and Corrosion [17 Periods]

A.   Electrochemistry:

Introduction to Electrochemistry-Conductance(Specific and Equivalent) and units. Types of cells-electrolytic & electrochemical cells (Galvanic Cells)-Electrode potential-cell potential (EMF).Electrochemical series and its applications,Nernst equation its applications and numerical problems. Reference electrodes - Calomel Electrode and Glass electrode-determination of pH using glass electrode. Batteries: Primary (dry cells) and secondary (Lead-Acid cell, Ni-Cd cell) - applications of batteries. Fuel cells: Hydrogen - Oxygen fuel cell and its applications.

B. Corrosion: [7 Periods]

Causes and effects of corrosion: Theories of corrosion - Chemical & Electrochemical corrosion, Pilling-Bedworth rule,Types of corrosion: Galvanic and Water-line corrosion. Factors affecting rate of corrosion-Nature of metal and Nature of Environment, Corrosion control methods - Cathodic protection (Sacrificial anodic and impressed current cathodic methods). Surface coatings: Methods of metallic coatings - hot dipping (Galvanization),Electroplating (Copper) andElectroless plating (Nickel).

Module IV: Stereochemistry, Reaction mechanism& synthesis of drug molecules and NMR spectroscopy: [12 Periods]

Introduction to Isomers - classification of isomers - structural (chain, positional & functional) and stereoisomerism-geometrical (cis-trans & E-Z system) - characteristics of geometrical isomerism, optical isomerism (chirality - optical activity, specific rotation, enantiomers and diastereomers) of tartaric acid and lactic acid. Conformational isomerism ofn-Butane. Introduction to bond cleavage (homo & hetero cleavage) - reaction intermediates and their stability. Types of organic reactions - Mechanism of substitution (SN^1& SN^2) and (E_1&E_2) reactions with suitable example. Ring opening (Beckmann rearrangement), oxidation and reduction (Cannizaro reaction), cyclization (Components of Diels-Alder reaction-Mechanism of Diels-Alder reaction with suitable example) reactions.

Synthesis of Paracetamol, Aspirin and their applications.

Introduction to Spectroscopy, Basic concepts of nuclear magnetic resonance spectroscopy, chemical shift and spin-spin splitting.

UNIT-V   FUELS AND COMBUSTION   **[08 PERIODS]**

Fuels: Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG.

Combustion: Definition, Calorific value of fuel – HCV, LCV; Calculation of air quantity required for combustion of a fuel. Determination of calorific value by Junkers gas calorimeter-Numerical problems on combustion.

Text Books:

1. P.C.Jain and Monica Jain, "**A Text Book of Engineering Chemistry**", DhanpatRai Publications, New Delhi, 16th Edition 2014.
2. S.S. Dara and S.S. Umare, "**A Text Book of Engineering Chemistry**", S Chand Publications, New Delhi, 12th Edition 2010.

Reference Books:

1. B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath,"**Text Book of Engineering chemistry**",Cengage Learning India Pvt.Ltd,2016.
2. M.G. Fontana and N. D. Greene, "**Corrosion Engineering**", McGraw Hill Publications, New York, 3rd Edition, 1996.

Course Outcomes:

At the end of the course, students will be able to:

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Understand water treatment, specifically hardness of water and purification of water by various methods.	Understand(L2)
CO2	Analyze microscopic chemistry in terms of atomic and molecular orbital's splitting and band theory related to conductivity	Analyze(L4)
CO3	Apply knowledge of electrochemical cell concept with respect to fuel cells, batteries, theories of corrosion. Applications of corrosion control methods.	Apply(L3)
CO4	Acquire basic knowledge on the concepts of stereochemistry, chemical reaction mechanisms that are used in the synthesis of drug molecules, interpretation of NMR in organic molecules and their uses in medical field.	Analyze (L4)
CO5	Acquire the knowledge of various fuels and identify a better fuel source of less pollution.	Analyze (L4)

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	2										
CO2	2	1		2	1										
CO3	3	3	2	2	1		2								
CO4	3	1	1	1	2	1	3								
CO5	3	3	3	1			3								

PREREQUISITES: NIL

Course Objectives:
To develop in students, graphic skills for communication of concepts and ideas of engineering products.

MODULE I:
Introduction to Engineering Drawing, Principles of Engineering Graphics and their significance, Lettering.
Geometrical Constructions: Regular polygons only. Conic Sections: Ellipse, Parabola, Hyperbola– General method only Cycloidal Curves and Involute, tangents & normal for the curves.Scales: Plane Scale, Diagonal scale, Vernier Scale.

MODULE II:
Orthographic Projections: Principles of Orthographic Projections – Conventions – First and Third Angle projections.
Projection of Points: Projection of points including all four quadrants.
Projection of Lines: Projection of Lines - parallel, perpendicular, inclined to reference planes and Traces.

MODULE III:
Projection of Planes: Axis inclined to both the reference plane.
Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone by rotatingobject method. Axis inclined to both the reference plane.

MODULE IV:
Section of Solids: Sectioning of single solid with the cutting plane inclined to one plane and perpendicularto the other - true shape of section.
Development of Surfaces: Development of lateral surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

MODULE V:
 Isometric Projections: Principles of Isometric Projection – Isometric Scale, Isometric Views– Conventions –Plane Figures,Simple Solids.
Transformation of Projections: Conversion of Isometric Views to Orthographic Views and vice versa–simple objects.

TEXT BOOKS

1. K.L.Narayana, S. Bheemanjaneyulu "Engineering Drawing with Auto CAD-2016" New Age InternationalPublishers, 1st Edition, 2018.

2. N.D. Bhat, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.

REFERENCES

1. K.L.Narayana, P.Kannaiah, "Engineering Drawing", SciTech Publishers. 2nd Edition, 2017

2. K.Venugopal,"Engineering Drawing",NewAge International Publishers, 3rd Edition, 2014.

3. K. V. Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers,

2015.

4. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2011.

5. Trymbaka Murthy, "Computer Aided Engineering Drawing", I.K. international
    Publishing House, 3rdEdition, 2011.

E - RESOURCES

1. http://nptel.ac.in/courses/112103019/

2. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+d
   rawing
3. https://www.wiziq.com/tutorials/engineering-drawing
4. http://freevideolectures.com/Course/3420/Engineering-Drawing
5. http://www.worldcat.org/title/journal-of-engineering-graphics/oclc/1781711
6. http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-
   graphics nit jalandhar (EG MECI102)

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B09	**Semiconductor Physics**	L	T	P
Credits: 4		3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:

1. To outline the dual nature of matter
2. To elaborate the significance of the Kronig-Penney model in classifying the materials
3. To illustrate the working of p-n junction diode, photodiode, LED and solar cell
4. To compare the working of Ruby laser, He-Ne laser and semiconductor laser, besides illustrating the working principle of optical fibre and elaborate its applications.
5. To explain various logic gates.

Module–I:QuantumMechanics **[8 Periods]**

Introduction, Plank's theory of black body radiation, deduction of Wien's displacement law and Ralygien's law; Louis de Broglie's concept of matter waves; Davisson and Germer experiment; G.P. Thomson Experiment; Heisenberg's uncertainty principle and its application (electron cannot exist inside the nucleus); Schrodinger's time-independent wave equation, Physical significance and properties of wave function; Particle in a one-dimensional infinite potential well.

Module – II: Band theory of solids **[8 Periods]**

Introduction, Postulates and drawbacks of Classical and Quantum free electron theory, Fermi Dirac distribution function; Density of energy states; Bloch theorem; Qualitative treatment of Kronig - Penney model; E Vs k relationship; Origin of energy bands; Classification of materials into Conductors, Semiconductors and insulators; Concept of Effective mass.

Module –III: Semiconductor Physics **[13 Periods]**

A:Introduction, Intrinsic and Extrinsic Semiconductors; Expression for carrier concentration in intrinsic and extrinsic semiconductors; Variation of Fermi energy level in Intrinsic and extrinsic semiconductors with respect to temperature and doping concentration.

B: Direct and indirect bandgap semiconductors; Carrier generation and Recombination; Drift and Diffusion mechanisms; Equation of Continuity; P-N Junction diode, Energy band diagram, V-I haracteristics; Construction and Working of Photodiode, LED & Solar cell and their applications.

Module – IV **[12 Periods]**

LASER: Introduction, Characteristics of LASER; Absorption, Spontaneous and Stimulated emission; Einstein's coefficients; Population inversion; Pumping mechanisms; Basic components of a LASER system; Types of Lasers: Ruby LASER, He-Ne LASER, Semiconductor diode LASER (Homo junction and hetero junction); Applications of LASER - Computers, Medical, Military.

Optical Fibers: Introduction to Optical fibers; Total Internal Reflection; Acceptance angle and acceptance cone, Numerical aperture; types of optical fibers; Losses in optical fibers - absorption losses, scattering losses and bending losses; Applications of optical fibers - Communications, Level Sensor, LASER angioplasty.

Module – V: Introduction to Digital Electronics **[9 Periods]**

Different types of number systems, Binary logic; Boolean algebra - Basic theorems and properties of Boolean algebra; Boolean functions; logic gates – construction and working of AND, OR, NOT, NAND, NOR and XOR using discrete components.

Integrated circuits: Levels of integration - SSI, MSI, LSI and VLSI; basic IC logic gates - AND, OR, NOT, NAND, NOR and XOR.

Text Books:
1. K Vijaya Kumar, S Chandralingam, "Modern Engineering Physics'' Volume I & II, S. Chand, 1st Edition, 2017.
2. Jasprit Singh, "Semiconductor Optoelectronics: Physics and Technology", McGraw-Hill, 1995.
3. Morris Mano, "Digital Design", Prentice - Hall, 1995.

Reference Books:
1. P K Palanisamy, **"Engineering Physics"**, SciTech Publication, 4th Edition, 2014.
2. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India
3. Revised Edition, 2014.
4. P Horowitz and W. Hill, "The Art of Electronics" Cambridge University Press, 3rd edition, 2015.
5. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
6. P Bhattacharya, "**Semiconductor Optoelectronic Devices**", Prenticehall of India,1997

e-RESOURCES
1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.researchgate.net/publication/292607115_Applied_Physics
3. https://www.livescience.com/33816-quantum-mechanics-explanation.html

NPTEL VIDEOS:
1. http://nptel.ac.in/courses/113104012/
2. https://www.youtube.com/watch?v=9seDKvbaoHU&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0&index=29
3. https://www.youtube.com/watch?v=4a0FbQdH3dY

Course Outcomes:
At the end of the course, the student will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Explain the dual nature of the matter and evaluate the energy of a particle trapped in 1D infinite potential well	**Understand**
CO2	Classify the materials into conductors, semiconductors and insulators based on the outcomes of Kronig - Penney model	Apply
CO3	Analyze the working of semiconductor devices like PN junction diode, Photodiode, LED and Solar cell	Analyze
CO4	Compare and contrast Ruby, He-Ne, Semiconductor Lasers and discover the working principle of optical fibers besides and elucidating their applications.	Understand
CO5	Describe the Boolean algebra and examine various logic gates	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1									
CO2	3	1	2									
CO3	3	2	2									
CO4	3	2	2									
CO5	2	2	1									

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code:C0B02	**Probability and Statistics** (Common For CSE, IT, CSE(AI&ML,DS,CS,IOT), B.Tech (AI&ML)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:
1. Define event, outcome, trial, simple event, sample space and calculate the probability that an event will occur.
2. To learn the random variables and its distributions.
3. Statistical analyses are very often concerned with the difference between means.
4. Investigate the variability in sample statistics from sample to sample
5. Identify the direction and strength of a linear correlation between two factors.

MODULE I: Probability: [10 Periods]
Introduction to Probability ;Events, sample space, mutually exclusive events. Exhaustive events. Addition theorem for 2& n events and their related problems, conditional probability ,multiplication theorem, Dependent and Independent events, Boole's inequality, Baye's Theorem.

MODULE II: Random variables: [14 Periods]
Random variables, Discrete and continuous Random variables, Probability mass function, Probability density function, probability distribution functions, Expectation, Discrete Probability distributions. Bernoulli, Binomial, Poisson, Geometric distributions of their mean and variance, moment generating function–related problems. Continuous probability distributions: Normal distribution, Uniform distribution, exponential distribution their mean and variance, moment generating function, Central Limit theorem(Without proof).

MODULE III: Sampling Distributions: [14 Periods]
(A) Definitions of population-sampling-statistic, parameter. Types of sampling, expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, point estimation and interval estimation

(B) Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, and Level of significance. One sided test, two-sided test.
Large sample tests:
    (i) Test of significance for single mean
    (i) Test of significance for difference of means
    (ii) Test of significance for single proportion
    (iii) Test of significance for difference of proportions
    (iv) Test of significance for standard deviations

MODULE IV: Small sample tests: [12 Periods]
Student t-distribution, its properties and its assumptions, Test of significance difference between sample mean and population mean; difference between means of two small samples, Snedecor's, F- distribution and its properties. Test of equality of two population variances, Chi-square distribution, its properties, Chi-square test of goodness of fit, Independence of attributes.

MODULE V: Correlation, Regression: [10 Periods]
Scatterplot, Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression. Multiple regression for three variables.

Text Books

1. Walpole, Probability Statistics, for Engineers & Scientists, 8th Edition, Pearson Education.
2. Paul A Mayer Introductory Probability and Statistical Applications, John Wiley Publications.
3. 3.Monte Geometry, "Applied Statistics and Probability for Engineers", 6th Edition, Wiley Publications.

References

1. P. G. Hole, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
3. W. Feller, An Introduction to Probability Theory and its Applications, Vol.1, 3rd Ed., Wiley, 1968.

E – Resources

1. http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20&%20Statistics.pdf(Probability& Statistics for Engineers & Scientists text book)
2. http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf (Random variables and its distributions)
3. http://users.wfu.edu/Cottrell/ecn215/sampling.pdf (Notes on Sampling and hypothesis testing)
4. **Concerned Journals/ Magazines links:**
1. http://www.pnas.org/content/93/9/3772.full.pdf (Hypothesis testing and earthquake prediction)
2. http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=2373&context=tqr(Sampling Theory)
3. https://sci-hub.cc/10.1111/j.1540-6261.1996.tb05219.x (probability Distributions)

c) NPTEL Videos:

   1. http://nptel.ac.in/courses/117105085/ (Introduction to theory of probability)
   2. http://nptel.ac.in/courses/117105085/9 (Mean and variance of random variables)
   3. http://nptel.ac.in/courses/111105041/33 (Testing of hypothesis)

Course Outcomes:

After Completion of the course the students will be

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Understand and appreciate the role of P&S in data analytics and big data analysis.	**Analyze**
CO2	Find the Probability in certain realistic situation	Understand
CO3	Identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables Involved in the probability models. It is quite useful for all branches of engineering.	Understand
CO4	Calculate mean and proportions (large and small sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.	Apply
CO5	understand how to forecast the future observations.	Understand

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3		2	2			1	1			
CO2	3	3	3		2			2	1	1	1				
CO3	3	2	3		2	1	1	1			1				
CO4	3	2	2	2	2	2		3	1	1	3				
CO5	3	3	2	1	3	1	2	2	1	1	3	1			

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0504	**Python Programming** (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science), CSE (IoT) and AI)	**L**	**T**	**P**
Credits: 4		3	1	-

Course Objectives: This course will enable students to

1. Learn syntax and semantics along with the basic data structures of Python
2. Handle modules, files and exceptions in Python.
3. Understand regular expressions and multithreaded programming in Python.
4. Implement Object Oriented Programming concepts in Python.
5. Build GUI programming and web programming in Python.

MODULE - I [10 Periods]

Python Basics, Getting started, Python Objects, Numbers, Sequences: Strings, Lists, Tuples, Set and Dictionary. Conditionals and Loop Structures

MODULE - II [9 Periods]

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

Files: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules.

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Why Exceptions, Why Exceptions at All? Exceptions and the sys Module.

MODULE - III [10 Periods]

Regular Expression (RE): Introduction, Special Symbols and Characters, REs and Python.

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

MODULE – IV [10 Periods]

Classes and Object-Oriented Programming (OOP): OOP, Classes, Class Attributes, Instances, Instance Attributes, Binding and Method Invocation, Composition, Subclassing and Derivation, Inheritance, Built-in Functions for Classes, Instances, and Other Objects, Types vs. Classes/Instances, Customizing Classes with Special Methods, Privacy, Delegation and Wrapping

MODULE - V [9 Periods]

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs.

Web Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

TEXT BOOKS

1. Wesley J. Chun, Core Python Programming, Second Edition, Prentice Hall, 2007.

2. Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2011.

REFERENCE BOOKS

1. Allen B. Downey, "Think Python, How to think like a Computer Scientist", First Edition, O'reilly Publishing, 2018.

2. Vamsi Kurama, "Python Programming: A Modern Approach", Pearson India, 2017.

3. Mark Lutz, "Learning Python", Fifth Edition, O'rielly Publishers, 2013.

E–RESOURCES

1. "Learn Python - Free Interactive Python Tutorial", https://www.learnpython.org/

2. "Free Python Tutorial - Python For Beginner," https://www.udemy.com/share/101EfoB UcccV1SQHw

3. "Basics of Python for Data Science", https://olympus.greatlearning.in/courses/11265

4. "Beginners Guide / Programmers - Python Wiki", https://wiki.python.org/moin/Beginners Guide/Programmers

5. "Introduction to Python", https://www.datacamp.com/courses/intro-to-python-for-data-science

Course Outcomes:

At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Learn syntax and semantics along with the basic data structures of Python	**Analyze**
CO2	Apply different operation on Files by using modules and implement exceptions in Python	Apply
CO3	Identify the use regular expressions and multithreaded programming in Python	Understand
CO4	Implement Object Oriented Programming concepts to build programs in Python	Apply
CO5	Identify different GUI Components to Design web applications in Python	**Analyze**

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2											2	3	2	
CO2	3	2	1									1	3	2	1
CO3	3	3	1									2	3	3	2
CO4	3	1										2	3	2	1
CO5	3	3	1									2	3	3	2

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code: C0B11	**Applied Physics Lab** (Common for AI&ML, CSE (AI & ML), CSE (SC), CSE (IoT), CSE (Data Science) ,CSE and IT)	L	T	P
Credits: 1		-	-	2

Course Objectives:

The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

List of Experiments

1 **Planck's constant**
   To determine Planck's constant using Photo electric effect.
2 **Energy band –gap of a semiconductor**
   To determine the energy band gap of a semiconductor.
3 **V-I and P-I characteristics of light emitting diode**
   Plot V-I and P-I characteristics of light emitting diode.
4 **Laser diode**
   To study the Characteristics of Laser diode.
5 **Solar Cell**
   To study the V-I Characteristics of solar cell.
6 **LCR Circuit**
   To determination of resonant frequency, bandwidth and quality factor of RLC circuit.
7 **Numerical Aperture of an Optical fiber**
   To determine the Numerical aperture of the given fiber.
8 **Bending Loss of a Fiber**
   To determine the bending loss of the given fiber.
9 **Light Dependent Resistance (LDR)**
   To determine the characteristics of a LDR.
10 **Stewart and Gee's experiment**
   Determination of Magnetic field along the axis of current carrying circular coil.
11 **B-H Curve**
To study the magnetization of ferromagnetic material in presence of magnetic field.
12 **Sonometer**
To verify the frequency of AC Supply.
13. Construction of fundamental logic gates using discrete components and verification of truth tables
14. Verification of truth tables of fundamental logic gates using ICs
15. Construction of fundamental logic gates using universal logic gates.

Course Outcomes:

At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Develop skills to impart practical knowledge in real time solution	**Analyze**
CO2	Understand principle, concept, working, application and comparison of results with theoretical calculations	Understand
CO3	Design new instruments with practical knowledge	Apply
CO4	Understand measurement technology	Understand
CO5	Use new instruments and real time applications in engineering studies	**Analyze**

	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2											2	3	2	
CO2	3	2	1									1	3	2	1
CO3	3	3	1									2	3	3	2
CO4	3	1										2	3	2	1
CO5	3	3	1									2	3	3	2

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B18	**Engineering Chemistry Lab**	**L**	**T**	**P**
Credits: 1	**(Common for ALL)**	**-**	**-**	**2**

Course objectives:

To provide the students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

List of Experiments:

1. Calibration of Volumetric apparatus.
2. Estimation of Total Hardness of water by EDTA Method.
3. Estimation of an acid by P^Hmetry.
4. Estimation of alkalinity of water.
5. Estimation of strength of an acid by Conductometry.
6. Estimation of strength of an acid by Potentiometry.
7. Estimation of Mn^{+2}ion in $KMnO_4$ by Colorimetry.
8. Determination of viscosity of given liquids by Ostwald's viscometer.
9. Determination of surface tension of given sample using stalagmometer.
10. Estimation of iron (II) by dichrometry.
11. Determination of rate constant of hydrolysis of methyl acetate.
12. Preparation of Aspirin.

Course outcomes:

At the end of the course, students will be able to:

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Acquire knowledge about the chemistry lab, kind of experiments that can be performed and the precautions to perform four types of titrations & understand the principle involved in the applications of the method.	Understand
CO2	Understand about mineral analytic technique for estimation of ions/metal ions in minerals	Understand
CO3	Apply instrumental techniques such as colorimetry, conductometry & potentiometry	Apply
CO4	Learn to determine physical properties like free chlorides in water, viscosity & surface tension.	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	1											
CO2	2	1	2												
CO3	2	2		1											
CO4	2	2	1												
CO5	2	1	2												

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code: C0506	**Python Programming Lab** (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science) and CSE (IoT))	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: NIL
Course Objectives:
This course enables the students to develop various applications using python.

Software Requirements: Python

List of Programs:
1 a) Write a program to purposefully raise Indentation Error and correct it.
   b) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).
   c) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
2 a) Write a Program for checking whether the given number is a even number or not.
   b) Using for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10.
   c) Write a program using for loop that loops over a sequence. What is sequence?
   d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
3 a) Find the sum of all the primes below two million.
   b) Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89
   c) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.
   d) Write a program to count the numbers of characters in the given string and store them in a dictionary data structure
   e) Write a program to use split and join methods in the given string and trace a birthday with a dictionary data structure.
4 a) Write a program to combine two lists into a dictionary.
   b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
5 a) Write a program to print each line of a file in reverse order.
   b) Write a program to compute the number of characters, words and lines in a file.
6 a) Write a function ball _collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.
   Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius. If (distance between two balls centers) <= (sum of their radii) then (they are colliding)
   b) Find mean, median, mode for the given set of numbers in a list.
7 a) Write a function nearly_ equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
   b) Write a function dups to find all duplicates in the list.
   c) Write a function unique to find all the unique elements of a list.

8　a)　Write a function cumulative_product to compute cumulative product of a list of numbers.

    b)　Write a function reverse to reverse a list. Without using the reverse function.

9　Create a Regular Expression and implement the following

    a)　Recognize the following strings: "bat," "bit," "but," "hat," "hit," or "hut."

    b)　Match any pair of words separated by a single space, i.e., first and last names.

    c)　Match any word and single letter separated by a comma and single space, as in last name, first initial.

10　Write a python program to implement multithreading scenarios.

11　Write a python program to simulate the banking operations using Class.

12　Write a python program to demonstrate the Queue / Stack operations using Class.

TEXT BOOKS

1. Wesley J. Chun, Core Python Programming, Second Edition, Prentice Hall, 2007.

2. Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2011.

REFERENCE BOOKS

1. Allen B. Downey, "Think Python, How to think like a Computer Scientist", First Edition, O'reilly Publishing, 2018.

2. Vamsi Kurama, "Python Programming: A Modern Approach", Pearson India, 2017.

3. Mark Lutz, "Learning Python", Fifth Edition, O'rielly Publishers, 2013.

Course Outcomes

At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Apply core Python scripting elements such as variables and flow control structures	Apply
CO2	Implement data structures like lists, tuple, dictionary and sequence in Python	Analyze
CO3	Build Python programs by using OOPs concepts and apply different file operations	Apply

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1										2	3	2	1
CO2	3	2	1									1	3	2	1
CO3	3	2	1									2	3	2	1

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech. III Semester**		
Code: C0507	**Discrete Mathematics**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL
Course Objectives:
The main objectives of the course are to:
- Introduce concepts of mathematical logic for analyzing propositions and proving theorems.
- Use sets for solving applied problems, and use the properties of set operations algebraically.
- Work with relations and investigate their properties.
- Investigate functions as relations and their properties.
- Introduce basic concepts of graphs, digraphs and trees.

MODULE I: Mathematical Logic [10 Periods]
Basic Logics: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology.
Implications and Quantifiers: Equivalence implication, Normal forms, Quantifiers, Universal quantifiers.

MODULE II: Predicate Logic and Relations [10 Periods]
Predicate Logic: Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Proof of automatic Theorem.
Relations: Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

MODULE III: Functions and Algebraic Structures [10 Periods]
Functions: Inverse Function, Composition of functions, recursive Functions, Lattice and its Properties.
Algebraic Structures: Algebraic systems Examples and general properties, Semi-groups and monoids, groups, sub-groups, homomorphism, Isomorphism, Lattice as POSET, Boolean algebra.

MODULE IV: Counting Techniques and Theorems [09 Periods]
Counting Techniques: Basis of counting, Combinations and Permutations with repetitions, Constrained repetitions
Counting Theorems: Binomial Coefficients, Binomial and Multinomial theorems, principles of Inclusion – Exclusion. Pigeon hole principle and its applications.

MODULE V: Generating functions and Recurrence Relation [09 Periods]
Generating Functions: Generating Functions, Function of Sequences, Calculating Coefficient of generating function.
Recurrence Relations: Recurrence relations, Solving recurrence relation by substitution and Generating functions. Method of Characteristics roots, solution of Non-homogeneous Recurrence Relations.

TEXTBOOKS:
1. J P Tremblay & R Manohar, "**Discrete Mathematics with applications to Computer Science**", Tata McGraw Hill.
2. J.L. Mott, A. Kandel, T.P.Baker "**Discrete Mathematics for Computer Scientists & Mathematicians**", PHI.

REFERENCES:
1. Kenneth H. Rosen, "**Discrete Mathematics and its Applications**", TMH, Fifth Edition.
2. Thomas Koshy, "**Discrete Mathematics with Applications**", Elsevier.
3. Grass Man & Trembley, "**Logic and Discrete Mathematics**", Pearson Education.
4. C L Liu, D P Nohapatra, "**Elements of Discrete Mathematics** - **A Computer Oriented Approach**", Tata McGraw Hill, Third Edition.

E-RESOURCES:
1. http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf
2. http://www.medellin.unal.edu.co/~curmat/matdiscretas/doc/Epp.pdf
3. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xPG734QA9tMJN2ncqS12 ZbN7pUSSlWCxSgPOZJEokyWJlxQLYsrFyeITA70W9C8Pg
4. http://nptel.ac.in/courses/106106094/

Course Outcomes:
At the end of the course, a student will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	**Apply** the concepts of connectives and normal forms in real time applications	Apply
CO2	**Summarize** predicate logic, relations and their operations	Analyze
CO3	Describe functions, algebraic systems, groups and Boolean algebra.	Understand
CO4	**Illustrate** practical applications of basic counting principles, permutations, combinations, and the pigeonhole methodology	Illustrate
CO5	**Analyze** techniques of generating functions and recurrence relations	Analyze

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2				3							2	3		
CO2	3											2	3		
CO3		3										2	3		
CO4	3	3	2	3								2		3	
CO5					3							2		3	

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech. III Semester**		
Code:C0509	**Computer Organization and Architecture**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: No prerequisites
Objectives:

- Discuss the basic concepts and structure of computers.
- Understand concepts of register transfer logic and arithmetic operations.
- Explain different types of addressing modes and memory organization.
- Learn the different types of serial communication techniques.
- Summarize the Instruction execution stages.

MODULE – I   **[10 Periods]**
Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.
Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

MODULE – II   **[10 Periods]**
Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.
Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.
Basic Computer Organization and Design: Instruction Codes, Computer Registers Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input – Output and Interrupt.

MODULE – III   **[9 Periods]**
Micro Programmed Control: Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.
Central Processing Unit: General Register Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control.

MODULE – IV   **[10 Periods]**
Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.
Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations. Decimal Arithmetic Unit, Decimal Arithmetic Operations.

MODULE – V   **[9 Periods]**
Input-Output Organization: Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access.
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associate Memory, Cache Memory.

Textbook:
1. Computer System Architecture, M. Moris Mano, 3rd Edition, Pearson/PHI.
References:
1. Computer Organization, Car Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.

2. Computer Organization and Architecture, William Stallings 6th Edition, Pearson/PHI.
3. Structured Computer Organization, Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

E-Resources:
1. https://books.google.co.in/books?isbn=8131700704
2. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7Eh9eBOsT1ELoYpKlg
   _xngrkluevXOJLs1TbxS8q2icgUs3hL4_KAi5So5FgXcVg
3. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xAYUzYSlXl4zudlsolr-
   e7wQNrNXLxbgGFxbkoyx1iN3YbHuFrzI2jc_70rWMEwQ
4. http://nptel.ac.in/courses/106106092/

Outcomes:

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the theory and architecture of central processing unit	Understand
CO2	Analyze some of the design issues in terms of speed, technology, cost, performance	Analyze
CO3	Design a simple CPU with applying the theory concepts.	Apply
CO4	Use appropriate tools to design verify and test the CPU architecture	Understand
CO5	Learn the concepts of parallel processing, pipelining and inter processor communication.	Analyze

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2									2			
CO2		2	3									1			
CO3	2	2	3	2	2							2			
CO4	3														
CO5	3														

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0510	**Data Structures**	L	T	P
Credits: 3		3	-	-

Prerequisites: A course on "Programming for Problem Solving "
Course Objectives:
- Exploring basic data structures such as linked list, stacks and queues.
- Introduces a variety of data structures such as dictionaries and hash tables
- To learn non linear data structures i.e. Binary search trees and height balanced trees.
- To understand the graph traversal algorithms and heap sort.
- Introduces the pattern matching and tries algorithms

Module-I: [10 Periods]
Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

Module-II: [09 Periods]
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.
Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

Module-III: [10 Periods]
Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Definition and example of Red–Black, Splay Trees.

Module-IV: [10 Periods]
Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Max Heap, Min Heap, Heap Sort. External Sorting: Model for external sorting, Merge sort.

Module-V: [09   Periods]
Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

Text Books:
1. Jean Paul Tremblay, Paul G Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hills, 2nd Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A
3. Pseudo code approach with C ", Thomson (India), 2nd Edition, 2004.

References:
1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, "Fundamentals of Data Structure in C", University Press (India), 2nd Edition, 2008.
2. A. K. Sharma, "Data structures using C", Pearson, 2nd Edition, June, 2013.
3. R. Thareja, "Data Structures using C", Oxford University Press, 2nd Edition, 2014.

E-Resources:
1. http://gvpcse.azurewebsites.net/pdf/data.pdf
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm

4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
5. http://nptel.ac.in/courses/106102064/1

Course Outcomes:

At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	**Implement** the linear data structures such as linked list, stacks and queues	Understand
CO2	**Understand** the Dictionaries and Hash table representation	Understand
CO3	**Analyze** the various non linear data structures with its operations	Analyze
CO4	**Develop** the programs by using Graph Traversal and heap sort	Understand
CO5	**Apply** data structure concepts for the implementation of pattern matching and tries	Apply

CO- PO,PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2										2	3	
CO2	2	2	3										3	2	
CO3		2	2											2	1
CO4		2	3										2	3	
CO5	2	3	3										2	3	

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0511	**Object Oriented Programming through Java**	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Programming

Course Objectives:

- To understand the basic object-oriented programming concepts and apply them in problem solving.
- To illustrate inheritance concepts for reusing the program.
- To demonstrate multitasking by using multiple threads and event handling
- To develop data-centric applications using JDBC.
- To understand the basics of java console and GUI based programming

MODULE-I: [10 Periods]

Object Oriented Thinking and Java Basics- Need for OOP paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

Module II: [10 Periods]

Inheritance and Packages– Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

MODULE III: [09 Periods]

Interfaces - Defining an interface, differences between classes and interfaces, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, Exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

MODULE IV: [10 Periods

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user

interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices,

Lists Panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

MODULE V: **[09 Periods]**

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

Text Books:
1. Java the complete reference, 7th edition, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

References:
1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
2. An Introduction to OOP, third edition, T. Budd, Pearson education.
3. Introduction to Java programming, Y. Daniel Liang, Pearson education.
4. An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education
7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8. Java and Object Orientation, an introduction, John Hunt, second edition, Springer. 9. Maurach's Beginning Java2 JDK 5, SPD.

E-RESOURCES:
1. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-RPf64_TFk2i4LJhgQFPQ WAEt-Zobbm3twyubjRA1YOe9WVwkN2qGcxBwdHaPdi_mMQ
2. https://ndl.iitkgp.ac.in/result?q={"t":"search","k":"object%20oriented%20programming", "s":["type=\"video\""],"b":{"filters":[]}}
3. http://www.rehancodes.com/files/oop-using-c++-by-joyce-farrell.pdf
4. http://www.nptel.ac.in/courses/106103115/36

Course Outcomes:

At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection	Understand
CO2	Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords	Understand
CO3	Use multithreading concepts to develop inter process communication	Analyze
CO4	Understand the process of graphical user interface design and implementation using AWT or swings.	Understand
CO5	Develop applets that interact abundantly with the client environment and deploy on the server.	Apply

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3			3			2			2	3	3
CO2	3	3		1	3		3			2			3	3	3
CO3	3	3		3			3			3			3	3	3
CO4	2	1					3			3			2		
CO5	2						3			1					

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C1202	Introduction to IOT	L	T	P
Credits: 3		3	-	-

Course Objectives:
The objectives of the course are to:
- Understand the concepts of Internet of Things and able to build IoT applications
- Learn the programming and use of Arduino and Raspberry Pi boards.
- Known about data handling and analytics in SDN.

Module–I
Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

Module–II
Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

Module–III
Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi, Case studies.

Module–IV
Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics.

Module–V
Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.

Case Study: Agriculture, Healthcare, Activity Monitoring

Text Books:
1. Pethuru Raj And Anupama C. Raman "The Internet 'Of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press)
2. Terokarvinen, kemo, karvinen and villey valtokari, "Make sensors": 1st edition, maker media, 2014.

Reference Books:
1. Vijay Madisetti, Arshdeep Bahga, "Internet Of Things: A Hands-On Approach"
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals Of Wireless Sensor Networks:Theory And Practice"
3. Beginning Sensor Networks With Arduino And Raspberry Pi – Charles Bell, Apress, 2013

Course Outcomes:

At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Known basic protocols in sensor networks	Understand
CO2	Program and configure Arduino boards for various designs	Understand
CO3	Python programming and interfacing for Raspberry Pi	Analyze
CO4	Explore IoT applications in different domains	Understand

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3			3			2			2	3	3
CO2	3	3		1	3		3			2			3	3	3
CO3	3	3		3			3			3			3	3	3
CO4	2	1					3			3			2		

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: C0512	**Data Structures Lab**	L	T	P
Credits: 1.5		-	-	3

Prerequisites: A Course on "Programming for problem solving"

Objectives:
1. To learn linear data structures such as linked list, stack and queues with its operations
2. Ability to learn programs on binary search tree and graph traversal strategies.
3. To understand the pattern matching and hashing techniques.

Software Requirements: C

List of Programs:
1   Write a program that uses functions to perform the following operations on singly linked list.
    i) Creation   ii) Insertion   iii) Deletion   iv) Traversal
2   Write a program that uses functions to perform the following operations on doubly linked list.
    i) Creation   ii) Insertion   iii) Deletion   iv) Traversal
3   Write a program that uses functions to perform the following operations on circular linked list.
    i) Creation ii) Insertion iii) Deletion iv) Traversal
4   Write a program that implement stack (its operations) using
    i) Arrays   ii) Pointers
5   Write a program that implement Linear Queue (its operations) using
    i) Arrays   ii) Pointers
6   Write a program that implement Deque (its operations) using
    i) Arrays   ii) Pointers
7   Write a program to implement all the functions of a dictionary using hashing.
8   Write a program that implement Binary Search Trees to perform the following operations
    i) Creation ii) Insertion   iii) Deletion   iv) Traversal
9   Write a program to implement the tree traversal methods using recursion.
10 Write a program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Heap sort   ii) Merge sort
11 Write a program to implement the graph traversal methods such as BFS and DFS.
12 Write a program to implement the Knuth-Morris- Pratt pattern matching algorithm.

Text Books
1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

References
1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

Course Outcomes:
At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Develop C programs for computing and real life applications using basic data structures like stacks, queues, linked lists, Binary Search Trees	Understand
CO2	Make use of basic data structures implementing various tree and graph traversal operations and algorithms	implement
CO3	Apply the concepts of basic data structures and implement advanced operations AVL Trees, Red –Black Trees, and Splay Trees concepts	Apply

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2										3	2	
CO2	2	2	3										2	3	
CO3		2	3										2	3	1

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C1203	**Object Oriented Programming Lab**	**L**	**T**	**P**
Credits: 1.5		**-**	**-**	**3**

Prerequisites: NIL
Software Requirements: JDK
Course Objectives:
- To understand OOP principles.
- To understand the Exception Handling mechanism.
- To understand Java collection framework.
- To understand multithreaded programming.
- To understand swing controls in Java.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program to demonstrate the OOP principles. [i.e., Encapsulation, Inheritance, Polymorphism and Abstraction].

3. Write a Java program to handle checked and unchecked exceptions. Also, demonstrate the usage of custom exceptions in real time scenario.

4. Write a Java program on Random Access File class to perform different read and write operations.

5. Write a Java program to demonstrate the working of different collection classes. [Use package structure to store multiple classes].

6. Write a program to synchronize the threads acting on the same object. [Consider the example of any reservations like railway, bus, movie ticket booking, etc.].

7. Write a program to perform CRUD operations on the student table in a database using JDBC.

8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

9. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. [Use Adapter classes]

Text Books:
1. Herbert Schildt, "**Java The complete reference**", TMH, 8th edition, 2011.
2. T. Budd, "**Understanding OOP with Java**", Pearson Education, updated edition, 1998.

References:
1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

Course Outcomes:
At the end of the course, students will be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Able to write programs for solving real world problems using the java collection framework	Understand
CO2	Able to write programs using abstract classes	implement
CO3	Able to write multithreaded programs	Apply
CO4	Able to write GUI programs using swing controls in Java.	Analyze

CO- PO, PSO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
COs	**ProgrammeOutcomes (POs)**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3										3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	
CO4			2		2										

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0514	**Data Visualization: R Programming/Power BI Lab**	**L**	**T**	**P**
Credits: 2		-	1	2

Course Objectives:
- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
- To discern patterns and relationships in the data.
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

LIST OF EXPERIEMENTS:

1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations,Creating Your First visualization?

2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau,creating basic charts(line, bar charts, Tree maps),Using the Show me panel.

3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculationsand fields.

4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Toolsand Menus, Formatting specific parts of the view.

5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.

6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.

7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels,customizing filters, Using and Customizing tooltips, Formatting your data with colors.

8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.

9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.

10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCE BOOKS:
1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India

Course Outcomes:

At the end of the course a student should be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Understand How to import data into Tableau	Understand
CO2	Understand Tableau concepts of Dimensions and Measures	implement
CO3	Develop Programs and understand how to map Visual Layouts and Graphical Properties.	Apply
CO4	Create a Dashboard that links multiple visualizations	Analyze
CO5	Use graphical user interfaces to create Frames for providing solutions to real world problems.	Understand

COs	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		2												
CO2	2	3	2												
CO3	2		2	3											
CO4					2	3									
CO5			2	3		1									

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C00M1	**Gender Sensitization**	L	T	P
Credits: NIL	(An Activity-based Course)	-	-	2

Prerequisites: NIL

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course:
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Module I: Understanding Gender [06 Periods]
Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudestowards Gender-Construction of Gender-Socialization: Making Women, Making Men
- Preparing for Womanhood. Growing up Male. First lessons in Caste.

Module II: Gender Roles And Relations [06 Periods]
Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Module III: Gender and Labour [07 Periods]
Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Sharethe Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.-Gender Development Issues-Gender, Governance and Sustainable Development-Gender andHuman Rights-Gender and Mainstreaming.

Module IV: Gender - Based Violence [07 Periods] The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a

HumanRights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping withEveryday Harassment- Further Reading: *"Chupulu".*
Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Module V: Gender and Culture   **[06 Periods]**
Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and PopularLiterature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender andPopular Literature - Just Relationships: Being Together as Equals
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

➢ **Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".**

➢ **Essential Reading**: The Textbook, "Towards a World of Equals: A Bilingual Textbook onGender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote,Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu**published by Telugu Akademi, Telangana Government in 2015.**

Assessment and Grading:
- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

Text Books:
1. Towards a World of Equals: A bilingual Textbook on Gender, A Suneetha -etall

References:
1. Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We Were Making History...' Life Stories of Women in the ToIrmgana People's Struggle. New Delhi: Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by - the-numbers-where-Indan-womenworkP
3. K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto://harooreollins.co.in/BookDetailasp?FlookCndet,3732
4. Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

E-Resources:

1. http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm   (UNDERSTANDING GENDER)
2. https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)
3. http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/ (GENDER AND LABOUR)
4. http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004 (ISSUES OF VIOLENCE)
5. http://www.nordiclabourjournal.org/emner/likestilling (GENDER AND BIOLOGY)

Course Outcomes:

At the end of the course a student should be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Understanding of important issues related to gender in contemporary India.	Understand
CO2	sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film	implement
CO3	Attain a finer grasp of how gender discrimination works in our society and how to counter it..	Apply

<table>
<tr><td colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">Programme Outcomes (POs)</td><td colspan="3">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>3</td><td>3</td><td></td><td>2</td><td>3</td><td>1</td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>3</td><td>3</td><td></td><td>2</td><td>3</td><td>2</td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>3</td><td>3</td><td></td><td>2</td><td>3</td><td>1</td><td></td><td></td></tr>
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2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code:C0B07	**Applied Statistics and Optimization Techniques**	**L**	**T**	**P**
Credits: 4		4	-	-

Module – I [12 Periods]

Analysis of Variance & Analysis of Co-variance

Analysis of Variance (ANOVA):one-way & two-wav ANOVA and multiple comparisons. Introduction to Factorial design - 2^2 and 2^n. Factorial design, Analysis of Co-variance (ANCOVA) Conducting ANCOVA

Module – II [12 Periods]

Design of Experiments

Importance and applications of design of experiments, Principles of experimentation, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Comparison of the efficiencies of above designs

Module III [13 Periods]

Transportation and Assignment

Transportation: Optimal Solution by North West Corner Method- VAM- Least Cost Method- MODI Method.

Assignment: Formulation-Unbalanced Assignment Problem-Hungarian Algorithm-Travelling Salesman Problem.

Module IV: Game Theory [13 Periods]

Game Theory, Theory of Games, Competitive games, rules for game theory, Saddle point – minmax (maxmin) method of optimal strategies, mixed strategies –Value of the game- two-person zero sum game, method of dominance, graphical method

Method V: Queuing Theory [10Periods]

Structure of a queuing system, operating Characteristics of queuing system, Transient and Steady states, Terminology of Queuing systems, Arrival and service Processes, Pure Birth-Death process.

Deterministic queuing Models (M/M/1) : (FIFO) Model, (M/M/1) :(FIFO) Model.

Proposed Text Books:
1. Monte Gomery, "Applied Statistics and Probability for Engineers", 6th Edition, Wiley Publications.
2. J K Sharma, "Operations research Theory and applications" Macmillan publishers india limited, 4th edition.
3. Paul A Maeyer Introductory Probability and Statistical Applications, John Wiley Publicaitons.

Proposed Reference Books:
1. Willam Feller: "Introduction to Probability theory and its applications". Volume–I,Wiley
2. Goon AM, Gupta MK, Das Gupta B: "Fundamentals of Statistics", Vol-I, the World Press Pvt. Ltd. ,Kolakota.
3. V.K. Kapoor and S.C. Gupta: "Fundamentals of Mathematical Statistics", Sultan Chand &Sons, New Delhi

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0515	**Database Management Systems**	L	T	P
Credits: 3		3	-	-

Prerequisites: A course on "Data Structures".

COURSE OBJECTIVES:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

MODULE – I   [12 Periods]

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model.

MODULE – II   [10 Periods]

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

MODULE – III   [12 Periods]

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and

EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form.

MODULE – IV   [9 Periods]

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

MODULE – V   [10 Periods]

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and

Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM),

B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Course Outcomes:
At the end of the course a student should be able to

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Gain knowledge of fundamentals of DBMS, database design and normal forms	Understand
CO2	Master the basics of SQL for retrieval and management of data	Analyze
CO3	Be acquainted with the basics of transaction processing and concurrency control	Apply
CO4	Familiarity with database storage structures and access techniques	Analyze

COs	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2			3				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester	
Code: C0516	**Operating Systems**	L	T	P
Credits: 3		3	-	-

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Computer Organization and Architecture".

COURSE OBJECTIVES:

- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

 MODULE – I   **[12 PERIODS]**

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls
Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads
MODULE – II   **[9 Periods]**
CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.System call interface for process management-fork, exit, wait, waitpid, exec
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.
MODULE – III   **[10 Periods]**
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors **Interprocess Communication Mechanisms:** IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.
MODULE – IV   **[9 Periods]**
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

 MODULE – V   **[10 Periods]**
File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition,John Wiley.

2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:
1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005,Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education.
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

Course outcomes:

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Will be able to control access to a computer and the files that may be shared	Understand
CO2	Demonstrate the knowledge of the components of computers and their respective roles in computing.	Analyze
CO3	Ability to recognize and resolve user problems with standard operating environments	Apply
CO4	Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively	Analyze

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1									2	1		2
CO2	2	2										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)		**B.Tech. IV Semester**	
Code: C0517	**Design and Analysis of Algorithms**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Data Structures

Course Objectives:
1. To learn fundamental concepts an algorithm, Pseudo code, performance analysis, time complexity, disjoint sets, spanning trees and connected components.
2. To Learn and Understanding of divide and conquer, applications, binary search, sorting and Strassen's matrix, greedy method, job sequencing, spanning trees and shortest path problem.
3. To Learn and understanding dynamic programming, matrix chain, optimal binary search, knapsack problem and optimization methods, all pairs shortest path, travelling sales problem and reliability design.
4. To Learn and understanding backtracking, n-queen problems, subset problem, graph coloring, Hamiltonian cycles and branch bound methods, travelling sales, knapsack problem, branch and bound, FIFO branch.
5. To Learn and understanding of NP Hard and NP complete problems

Module-I: Basics of Algorithm Design   [09 Periods]
Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations, Amortized analysis.
Disjoint Sets: Disjoint set operations, union and find algorithms, spanning trees, connected components and bi connected components.

Module-II: Algorithm Methods   [10 Periods]
Divide and Conquer - General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication
Greedy method: General method, applications-Job sequencing with deadlines, general knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Module-III: Dynamic Programming and Optimization Techniques   [10 Periods]
Dynamic Programming - General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem   .
Optimization Techniques - All pairs shortest path problem, travelling sales person problem, Reliability design.

Module-IV: Backtracking and Branch and Bound   [10 Periods]
Backtracking-General method, n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles
Branch and Bound - General method, applications: Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

Module-V: NP-Hard and NP-Complete problems   [09 Periods]
NP-Hard and NP-Completeness: Basic concepts, NP - Hard and NP Complete classes, Cook's theorem, Deterministic and Non-Deterministic algorithms, NP-hard graph problems and scheduling problem

Text Books:
1. Ellis Horowitz, SatrajSahni and Rajasekharan, **"Fundamentals of Computer Algorithms "**Galgotia publications pvt. Ltd
2. T.H.Cormen,C.E.Leiserson, R.L.Rivest ,and C.Stein, **"Introduction to Algorithms"**, second edition, PHI Pvt. Ltd./ Pearson Education

References:
1. M.T.Goodrich and R.Tomassia**"Algorithm Design, Foundations, Analysis and Internet examples"**, John wiley and sons.
2. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, **"Introduction to Design and Analysis of Algorithms A strategic approach"**, Mc Graw Hill.
3. Parag Himanshu Dave, Himanshu Balchandra Dave,**"Design and Analysis of algorithms"** Pearson

E-Resources:
1. https://comsciers.files.wordpress.com/2015/12/horowitz-and-sahani-fundamentals-of-computer-algorithms-2nd-edition.pdf
2. http://en.cnki.com.cn/Article_en/CJFDTOTAL-JFYZ200208019.htm
3. http://nptel.ac.in/courses/106101060/

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	**Analyze** performance of algorithms using asymptotic notations, performance analysis, disjoint sets, spanning trees and connected components	**Analyze**
CO2	**Describe and analyze** paradigms for designing good algorithms using Divide-and-Conquer and Greedy Techniques, applications, binary search, sorting and Strassen's matrix, greedy method, job sequencing, spanning trees and shortest path problem	**Analyze**
CO3	**Synthesize** dynamic-programming algorithms and analyze matrix chain, optimal binary search, knapsack problem and optimization methods, all pairs shortest path, travelling sales problem and reliability design	Apply
CO4	**Apply** backtracking and branch and bound techniques to solve some complex problems, n-queen problems, subset problem, graph coloring, Hamiltonian cycles and branch bound methods, travelling sales, knapsack problem, branch and bound, FIFO branch	Apply
CO5	**Apply** algorithm design techniques to solve certain NP-complete problems.	Apply

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2									3	2	
CO2	3	2	3	2									3	2	
CO3	3	2	3	2									3	2	
CO4	3	2	3	2									3	2	
CO5	3	2	3	2									3	2	

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C1204	**Web Technologies**	L	T	P
Credits: 3		3	-	-

COURSE OBJECTIVES:
1. To introduce Web Terminology
2. To introduce XML and processing of XML Data with Java
3. To introduce Server side programming with Java Servlets and JSP
4. To introduce Client side scripting with Java script and AJAX.

MODULE I: [10 PERIODS]
Introduction to WWW : Protocols and programs, secure connections, application and development tools, the web browser, What is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP
Web Design: Web site design principles, planning the site and navigation,

MODULE II: [09 PERIODS]
HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;
XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

MODULE III: [10 PERIODS]
Introduction to Servlets: Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request &Responses, Using Cookies and Sessions, connecting to a database using JDBC.

MODULE IV: 10 Periods]
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

MODULE V: [09 PERIODS]
Client side Scripting: Introduction to Java script, Java script language – declaring variables, scope of variables, functions, Event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

TEXT BOOKS:
1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

REFERENCES:
1. Web Programming, building internet applications, Chris Bates, 2nd Edition, Wiley Dreamtech
2. Java Server Pages, Hans Bergsten, SPD O'Reilly,
3. Java Script, D. Flanagan, 6th Edition, O'Reilly Media.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W.Sebesta, 4th Edition, Pearson.
6. Internet and World Wide Web — How to program, Dietel and Nieto, Pearson.

E-RESOURCES:
1. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
2. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf
3. http://airccse.org/journal/ijdms/ijdms.html
4. http://www.springer.com/computer/database+management+%26+information+retrieval?SGWID=0-153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

COURSE OUTCOMES
1. Gain knowledge of client side scripting, validation of forms and AJAX programming
2. Have understanding of server side scripting with PHP language
3. Have understanding of what is XML and how to parse and use **XML** Data with Java
4. To introduce Server side programming with Java Servlets and JSP

COs	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														

| COs | Programme Outcomes (POs) | | | | | | | | | | | | PSOs | | |
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2			3				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech.** **IV Semester**		
Code: C0519	**Database Management Systems Lab**	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Co-requisites: "Database Management Systems"

Course Objectives:
- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

List of Experiments:
1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
   B. Nested, Correlated subqueries
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

Text Books:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill,3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

Reference Books:

1. Database Systems design, Implementation, and Management, Peter Rob& Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Course Outcomes:

At the end of the course, students will be able to

CO	Statement	Blooms Taxonomy Level
CO1	Design database schema for a given application and apply normalization	Analyze
CO2	Acquire skills in using SQL commands for data definition and data manipulation	Apply
CO3	Develop solutions for database applications using procedures, cursors and triggers	Analyze

CO- PO, PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3										2	2

COURSE OBJECTIVES:

This course will make students

1. To analyze asymptotic performance of algorithms, understand different methods postfix, infix expressions, spanning tree algorithms, Strassen's matrix multiplication.
2. To develop solutions to Job sequencing problems, Knapsack algorithm, shortest path algorithms.
3. To implement solutions traveling sales person.
4. To apply dynamic programming method N-Queen's Problem.
5. To learn and apply synthesizing branch and bound, NP problems.

Software Requirements: Turbo C++ / JDK

LIST OF PROGRAMS:

1. Write a program to evaluate a postfix expression E. Assume E is presented data String.
2. Write a program to obtain the postfix form of an infix expression E. Again assume eE has only the binary operators +,-,*,/,^.
3. Implement the minimum cost spanning tree algorithm (Kruskal's algorithm).
4. Implement the minimum cost spanning tree algorithm (Prim's algorithm).
5. Implement Strassen's matrix multiplication.
6. Implement Job sequencing problem with deadlines.
7. Implement the Knapsack Algorithm.
8. Implement the shortest path Dijkstra's Algorithm.
9. Implement SSSP (Single Source Shortest Path) in DAG (Directed Acyclic Graphs).
10. Implement travelling sales person problem.
11. Implement N-Queen's Problem using Backtracking.
12. Implement sum of subsets problem.

TEXTBOOKS

1. Ellis Horowitz, Satraj Sahni and Rajasekharan, "Fundamentals of Computer Algorithms" Galgotia publications pvt. Ltd
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, "Introduction to Algorithms", second edition, PHI Pvt. Ltd./ PearsonEducation
3. Parag Himanshu Dave, Himanshu Balchandra Dave, "Design and anlysis of algorithms" Pearson.

REFERENCES

1. M.T.Goodrich and R.Tomassia "Algorithm Design, Foundations, Analysis and Internet examples", John wileyandsons.
2. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, "Introduction to Design and Analysis of Algorithms A strategic approach", Mc GrawHill.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO	Statement	Blooms Taxonomy Level
CO1	**Analyze** asymptotic performance of algorithms, understand different methods	Analyze
CO2	**Develop** solutions to Job sequencing problems, Knapsack algorithm, shortest path algorithms,	Apply
CO3	**Implement** solutions traveling sales person.	Analyze
CO4	**Apply** dynamic programming method N-Queen's Problem.	Apply
CO5	**Apply** synthesizing branch and bound NP problems.	Apply

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes (POs)												PSOs		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2									3	3	
CO2	3	3	3	2									3	2	
CO3	3	3	3	2									3	2	
CO4	3	3	3	2									3	2	
CO5	3	3	3	2									3	2	

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0522	Node JS/React JS/ Django	L	T	P
Credits: 1		-	-	2

Prerequisites: Object Oriented Programming through Java, HTML Basics

Course Objectives:

- To implement the static web pages using HTML and do client side validation using JavaScript.
- To design and work with databases using Java
- To develop an end to end application using java full stack.
- To introduce Node JS implementation for server side programming.
- To experiment with single page application development using React.

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 andexperiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implementan application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed inexperiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various sessiontracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS,path, event.
10. Develop an express web application that can interact with REST API to perform CRUDoperations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation usingchart.js
14. Create a TODO application in react with necessary components and deploy it into github.

Reference Books:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2ndEdition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo,Express, React, and Node, 2nd Edition, A Press.

Course Outcomes:

At the end of the course, the student will be able to,

CO	Statement	Blooms Taxonomy Level
CO1	Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.	Apply
CO2	Demonstrate Advanced features of JavaScript and learn about JDBC	Analyze
CO3	Develop Server – side implementation using Java technologies like	Apply
CO4	Develop the server – side implementation using Node JS.	Apply
CO5	Design a Single Page Application using React.	Analyze

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1									2	1		1
CO2	2	2		1								2	2		1
CO3	1	2		1								1	1		
CO4	2	3	1	1											
CO5	2	2													1

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** (Autonomous)	**B.Tech. IV Semester**		
Code: C00M2	**Environmental Science**	**L**	**T**	**P**
Credits: NIL		**2**	**-**	**-**

Course Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

MODULE – I [10 Periods]

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

MODULE – II [12 Periods]

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

MODULE – III [9 Periods]

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

MODULE – IV [10 Periods]

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

MODULE – V [12 Periods]

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental

Management Plan
(EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA),Low carbon life style.

TEXT BOOKS:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:
1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

Course Outcomes:
At the end of the course, it is expected that students will be able to:

CO	Statement	Blooms Taxonomy Level
CO1	Identify and analyze environmental problems as well as the risks associated with these problems	Analyze
CO2	Understand what it is to be a steward in the environment	Understand
CO3	Studying how to live their lives in a more sustainable manner	Apply

COS	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Prerequisites: None

Course Objective: To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

MODULE-I: Introduction to Business and Economics   [10 Periods]

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

MODULE-II: Demand and Supply Analysis   [10 Periods]

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

MODULE-III: Production, Cost, Market Structures & Pricing   [10 Periods]

Production Analysis: Factors of Production, Production Function, Production Function with one

variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

MODULE-IV: Financial Accounting   [10 Periods]

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger,

Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

MODULE-V: Financial Analysis through Ratios   [10 Periods]

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International

Book House Pvt. Ltd. 2013.

2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.

3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata

McGraw Hill Education Pvt. Ltd. 2012.

REFERENCES:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.

2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. V Semester	
Code: C6637	ARTIFICIAL INTELLIGENCE	L	T	P
Credits: 3		3	-	-

Prerequisites: Discrete Mathematics

Course Objectives:

This course enable the students to understand the basic fundamentals of Artificial Intelligence, determine various problem solving strategies, understand the logic concepts, different approaches to represent the knowledge, develop the expert systems in various phases and its applications, apply the fuzzy logic in various problem solving techniques

Module-I:

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI.

Module-II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem

Search Strategies: exhaustive searches, heuristic search techniques, iterative-deepening A*, constraint satisfaction

Module-III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, predicate logic

Module-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure.

Module-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

TEXT BOOKS

1. Saroj Kaushik, "**Artificial Intelligence**", CENGAGE Learning,
2. Stuart Russel, Peter Norvig, "**Artificial intelligence, A modern Approach**", 2nded, PEA
3. Rich, Kevin Knight, Shiv Shankar B Nair, "**Artificial Intelligence**", 3rd Ed, TMH
4. Patterson, "**Introduction to Artificial Intelligence**", PHI

REFERENCES

1. George F Lugar, "**Atificial intelligence, structures and Strategies for Complex problem solving**", 5th edition, PEA
2. Ertel, Wolf Gang, "**Introduction to Artificial Intelligence**", Springer
3. Blay WhitBY "**Artificial Intelligence**" Rosen Publishing.

E-RESOURCES

1. https://i4iam.files.wordpress.com/2013/08/artificial-intelligence-by-rich-and-knight.pdf
2. https://books.google.co.in/books?id=pVR9W5LEZUwC&printsec=frontcover&source=gbs _ge_summary_r&cad=0#v=onepage&q&f=false
3. https://www.journals.elsevier.com/artificial-intelligence/

4. http://www.ceser.in/ceserp/index.php/ijai
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7_M07uyea_7zp_zRG3BvdU
Vy2TIab45fvPeNJfynQsAbmBEgDSUqzidwcse6xwotJA
6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRBg_vrHK12-
lgOzTVbb5oZ6eQOBjCWDfRvquHJLEOFENjI5AmOqRc9Ar3eJF4CGFrw

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the fundamental concepts in Artificial Intelligence.	Understand
CO2	Analyze the applications of search strategies and problem reductions	Analyze
CO3	Apply the mathematical logic concepts	Apply
CO4	Develop the Knowledge representations in Artificial Intelligence	Apply
CO5	Explain the Fuzzy logic systems	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C1205	SOFTWARE ENGINEERING	L	T	P
Credits: 3		3	-	-

Prerequisite: NIL

Course Objectives:

Student will be able to learn fundamental aspects of Software Engineering and analyze various process models. To identify various types of requirements and the process for Requirements Engineering. To make use of various System Models to conceptualize and construct a system. To demonstrate different testing tactics and define metrics for software measurement. To classify and mitigate the Software Risks and learn to achieve quality standards.

Module I: Introduction to Software Engineering   [09 Periods]

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI).

Process models: The waterfall model, Spiral model and Agile methodology

Module II: Requirements of Software Engineering   [09 Periods]

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

Module III: Phases of Software Engineering   [09 Periods]

Design Engineering: Design process and design quality, design concepts, the design model.

Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

Module IV: Test Strategies   [09 Periods]

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Metrics for Process and Products: Software measurement, metrics for software quality.

Module V:Risk Management   [09 Periods]

Management of Risk Process: Reactive vs proactive risk strategies, Software risks, Risk identification, Risk projection Risk refinement, RMMM, RMMM plan

Quality Management: Quality concepts, Software quality assurance, Software reviews, Formal technical reviews, Statistical Software Quality Assurance, Software Reliability, ISO 9000 Quality standards

Text Books:

1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGrawHill International Edition, 5th edition,2001.

2. Ian Summerville, Software engineering, Pearson education Asia, 6thedition,2000.

References:

1. Pankaj Jalote- An Integrated Approach to Software Engineering, SpringerVerlag,1997.

2. James FPeters and WitoldPedryez, ‒Software Engineering – An Engineering Approach, John Wiley and Sons, New Delhi,2000.

3. AliBehforoozandFrederickJHudson, ‒Software Engineering\Fundamentals, Oxford University Press, NewDelhi,1996.

E RESOURCES:

1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software +engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUK EwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

2. engineering%20by%20ian%20sommerville%20FREE%20download&f=false

3. http://ieeexplore.ieee.org/document/4807670/

4. https://link.springer.com/search?facet-journalid=40411&package=openaccessarticles &query=&facet-sub-discipline=%22Software+Engineering%22

5. http://freevideolectures.com/Course/2318/Software-Engineering

6. http://freevideolectures.com/Course/2318/Software-Engineering/5

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Obtain knowledge about principles of software engineering and software process models.	Understand
CO2	Interpret the functional, non-functional requirements and requirement engineering process.	Apply
CO3	Focus on the fundamentals of modeling a software project.	Understand
CO4	Obtain knowledge about Identifying appropriate test strategies, estimation and maintenance of software systems.	Analyze
CO5	Analyse various Risk Management and Quality Management Techniques.	Analyze

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	1	-	-	-	-	-	-	-	1	3	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	1	3	1	-
CO3	3	2	2	1	-	-	-	-	-	-	-	1	2	2	-
CO4	2	2	2	1	-	-	-	-	-	-	-	1	2	1	1
CO5	2	1	1	-	-	-	-	-	-	-	-	1	2	1	1

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C6201	**Computer Networks**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:

This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnetting and supernetting, explain the concepts of protocols of Transport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.

MODULE I: Basics of Networking and Physical layer [10 Periods]

Basics of Networking - Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, TCP/IP model.

Physical layer - Digital transmission, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

MODULE II: Datalink layer [11 Periods]

Functionalities of Data link layer-Introduction, Framing, Error Detection and Correction–Parity – LRC – CRC- Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. Random access, Controlled access, Channelization, Collision Free Protocols.

LAN - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11

MODULE III: Network Layer [09 Periods]

A: Basics of Network Layer- Logical Addressing, Internetworking, Tunneling, Address mapping,

B: Communication Protocols - ICMP, IGMP, Forwarding, Unicast Routing Protocols, Multicast Routing Protocols.

MODULE IV: Transport Layer [09 Periods]

Connection Oriented and Connectionless Protocols- Process to Process Delivery, UDP and TCP protocols, SCTP.

Congestion Control - Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

MODULE V:Application layer [09 Periods]

DNS - Domain name space, DNS in internet, Electronic mail

Protocols and Network Security - FTP, WWW, HTTP, SNMP, Network Security, Cryptography.

TEXT BOOKS

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4[th]Edition, TMH, 2006.

2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, Pearson Education/PHI.

REFERENCES

1. P.C .Gupta, "Data communications and computer Networks", PHI.

2. S.Keshav, "An Engineering Approach to Computer Networks", 2nd Edition, Pearson Education.

3. W.A. Shay, "Understanding communications and Networks", 3rd Edition, Cengage Learning.

4. James F.Kurose& Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 3rd Edition, Pearson Education.

E-RESOURCES

1. https://www.saylor.org/site/wp-content/uploads/2012/02/Computer-Networking-
Principles-Bonaventure-1-30-31-OTC1.pdf
2. http://ebook-dl.com/downloadbook/230
3.https://doi.org/10.1016/0169-7552(89)90019-6
4.http://nptel.ac.in/courses/106105081/

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the Layered Architecture of Computer Networks.	Understand
CO2	Conceptualize the protocols of Data Link Layer and can build Local area networks.	Analyze
CO3	Apply Subnet and Supernet concepts in the construction of computer network.	Apply
CO4	Summarize the protocols used in Transport Layer, QoS and Congestion control mechanisms.	Understand
CO5	Analyze different protocols of Application Layer and various security risks.	Analyze

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes(POs)												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1	1	1	-	-	-	-	-	-	-	1	2	2	1
CO2	3	3	1	1	-	-	-	-	-	-	-	1	3	2	1
CO3	3	1	1	1	-	-	-	-	-	-	-	1	3	3	1
CO4	2	1	1	1	-	-	-	-	-	-	-	1	3	2	1
CO5	3	3	1	-	-	-	-	-	-	-	-	1	3	2	-

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C1206	Biometrics	L	T	P
Credits: 3	[Open Elective-I]	3	-	-

Prerequisites:
- Information security

- Network Security

Course Objectives:

- Will learn the biometric technologies.
- Learn the computational methods involved in the biometric systems.
- Learn methods for evaluation of the reliability and quality of the biometric systems.

MODULE-I: Introduction & Handwritten Character Recognition   [09 Periods]

Introduction, history, type of Biometrics, General Architecture of Biometric Systems, Basic Working of biometric Matching, Biometric System Error and performance Measures, Design of Biometric Systems, Applications of Biometrics, Benefits of Biometrics Versus Traditional Authentication Methods, character Recognition, System Overview, Gesture Extraction for character Recognition, Neural; Network for handwritten Character Recognition, Multilayer Neural Network for Handwritten Character Recognition, Devanagari Numeral Recognition, Isolated Handwritten Devanagari Character Recognition suing Fourier Descriptor and Hidden markov Model.

MODULE-II: Face Biometrics & Retina And Iris Biometrics   [09 Periods]

Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages, Performance of Biometrics, Design of Retina Biometrics, Iris Segmentation Method, Determination of Iris Region, Experimental Results of Iris Localization, Applications of Iris Biometrics, Advantages and Disadvantages. Vein and Fingerprint Biometrics & Biometric Hand Gesture Recognition For Indian Sign Language. Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages, Basics of Hand Geometry, Sign Language, Indian Sign Language, SIFT Algorithms- Practical Approach Advantages and Disadvantages.

MODULE-III: Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics   [09 Periods]

Introduction, Privacy Concerns Associated with Biometric Developments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics - Introduction to Biometric Cryptography, General Purpose Cryptosystem, Modern Cryptography and Attacks, Symmetric Key Ciphers, Cryptographic Algorithms, Introduction to Multimodal Biometrics, Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics and Advantages of Multimodal Biometrics Characters, AADHAAR : An Application of Multimodal Biometrics.

MODULE-IV: Watermarking Techniques & Biometrics   [09 Periods]

Scope And Future Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics -Biometrics, and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometric, Radio Frequency Identification Biometrics, DNA Biometrics,

Comparative Study of Various Biometrics Techniques.

MODULE-V: Image Enhancement Techniques & Biometrics Stands   [09 Periods]

Introduction, current Research in image Enhancement Techniques, Image Enhancement,

Frequency Domain Filters, Databases and Implementation, Standard Development Organizations, Application Programming Interface, Information Security and Biometric Standards, Biometric Template Interoperability.

TEXT BOOKS:
1. G r Sinha and Sandeep B. Patil, Biometrics: concepts and applications, Wiely, 2013.
2. Paul Reid, Biometrics for Network Security, Pearson Education.

REFERENCE BOOKS:
1. Samir Nanavathi, Micheal Thieme and Raj Nanavathi, Biometrics, Identity verification in a networked world, Wiley, dream Tech.
2. John D. Woodward and Jr. Wiley Dreamtech, Biometrics, The Ultimate Reference.

E-RESOURSES:
1. https://www.biometricsinstitute.org
2. https://www.tutorialspoint.com/biometrics/biometrics_quick_guide.htm
3. http://nptel.ac.in
4. https://www.coursera.org

Course Outcomes: After completion of the course, students will be able to:

CO	Statement	Blooms Taxonomy Level
CO1	Identify the various Biometric technologies.	Analyze
CO2	Design of biometric recognition for the organization.	Create
CO3	Develop simple applications for privacy.	Create
CO4	Understand the watermarking techniques of biometrics.	Understand
CO5	Understand the research on biometric techniques.	Understand

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0526	**Principles of Programming Languages**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites
1. A course on "Mathematical Foundations of Computer Science".
2. A course on "Computer Programming and Data Structures".

Course Objectives

- Introduce important paradigms of programming languages
- To provide conceptual understanding of high-level language design and implementation
- Topics include programming paradigms; syntax and semantics; data types, expressions and
  statements; subprograms and blocks; abstract data types; concurrency; functional and logic
  programming languages; and scripting languages

MODULE-I: Preliminary Concepts [10 Periods]

Reasons for Studying Concepts of Programming Languages,Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

MODULE-II: Names, Bindings, and Scopes [10 Periods]

Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants

Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence Expressions and Statements, Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

MODULE-III: Subprograms and Blocks [10 Periods]

Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

MODULE-IV: Concurrency [10 Periods]

Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency. Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

MODULE-V: Functional Programming Languages [10 Periods]

Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming. Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.

TEXT BOOKS:

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.
REFERENCES :
1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Acquire the skills for expressing syntax and semantics in formal notation	Understand
CO2	Identify and apply a suitable programming paradigm for a given computing application	Apply
CO3	Gain knowledge of the features of various programming languages and their comparison	Understand

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0527	**Image Processing**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL
Course Objectives:
To comprehend the relation between human visual system and machine perception and processing of digital images. To provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.

MODULE I: Digital Image Fundamentals &Image Transforms [09 Periods]

Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

MODULE II: Image Enhancement(Spatial Domain)   **[11   Periods]**
Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering. Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

MODULE III: Image Restoration   [09 Periods] Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

MODULE IV: Image Segmentation   **[10 Periods]**
Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation. Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

MODULE V:Image Compression   **[09 Periods]**
Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000Standards.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, "**Digital Image Processing**", 3rd Edition, Pearson,2008

2. S Jayaraman, S Esakkirajan, T Veerakumar, "**Digital Image Processing**", Mc Graw Hill Education,2010.

REFERENCES:

1. Scotte Umbaugh, "**Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools**", 2nd Ed, CRC Press,2011

2. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, "**Digital Image Processing using MATLAB**", 2nd Edition, MC GRAW HILL EDUCATION,2010.

3. Somka,   Hlavac,   "**Digital   Image   Processing   and Computer Vision**", Boyle- engage Learning (Indian edition)2008.

4. Adrian low, "**Introductory Computer Vision Imaging Techniques and Solutions**", 2008, 2nd Edition

E-RESOURCES:

1. https://trove.nla.gov.au/work/5520972

2. http://web.ipac.caltech.edu/staff/fmasci/home/astro_refs/Digital_Image_Processing_2ndEd.pdf

3. https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=83

Course Outcomes:

CO	Statement	Blooms

		Taxonomy Level
CO1	Exploration of the limitations of the computational methods on digital images.	Understand
CO2	Expected to implement the spatial and frequency domain image transforms on enhancement	Apply
CO3	Explain the different image restoration of images.	Understand
CO4	Elaborate understanding on image enhancement techniques.	Analyze
CO5	Analyze and define the need for compression and evaluate the basic compression algorithms.	Analyze

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes(POs)												PSOs		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2									3		
CO2	3	2	2	3	3		3			2			2		
CO3	2		3	3	2										
CO4	3	3	3	3			3			2			3		3
CO5	2		2	2	3								2		2

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE(Autonomous)		B.Tech. V Semester	
Code: C0524	**ADVANCED COMPUTER ARCHITECTURE**	**L**	**T**	**P**
Credits: 3	[Professional Elective – I]	**3**	**-**	**-**

Prerequisite: NIL

Course Objectives:

This course helps to explore on the advanced concepts and state-of-the-art developments in computer architecture: memory systems, pipelining, simultaneous multithreading, run- time optimization, array processing, parallel processing, multiprocessing, abstract analytic models, power-aware computing, embedded computing, relationship between computer design and application requirements, cost/performance tradeoffs, and many example computers of interesting and unusual features.

MODULE I: [09 Periods]

Fundamentals of Computer design- Technology trends- cost price and their trends- measuring and reporting performance - quantitative principles of computer design

MODULE II: [09 Periods]

Instruction set principles and examples- Classifying instruction set architecture - memory addressing- type and size of operands- operations in the instruction set- instructions for control flow- encoding an instruction set.

MODULE III: [10 Periods]

Instruction level parallelism (ILP)and its dynamic exploitation – Concepts and challenges-overcoming data hazards- reducing branch costs with dynamic hardware prediction – high performance instruction delivery- hardware based speculation ILP software approach- compiler techniques- static branch protection - VLIW approach -

H.W support for more ILP at compile time.

MODULE IV: [10 Periods]

Memory hierarchy design- Cache performance- reducing cache misses penalty and miss rate – virtual memory. Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading

MODULE V: [10 Periods]

Storage systems - Types – Buses - RAID- errors and failures - designing an I/O system in five easy pieces. Inter connection networks and clusters - interconnection network media – practical issues in interconnecting networks – clusters- designing a cluster

TEXT BOOKS:

1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kaufmann (An Imprint of Elsevier)

REFERENCE BOOKS:

1. "Computer Architecture and parallel Processing" Kai Hwang and A.Briggs International Edition McGraw-Hill.
2. Advanced Computer Architectures, DezsoSima, Terence Fountain, Peter Kacsuk, Pearson.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Understand and apply concept and principle of cache memory and virtual memory to high -performance computer architecture.	Understand
CO2	Understand pipelining and its speed advantage & design pipelined logic.	Understand
CO3	Proficient in fault-tolerant design techniques and examine various methods of error detection and correction such as TMR and Hamming Codes.	Apply
CO4	Identify tradeoffs between complex instruction set computers (CISC) and reduced instruction set computers (RISC).	Analyze
CO5	Analyze and perform tradeoffs between the cost, performance, and reliability of alternative computer architectures.	Analyze

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	2	1	-	-	-	-	-	-	2	3	-	-
CO2	2	-	3	2	1	-	-	-	-	-	-	-	3	2	-
CO3	1	-	3	2	1	-	-	-	-	-	-	2	-	3	-
CO4	2	2	3	2	1	-	-	-	-	-	-	2	2	-	-
CO5	2	2	3	2	1	-	-	-	-	-	-	2	-	-	-

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE(Autonomous)	B.Tech. V Semester		
Code: C0523	QUANTUM COMPUTING	L	T	P
Credits: 3	[Professional Elective – I]	3	-	-

Course Objectives:

A basic introduction to quantum mechanics, linear algebra and familiarity with the Dirac notation is provided first to get one's quantum moorings right . This is then followed by an introductory treatment of quantum computation and quantum information covering aspects of quantum entanglement, quantum algorithms, quantum channels. Rudimentary quantum computing is introduced using the IBM quantum computer and associated simulators .

MODULE I: Introduction   **[10 Periods]**

Elementary quantum mechanics:, linear algebra for quantum mechanics, Quantum states in Hilbert space, The Bloch sphere, Density operators, generalized measurements, no-cloning theorem.

MODULE II: Quantum correlations   **[09 Periods]**

Quantumcorrelations:Bellinequalitiesandentanglement,Schmidtdecomposition,superdensecoding, teleportation.

MODULE III: Quantum cryptography   **[09 Periods]**

Quantum cryptography: quantum key distribution

MODULE IV: Quantum gates and algorithms   **[09 Periods]**

Quantum gates and algorithms: Universal set of gates, quantum circuits, Solovay-Kitaev theorem, Deutsch-Jozsa algorithm, factoring

MODULE V: Programming a quantum computer   **[09 Periods]**

The IBM Q, coding a quantum computer using a simulator to carry out basic quantum measurement and state analysis.

TEXT-BOOKS

(1) Phillip Kaye, Raymond Laflammeet.al., An introduction to Quantum Computing, Oxford University press, 2007.

(2) Chris Bernhardt, Quantum Computing for Everyone, The MIT Press,Cambridge,2020

(3) David McMahon-Quantum Computing Explained-Wiley-Inter science, IEEE Computer Society (2008)

REFERENCES

(1) Quantum Computation and Quantum Information, M.A.Nielsen & I.Chuang, Cambridge University Press (2013).

(2) Quantum Computing, A Gentle Introduction, Eleanor G.Rieffel and Wolfgang H.Polak MIT press (2014)

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1	Analyze the behavior of basic quantum algorithms	
CO2	Implement simple quantum algorithms and information channels in the quantum circuit model	
CO3	Simulate a simple quantum error-correcting code	
CO4	Being able to analyze simple quantum algorithms and argue optimality	
CO5	Prove basic facts about quantum information channels	

COs	Programme Outcomes(POs)	PSOs		

CO-PO, PSO Mapping
(3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1									1	1	1
CO2	1	2	2	2	2								2		2
CO3	1	2	3	2	1								1		2
CO4		2					2				1			3	
CO5	1			3											

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE(Autonomous)	B.Tech. V Semester		
Code: C1207	SOFTWARE ENGINEERING & COMPUTER NETWORKS LAB	L	T	P
Credits: 2		-	1	2

Course Objectives:

- To have hands-on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.
- To understand the working principle of various communication protocols.

SOFTWARE ENGINEERING:

LIST OF EXPERIMENTS:

Do the following seven exercises for any two projects given in the list of sample projects or any otherProjects:

1. Development of problem statements.
2. Preparation of Software Requirement Specification Document, Design Documents andTesting Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing

techniques.

8. Sample Projects:
    1. Passport automation System
    2. Book Bank
    3. Online Exam Registration

COMPUTER NETWORKS

LIST OF EXPERIMENTS:

1. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding windowprotocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Ability to translate end-user requirements into system and software requirements	Understand
CO2	Ability to generate a high-level design of the system from the software requirements	Understand
CO3	Implement data link layer farming methods	Apply
CO4	Analyze error detection and error correction codes.	Analyze
CO5	Implement and analyze routing and congestion issues in network design.	Analyze

	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes(POs)												PSOS		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C6638	**ARTIFICIAL INTELLIGENCE LAB**	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Course Objectives:

This course is designed to:
1. Explore the methods of implementing algorithms using artificial intelligence techniques
2. Illustrate search algorithms
3. Demonstrate building of intelligent agents

List of Experiments:
1. Write a program to implement DFS
2. Write a program to implement BFS
3. Write a Program to find the solution for travelling salesman Problem
4. Write a program to implement Simulated Annealing Algorithm
5. Write a program to find the solution for wampus world problem
6. Write a program to implement 8 puzzle problem
7. Write a program to implement Towers of Hanoi problem
8. Write a program to implement A* Algorithm
9. Write a program to implement Hill Climbing Algorithm
10. Build a bot which provides all the information related to you in college.
11. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.	Apply
CO2	Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.	Understand
CO3	Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems	Understand

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3										3	2	
CO2			3		2								2	3	
CO3		2	2		2									2	

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0530	UI DESIGN-FLUTTER LAB	L	T	P
Credits: 1		-	-	2

Prerequisites: None

Course Objectives:

- Learns to Implement Flutter Widgets and Layouts
- Understands Responsive UI Design and with Navigation in Flutter
- Knowledge on Widges and customize widgets for specific UI elements, Themes
- Understand to include animation apart from fetching data

List of Experiments: Students need to implement the following experiments

1. a) Install Flutter and Dart SDK.
    b) Write a simple Dart program to understand the language basics.
2. a) Explore various Flutter widgets (Text, Image, Container, etc.).
    b) Implement different layout structures using Row, Column, and Stack widgets.
3. a) Design a responsive UI that adapts to different screen sizes.
    b) Implement media queries and breakpoints for responsiveness.
4. a) Set up navigation between different screens using Navigator.
    b) Implement navigation with named routes.
5. a) Learn about stateful and stateless widgets.
    b) Implement state management using set State and Provider.
6. a) Create custom widgets for specific UI elements.
    b) Apply styling using themes and custom styles.
7. a) Design a form with various input fields.
    b) Implement form validation and error handling.
8. a) Add animations to UI elements using Flutter's animation framework.
    b) Experiment with different types of animations (fade, slide, etc.).
9. a) Fetch data from a REST API.
    b) Display the fetched data in a meaningful way in the UI.
10. a) Write unit tests for UI components.
    b) Use Flutter's debugging tools to identify and fix issues.

Text Book:

 1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Implements Flutter Widgets and Layouts	Understand
CO2	Responsive UI Design and with Navigation in Flutter	Understand
CO3	Create custom widgets for specific UI elements and also Apply styling using themes and custom styles.	Apply
CO4	Design a form with various input fields, along with validation and error handling	Create
CO5	Fetches data and write code for unit Test for UI components and also animation	Apply

COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE(Autonomous)	B.Tech. V Semester		
Code: C00M3	QUANTITATIVE APTITUDE AND VERBAL REASONING-I	L	T	P
Credits: NIL		2	-	-

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE(Autonomous)	B.Tech. V Semester		
Code: C00M5	CONSTITUTION OF INDIA	L	T	P
Credits: NIL		2	-	-

Course Objectives:

Students will be able to:

- Understandthepremisesinformingthetwinthemesoflibertyandfreedomfromacivilrights perspective.
- ToaddressthegrowthofIndianopinionregardingmodernIndianintellectuals'constitutional roleand entitlementtociviland economicrights aswellastheemergence of nationhoodin the early years of Indian nationalism.
- ToaddresstheroleofsocialisminIndiaafterthecommencementoftheBolshevikRevolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

Studentswillbeableto:

- .

Unit-1 HistoryofMakingoftheIndianConstitution-HistoryofDraftingCommittee.

Unit-2 PhilosophyoftheIndianConstitution-PreambleSalientFeatures

Unit-3 ContoursofConstitutionalRights&Duties-FundamentalRights

- RighttoEquality
- RighttoFreedom
- RightagainstExploitation
- RighttoFreedomofReligion
- CulturalandEducationalRights
- RighttoConstitutionalRemedies
- DirectivePrinciplesofStatePolicy
- FundamentalDuties.

Unit-4 OrgansofGovernance:Parliament,Composition,QualificationsandDisqualifications,Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities:

Introduction,MayorandroleofElectedRepresentative,CEOofMunicipalCorporation.Panchayatraj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit - 6 Election Commission: Election Commission: Role and Functioning. Chief

Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Reading:
1. TheConstitutionofIndia,1950(BareAct),GovernmentPublication.
2. Dr.S.N.Busi,Dr.B.R.AmbedkarframingofIndianConstitution,1stEdition,2015.
3. M.P.Jain,IndianConstitutionLaw,7thEdn.,LexisNexis,2014.
4. D.D.Basu,IntroductiontotheConstitutionofIndia,LexisNexis,2015.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	DiscussthegrowthofthedemandforcivilrightsinIndiaforthebulkofIndiansbeforethe arrival of Gandhi in Indian politics	Understand
CO2	Discusstheintellectualoriginsoftheframeworkofargumentthatinformedthe conceptualization of social reforms leading to revolution in India.	Understand
CO3	DiscussthecircumstancessurroundingthefoundationoftheCongressSocialistParty[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution	Understand
CO4	DiscussthepassageoftheHinduCodeBillof1956.	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C1208	**Automata Theory and Compiler Design**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisite: Nil

Course Objectives:

- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- To understand deterministic and non-deterministic machines and the differences between decidability and undecidability.
- Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, intermediate code generation

Module–I: Introduction to Finite Automata: **[10 Periods]**

Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems. Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions. Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA

Module–II: Regular Expressions: **[10 Periods]**

Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma. Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

Module–III: Push Down Automata: **[10 Periods]**

Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA and CFG's, Acceptance by final state Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

Module–IV: Introduction: **[10 Periods]**

The structure of a compiler, Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers

Module–V: Syntax-Directed Translation: **[10 Periods]**

Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax Directed Translation Schemes, Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

Text Books:
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

Reference Books:
1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.
2. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Able to employ finite state machines for modeling and solving computing problems.	Apply
CO2	Able to design context free grammars for formal languages.	Apply
CO3	Able to distinguish between decidability and undecidability.	Analyze
CO4	Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.	Apply
CO5	Acquire skills in using lex tool and design LR parsers	Understand

	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**												**PSOS**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C6625	**Machine Learning**	L	T	P
Credits: 3		3	-	-

Pre-requisites: Linear Algebra and Probability Theory

Course Objectives:

The objectives of this course are:

1. Understand the need and elements of Machine Learning
2. Study various machine learning techniques
3. Design solutions for real world problems using machine learning techniques.

MODULE I: [10 PERIODS]

Introduction to Machine Learning: Introduction, Classic and Adaptive machines, learning types, deep learning, bio-inspired adaptive systems, Machine Learning and big data; Elements of Machine Learning: Data formats, Learnability, Statistical learning concepts, Class balancing, Elements of Information theory.

MODULE II: [09 PERIODS]

Feature Selection and Feature Engineering: Data sets, creating training and test sets, managing categorical data, missing features, data scaling and normalization, Withering, Feature selection and filtering, PCA, Visualization of high-dimensional datasets; Regression Algorithms: Linear models for regression, Regression types; Linear Classification Algorithms: Linear classification, logistic regression, grid search, classification metrics, ROC curve.

MODULE III: [10 PERIODS]

Naïve Bayes and Discriminant Analysis: Bayes theorem, Naïve Bayes classifiers, Discriminant analysis; Support Vector Machines: Linear SVM, Kernel-based classification; Decision Trees and Ensemble Learning: Binary Decision trees, Introduction to Ensemble Learning-Random Forests, AdaBoost, Gradient Tree Boosting, Voting classifier

Module IV: Rules and Analytical Learning [09 Periods]

Clustering Fundamentals: Basics, k-NN, Gaussian mixture, K-means, Evaluation methods, DBSCAN,Spectral Clustering, Hierarchical Clustering;

Introduction to Neural Networks: Introduction to deep learning, MLPs with Keras, deep learningmodel layers, introduction to Tensorflow.

Module V: Learning Techniques [10 Periods]

Machine Learning Architectures: Data collection, Normalization and regularization, Dimensionality reduction, Data augmentation, Modeling/Grid Search/Cross-validation, Visualization, GPU support, Introduction to distributed architectures, Scikit-learn tools for ML architectures, pipelines, Feature unions

Text Books:

1. Giuseppe Bonaccorso, "Machine Learning Algorithms", 2nd Edition, Packt, 2018,
2. Tom M. Mitchell, "Machine Learning", MGH, 1st Edition,2013.
3. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", Chapman and Hall / CRC, 2nd Edition, 2014.

References:

1. Abhishek Vijavargia "Machine Learning using Python", BPB Publications, 1st Edition, 2018
2. ReemaThareja "Python Programming", Oxford Press, 2017

3. Yuxi Liu, "Python Machine Learning by Example", 2nd Edition, PACT, 2017

E-Resources
1.   https://www.guru99.com/machine-learning-tutorial.htm
2.   https://www.tutorialspoint.com/machine_learning_with_python/index.htm
3.   https://www.geeksforgeeks.org/machine-learning/
4.   http://nptel.ac.in/courses/106106139/
5.   http://nptel.ac.in/courses/106105152/

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
1	Define the basic concepts related to Machine Learning	Analyze
2	Recognize the underlying mathematical relationships within and across Machine Learning algorithms and their paradigms	Understand
3	Determine the various applications of Machine Learning.	Apply
4	Design and develop solutions to real world problems using Machine Learning Algorithms	Apply
5	Evaluate and interpret the results of the various machine learning technique	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOS**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	2	1	-	-	-	-	-	-	1	1	2	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-	1	2	1
CO3	3	3	2	1	1	-	-	-	-	-	-	-	1	1	-
CO4	3	3	2	2	1	-	-	-	-	-	-	-	2	1	1
CO5	2	2	1	1	-	-	-	-	-	-	-	-	-	2	1

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0525	Computer Graphics	L	T	P
Credits: 3	[Professional Elective-II]	3	-	-

Prerequisites :
Programming for problem solving and Data Structures
Course Objectives:
Provide the basics of graphics systems including Points and lines, line drawing algorithms, 2D, 3D objective transformations
Module–I: [10 Periods]
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random-scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms (DDA and Bresenham's Algorithm) circle generating algorithms and ellipse - generating algorithms Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms
Module–II: [10 Periods]
2-D geometric transformations: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, clipping operations, point clipping, Line clipping-Cohen Sutherland algorithms, Polygon clipping-Sutherland Hodgeman polygon clipping algorithm.
Module–III: [10 Periods]
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces, Polygon rendering methods, color models and color applications.
Module–IV: [10 Periods]
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
3-D viewing: Viewing pipeline, viewing coordinates, projections, view volume and general projection transforms and clipping.
Module–V: [10 Periods]
Computer animation: Design of animation sequence, general computer animation functions, raster animations, computer animation languages, key frame systems, motion specifications.
Visible surface detection methods: Classification, back-face detection, depth-buffer method, BSPtree method, area sub-division method and octree method.
Text Books:
1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education
Reference Books:
1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
4. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
5. Computer Graphics, Steven Harrington, TMH.
COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Explore applications of computer graphics	Understand
CO2	Understand 2D, 3D geometric transformations and clipping algorithms	Understand
CO3	Understand 3D object representations, curves, surfaces, polygon rendering methods, color models	Understand
CO4	Analyze animation sequence and visible surface detection methods	Analyze

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C6711	**Data Analytics**	**L**	**T**	**P**
Credits: 3	**[Professional Elective-II]**	**3**	**-**	**-**

Prerequisites : "Database Management Systems" , Knowledge of probability and statistics.

Course Objectives:

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Module–I: Data Management **[09 Periods]**

Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

Module–II: Data Analytics **[10 Periods]**

Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and Variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

Module–III: Regression **[10 Periods]**

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc. Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

Module–IV: Object Segmentation **[10 Periods]**

Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features

Module–V: Data Visualization **[10 Periods]**

Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Text Books:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

Reference Books:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the impact of data analytics for business decisions and strategy	Understand
CO2	Carry out data analysis/statistical analysis	Apply
CO3	To carry out standard data visualization and formal inference procedures	Apply
CO4	Design Data Architecture	Apply
CO5	Understand various Data Sources	Understand

COs															

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester

Code: C1209	**Information Retrieval**	**L**	**T**	**P**
Credits: 3	**[Professional Elective-II]**	**3**	**-**	**-**

Prerequisites: Data Structures
Course Objectives:
- To learn the concepts and algorithms in Information Retrieval Systems
- To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Module–I: Introduction to Information Retrieval Systems   [10 Periods]
Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

Module–II: Cataloging and Indexing   [10 Periods]
History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

Module–III:Automatic Indexing   [10 Periods]
Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

Module–IV:User Search Techniques   [10 Periods]
Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

Module–V: Text Search Algorithms   [10 Periods]
Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

Text Book:
1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

Reference Books:
1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval by Yates and Neto Pearson Education.

COURSE OUTCOMES:

CO	Statement	Blooms

		Taxonomy Level
CO1	Ability to apply IR principles to locate relevant information large collections of data	Apply
CO2	To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.	Understand
CO3	Implement retrieval systems for web search tasks.	Apply
CO4	Design an Information Retrieval System for web search tasks.	Create

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0529	Distributed Databases	L	T	P

Credits: 3	[Professional Elective-II]	3	-	-

Prerequisites: Database Management Systems

Course Objectives:

- The purpose of the course is to enrich the previous knowledge of database systems and
- exposing the need for distributed database technology to confront with the deficiencies of the
- centralized database systems.
- Introduce basic principles and implementation techniques of distributed database systems.
- Equip students with principles and knowledge of parallel and object-oriented databases.
- Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Module–I: Introduction   [09 Periods]

Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.

Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

Module–II: Query processing and decomposition   [10 Periods]

Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

Module–III: Transaction Management   [10 Periods]

Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

Module–IV: Distributed DBMS Reliability   [09 Periods]

Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

Module–V: Distributed object Database Management Systems   [10 Periods]

Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson

Edn. Asia, 2001.

2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOK:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Understand theoretical and practical aspects of distributed database systems.	Apply
CO2	Study and identify various issues related to the development of distributed database system.	Understand
CO3	Understand the design aspects of object-oriented database system and related development.	Apply

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOS**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C1210	**Pattern Recognition**	L	T	P

Credits: 3	[Professional Elective-II]	3	-	-

Prerequisites:
- Programming for problem solving
- Computer Oriented Statistical Methods

Course Objectives:
- Introducing fundamental concepts, theories, and algorithms for pattern recognition and machine learning.

Module–I: Introduction: **[09 Periods]**
Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

Module–II: Nearest Neighbor Based Classifier: **[09 Periods]**
Nearest Neighbor Algorithm, Variants of the NN Algorithm, use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

Module–III: Hidden Markov Models: **[09 Periods]**
Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

Module–IV: Support Vector Machines: **[09 Periods]**
Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

Module–V: Clustering: **[09 Periods]**
Importance of clustering, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

Text Book:
1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub, 1st Ed.

Reference Books:
1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice Hall Pub.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the importance of pattern recognition and its representation	Understand
CO2	Analyze the variants of NN algorithm	Analyze
CO3	Understand the necessity of Hidden markov models, decision tree and SVM for classification	Understand
CO4	Understand different types of clustering algorithms	Understand

	CO- PO Mapping **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**														
	Programme Outcomes(POs)												**PSOS**		
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1															
CO2															
CO3															
CO4															

2022-23 Onwards (MR22)	**MALLA REDDY ENGINEERING COLLEGE** **(Autonomous)**	**B.Tech.** **VI Semester**		
Code: C0533	**Full Stack Development**	**L**	**T**	**P**
Credits: 3	**[Professional Elective-III]**	**3**	**-**	**-**

Pre-Requisites:
1. Object Oriented Programming
2. Web Technologies

Course Objectives:
Students will become familiar to implement fast, efficient, interactive and scalable web applications using run time environment provided by the full stack components.

Module–I: Introduction to Full Stack Development   **[10 Periods]**
Understanding the Basic Web Development Framework- User, Browser, Webserver, Backend Services, Full Stack Components - Node.js, MongoDB, Express, React, Angular. Java Script Fundamentals, NodeJS- Understanding Node.js, Installing Node.js, Working with Node Packages, creating a Node.js Application, Understanding the Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks

Module–II: **Node.js:**   **[10 Periods]**
 Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Accessing the File System from Node.js- Opening, Closing, Writing, Reading Files and other File System Tasks. Implementing HTTP Services in Node.js- Processing URLs, Processing Query Strings and Form Parameters, Understanding Request, Response, and Server Objects, Implementing HTTP Clients and Servers in Node.js, Implementing HTTPS Servers and Clients. Using Additional Node.js Modules-Using the os Module, Using the util Module, Using the dns Module, Using the crypto Module.

Module–III: MongoDB: **[10 Periods]**
Need of NoSQL, Understanding MongoDB, MongoDB Data Types, Planning Your Data Model, Building the MongoDB Environment, Administering User Accounts, Configuring Access Control, Administering Databases, Managing Collections, Adding the MongoDB Driver to Node.js, Connecting to MongoDB from Node.js, Understanding the Objects Used in the MongoDB Node.js Driver, Accessing and Manipulating Databases, Accessing and Manipulating Collections

Module–IV: Express and Angular: **[10 Periods]**
Getting Started with Express, Configuring Routes, Using Requests Objects, Using Response Objects. Angular: importance of Angular, Understanding Angular, creating a Basic Angular Application, Angular Components, Expressions, Data Binding, Built-in Directives, Custom Directives, Implementing Angular Services in Web Applications.

Module–V: React: **[10 Periods]**
Need of React, Simple React Structure, The Virtual DOM, React Components, Introducing React Components, Creating Components in React, Data and Data Flow in React, Rendering and Life Cycle Methods in React, Working with forms in React, integrating third party libraries, Routing in React.
Text Books:
1. Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular Web Development, 2 nd Edition, Addison-Wesley, 2019.
2. Mark Tielens Thomas, React in Action, 1 st Edition, Manning Publications.

Reference Books:

1. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node,
2 nd Edition, Apress, 2019. 2. Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', 1 st edition, Apress, 2018.
3. Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications Using React and Redux, 2 nd edition, Addison-Wesley Professional, 2018.

COURSE OUTCOMES:

CO	Statement	Blooms Taxanomy Level
CO1	Understand Full stack components for developing web application.	Understand
CO2	Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.	Apply
CO3	Use MongoDB data base for storing and processing huge data and connects with NodeJS application.	Apply
CO4	Design faster and effective single page applications using Express and Angular.	Create
CO5	Create interactive user interfaces with react components.	Create

	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C1211	Data Mining	L	T	P
Credits: 3	[Professional Elective-III]	3	-	-

Pre-Requisites:
1. Database Management System
2. Probability and Statistics

Course Objectives:

• Students will become acquainted with both the strengths and limitations of various data mining techniques like Association, Classification, Cluster and Outlier analysis.

Module–I: **Introduction to Data Mining**   **[10 Periods]**
What Data mining? Kinds of Data, Knowledge Discovery process, Data Mining Functionalities, Kinds of Patterns, Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity, Data Pre-processing: Major Tasks in Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

Module–II: **Association Analysis**   **[10 Periods]**
Basic Concepts, Market Basket Analysis, Apriori Algorithm, FP-growth, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel Associations and Multidimensional Associations.

Module–III: **Classification**   **[10 Periods]**
Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Metrics for Evaluating Classifier Performance, Ensemble Methods, Multilayer Feed Forward Neural Network, Support Vector Machines, k-Nearest-Neighbor Classifiers.

Module–IV: **Cluster Analysis**   **[10 Periods]**
Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, Density Based Method-DBSCAN, Outlier Analysis: Types of Outliers, Challenges of Outlier Detection, and Overview of Outlier Detection Methods

Module-V: Advanced Concepts   **[10 Periods]**
Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining- Spatial Data Overview, Spatial Data Mining Primitives, Spatial Rules, Spatial Classification Algorithm, Spatial Clustering Algorithms, Temporal Mining- Modeling Temporal Events, Time Series, Pattern Detection, Sequences, Temporal Association Rules.

Text Books:
1. Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann/Elsevier, 2012.
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, 2nd Edition, Pearson Education, India, 2006.

Reference Books:
1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson Education India, 2021.
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India, 2007.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the need of data mining and pre-processing techniques	Understand
CO2	Perform market basket analysis using association rule mining.	Apply
CO3	Utilize classification techniques for analysis and interpretation of data.	Apply
CO4	Identify appropriate clustering and outlier detection techniques to handle complex data.	Analyze
CO5	Understand the mining of data from web, text and time series data.	Understand

	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0534	Scripting Languages	L	T	P
Credits: 3	[Professional Elective-III]	3	-	-

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Object Oriented Programming Concepts".
Course Objectives:
- This course introduces the script programming paradigm
- Introduces scripting languages such as Perl, Ruby and TCL.
- Learning TCL

Module–I: **Introduction:** [10 Periods]
Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

Module–II: **Extending Ruby:** [10 Periods]
Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

Module–III: [10 Periods]
Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

Module–IV: [10 Periods]
Advanced perl Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

Module–V: **TCL** [10 Periods]
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.
Text Books:
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

Reference Books:
1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.
Course Outcomes:

CO	Statement	Blooms Taxonomy Level

CO1	Comprehend the differences between typical scripting languages and typical system and application programming languages.	Understand
CO2	Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem	Understand
CO3	Acquire programming skills in scripting language	Understand

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0535	**Mobile Application Development**	**L**	**T**	**P**

Credits: 3		**3**	**-**	**-**

Prerequisites
1. Acquaintance with JAVA programming
2. A Course on DBMS

Course Objectives
- To demonstrate their understanding of the fundamentals of Android operating systems
- To improves their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Module–I: **Introduction to Android Operating System**:   **[10 Periods]**
Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

Module–II: **Android User Interface**:   **[10 Periods]**
Measurements – Device and pixel density independent measuring unit - s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components –Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

Module–III: **Intents and Broadcasts**:   **[10 Periods]**
Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

Module–IV: **Persistent Storage**:   **[10 Periods]**
Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

Module–V: **[10 Periods]**
Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

Text Book:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.

Reference Books:

1. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013.
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the working of Android OS Practically.	Understand
CO2	Develop Android user interfaces	Create
CO3	Develop, deploy and maintain the Android Applications.	Create

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester		
Code: C6917	Internet of Things		L	T	P

Credits:3	[Professional Elective-II]	3	-	-

Pre-Requisites:
Computer organization, Computer Networks

Course Objectives:
- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

Module–I   **[10 Periods]**
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels and Deployment Templates Domain Specific IoTs – Home automation, Environment, Agriculture, Health and Lifestyle

Module–II   **[10 Periods]**
IoT and M2M – M2M, Difference between IoT and M2M, SDN and NFV for IoT, IoT System Management with NETCOZF, YANG- Need for IoT system Management, Simple Network management protocol, Network operator requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG

Module–III   **[10 Periods]**
IoT Systems – Logical design using Python-Introduction to Python – Python Data types & Data structures, Control flow, Functions, Modules, Packaging, File handling, Data/Time operations, Classes, Exception, Python packages of Interest for IoT

Module–IV   **[10 Periods]**
IoT Physical Devices and Endpoints - Raspberry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry PI with Python, Other IoT devices. IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs, WAMP-AutoBahn for IoT, Xively Cloud for IoT, Python web application framework – Django, Designing a RESTful web API

Module–V   **[10 Periods]**
Case studies- Home Automation, Environment-weather monitoring-weather reporting- air pollution monitoring, Agriculture.

Text Book:
1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.

Reference Book:
1. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the fundamental concepts of IoT and its applications	Understand

CO2	Analyse Machine to Machine and System Management in IOT with Protocols	Analyze
CO3	Design IOT Applications using Python Different packages	Apply
CO4	Build real world applications by applying Raspberry PI	Apply
CO5	Examine different web-based APIs while designing application Framework.	Analyze

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												

COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3	3	3						3	3	3
CO2	3			2	3							2			3
CO3	3			3	3										3
CO4	3	3	3	3	3	3						3			3
CO5	3	3	3	3	3							3	3	3	3

OPEN ELECTIVE – I

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0H03	**Advanced English Communication Skills Lab**	**L**	**T**	**P**
Credits: 1		-	-	2

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context. The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

3. **Activities on Writing Skills** – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening R22 B.Tech. AI & ML Syllabus JNTU Hyderabad Page 85 of 147 strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

• Spacious room with appropriate acoustics.
• Round Tables with movable chairs
• Audio-visual aids
• LCD Projector
• Public Address system
• P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
• T. V, a digital stereo & Camcorder
• Headphones of High quality 5. SUGGESTED SOFTWARE: The software consisting of the prescribed topics elaborated above should be procured and used.
• Oxford Advanced Learner's Compass, 7th Edition
• DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
• Lingua TOEFL CBT Insider, by Dream tech
• TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

Text Books:
1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2 nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

Reference Books:
1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and
    Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
 4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.

Course Outcomes:

After completion of the course, students will be able to:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the nuances of language through audio- visual experience and group activities.	Understand
CO2	Hone the accent for intelligibility	Understand
CO3	Realize the importance of listening skills and speaking skills and their application in real life situations.	Understand
CO4	Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.	Understand
CO5	Speak with clarity and confidence; thereby enhance employability skills of the students.	Understand

COS	CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1				1		1	2	2		1			
CO2										1		1			
CO3						1		1	2		2				
CO4								1	1	2		2			
CO5										2		2			

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C6626	**Machine Learning Lab**	L	T	P
Credits: 1		-	-	2

COURSE OBJECTIVES:

This course provides the students a broad introduction to python programming, machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance-based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.

LIST OF PROGRAMS:

1. Install python and useful packages and load the sample dataset to understand, and visualize
2. Implementation of Simple Linear Regression using Python
3. Implementation of Multivariate Linear Regression using Python
4. Implementation of Simple Logistic Regression and Multivariate Logistic Regression usingPython
5. Implementation of Decision Trees using Python
6. Implementation of any 3 Classification Algorithms using Python
7. Implementation of Random Forests Algorithm using Python
8. Implementation of K-Means, KNN Algorithms using Python
9. Implementation of SVM On Any Applicable Datasets using Python
10. Implementation of Neural Networks using Python
11. Implementation of PCA using Python
12. Implementation of Anomaly Detection and Recommendation using Python

REFERENCES

1. Machine Learning with Python/Scikit-Learn, - Application to the Estimation of Occupancy andHuman Activities, pp. 1-103

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Apply Machine Learning approaches for a given Problem	Understand
CO2	Analyze and identify the need for machine learning techniques for a particular domain	Understand
CO3	Develop the real time applications and predict its outcomes using machine learning algorithms	Analyze

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															

PROFESSIONAL ELECTIVE-III LAB

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C00P1	**Industrial Oriented Mini Project/ Internship /**	**L**	**T**	**P**
Credits: 2	**Skill Development Course (Big Data Spark)**	**2**	**-**	**-**

Prerequisites: NIL
Course Objectives:
Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aims to shorten the software development lifecycle to provide continuous delivery with high-quality.

 List of Experiments:
 1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code in exercise
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application for exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

 Text Books:
1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

Reference Books:
 1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley.

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C00M4	**Quantitative Aptitude &Verbal Reasoning-II**	**L**	**T**	**P**
Credits: Nil		2	-	-

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C00M3	Intellectual Property Rights	L	T	P
Credits: - Nil		2	-	-

Prerequisites: None

CourseObjectives:
- Significanceofintellectualpropertyanditsprotection
- Introducevariousformsofintellectualproperty

CourseOutcomes:
- DistinguishandExplainvariousformsofIPRs.
- Identifycriteriatofitone'sownintellectualworkinparticularformofIPRs.
- ApplystatutoryprovisionstoprotectparticularformsofIPRs.
- AppraisenewdevelopmentsinIPRlawsatnationalandinternationallevel

UNIT–I
IntroductiontoIntellectualProperty:Introduction,typesofintellectualproperty,internationalorganizations,agenciesandtreaties,importance of intellectualpropertyrights.

UNIT–II
TradeMarks:Purposeandfunctionoftrademarks,acquisitionoftrademarkrights,protectablematter,selecting, andevaluatingtrademark, trade markregistration processes.

UNIT–III
Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rightsto perform the work publicly, copyright ownership issues, copyright registration, notice of copyright,Internationalcopyrightlaw.
Lawofpatents:Foundationofpatentlaw,patentsearchingprocess,ownershiprightsandtransfer

UNIT–IV
Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations oftradesecrets,protectionforsubmission,and tradesecretlitigation.
Unfaircompetition:Misappropriationrightofpublicity,falseadvertising.

UNIT–V
New development of intellectual property: new developments in trademark law; copyright law, patentlaw,intellectualpropertyaudits.
International overview on intellectual property, international – trademark law, copyright law, internationalpatentlaw,andinternationaldevelopmentintradesecrets law.

TEXTBOOK:
1. Intellectualpropertyright,Deborah.E.Bouchoux,Cengagelearning.

REFERENCEBOOK:

**1.Intellectualpropertyright–
Unleashingtheknowledgeeconomy,prabuddhaganguli,TataMcGraw HillPublishing
companyltd.**

Text Book:
1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

Reference Book:
1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Distinguish and Explain various forms of IPRs.	Understand
CO2	Identify criteria to fit one's own intellectual work in particular form of IPRs.	Analyze
CO3	Apply statutory provisions to protect particular form of IPRs.	Apply
CO4	Appraise new developments in IPR laws at national and international level	Apply

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0H09	**Organizational Behavior**	**L**	**T**	**P**
Credits:3		3	-	-

Prerequisites: NIL

Course Objectives:

- This course demonstrates individual, group behavior aspects: The dynamics of organizational climate, structure and its impact on Organizations.

Module–I: [10 Periods]
Organizational Behaviour Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models.

Module–II: [10 Periods]
Individual Behaviour Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification, Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

Module–III: [10 Periods]
Group Behaviour Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

Module–IV: [10 Periods]
Leadership and Power Meaning – Importance – Leadership styles – Theories of leadership – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

Module–V: [10 Periods]
Dynamics of Organizational Behaviour Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness

Text Books:
1. Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organisational Behavior, McGraw Hill, 11th Edition, 2001.

Reference Books:
1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9 th Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education, 2004.

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C1212	Information Security	L	T	P
Credits:3		3	-	-

Prerequisites: Computer Networks and Mathematics

Course Objectives

• To understand the fundamentals of Cryptography

• To understand various key distribution and management schemes

• To understand how to deploy encryption techniques to secure data in transit across data networks

• To apply algorithms used for secure transactions in real world applications

Module–I: **[10 Periods]**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security Classical Encryption Techniques: DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

Module–II: **[10 Periods]**

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. Message authentication and Hash Functions: Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

Module–III: **[10 Periods]**

Digital Signatures: Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service. Email Security: Pretty Good Privacy (PGP) and S/MIME.

Module–IV: **[10 Periods]**

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Module–V: **[10 Periods]**

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

Text Book:

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

Reference Books:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

2. Principles of Information Security, Whitman, Thomson.

COURSE OUTCOMES:

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Analyze various security service mechanisms.	Analyze
CO2	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to various attacks.	Analyze
CO3	Apply cryptographic techniques in real time applications	Apply
CO4	Formulate web security services and mechanisms.	Analyze
CO5	Distinguish SSL, TLS and its applications	Analyze

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	-	-	-	-		-	-	-	1	2	1	1
CO2	3	3	1	1	-	-	-	-	-	-	-	1	3	2	-
CO3	3	1	1	1	-	-	-	-	-	-	-	1	3	2	-
CO4	3	3	1	1	-	-	-	-	-	-	-	1	2	2	1
CO5	3	3	1	1	-	-	-	-	-	-	-	1	3	2	-

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0544	Cloud Computing	L	T	P
Credits:3		3	-	-

Pre-requisites: Computer Networks & "Operating System".

Course Objectives:
• This course provides an insight into cloud computing.
• Topics covered include- Cloud Computing Architecture, Deployment Models, Service Models, Technological Drivers for Cloud Computing, Networking for Cloud Computing and Security in Cloud Computing.

Module–I: **[10 Periods]**
Computing Paradigms, Cloud Computing Fundamentals, Cloud Computing Architecture and Management

Module–II: **[10 Periods]**
Cloud Deployment Models, Cloud Service Models, Technological Drivers for Cloud Computing: SOA and Cloud, Multicore Technology, Web 2.0 and Web 3.0, Pervasive Computing, Operating System, Application Environment

Module–III: **[10 Periods]**
Virtualization, Programming Models for Cloud Computing: MapReduce, Cloud Haskell, Software Development in Cloud

Module–IV: **[10 Periods]**
Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, Cloud Service Providers

Module–V: **[10 Periods]**
Security in Cloud Computing, and Advanced Concepts in Cloud Computing

Text Book:
1. Chandrasekaran, K. Essentials of cloud computing. CRC Press, 2014

Reference Books:
1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

COURSE OUTCOMES:

CO	Statement	Blooms Taxanomy Level
CO1	Understand the cloud enabling technologies and the Cloud service models.	Understand
CO2	Choose the levels of virtualization and tools for resource provisioning.	Apply
CO3	Compare the cloud platform architectures of virtualized data centers and Inter- cloud Resource Management.	Apply
CO4	Analyze the principles of Security and Trust management to protect confidentiality of data in the Cloud.	Analyze
CO5	Propose the standards of Parallel and Distributed Programming Paradigms for improving user Access to Cloud Computing.	Analyze

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes(POs)**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				2							
CO2		1		2	2							1
CO3		1			3							2
CO4	1											2
CO5	1			2								1

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C7320	Semantic Web	L	T	P
Credits:3	[Professional Elective-IV]	3	-	-

Prerequisites: NIL

Course Objectives:
- Introduce Semantic Web Vision and learn Web intelligence
- Understanding about XML, RDF, RDFS, OWL
- Querying Ontology and Ontology Reasoning
- To learn Semantic Web Applications, Services and Technology
- To learn Knowledge Representation for the Semantic Web

Module–I: **Introduction:**   **[09 Periods]**
Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

Module–II: **Web Services:**   **[09 Periods]**
Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

Module–III: **Resource Description Framework:**   **[10 Periods]**
Features, Capturing Knowledge with RDF. XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

Module–IV: **Taxonomies and Ontologies:**   **[09 Periods]**
Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

Module–V: **Semantic Web Application:**   **[10 Periods]**
Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base. Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle

Text Books:
1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.
2. Peter Mika, Social Networks and the Semantic Web, Springer

Reference Books:
1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley Interscience

2. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Develop web applications using semantic techniques.	Apply
CO2	Relate knowledge representation methods for semantic web.	Analyze
CO3	Explain the key aspects of ontology engineering.	Understand
CO4	Design web services and its applications.	Apply
CO5	Analyze and build a social network	Analyze

CO- PO-PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1	1	-	-	1	-	-	-	-	-	-	-	-	-
CO2	2	-	2	1	-	1	-	-	-	-	-	-	-	-	-
CO3	2	-	3	1	1	2	-	-	-	-	-	-	-	-	-
CO4	1	-	3	1	1	2	-	-	-	-	-	-	-	-	-
CO5	1	-	2	1	1	1	-	-	-	-	-	-	-	-	-

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C1213	**High Performance Computing**	L	T	P
Credits:3	**[Professional Elective-IV]**	3	-	-

Pre-requisites:
Operating System, Computer Organization and Architecture

Course Objectives
- Understand High Performance Computing (HPC) system architectures and various computational models.
- Learn basics of CUDA programming.
- Apply parallel execution models and methodologies for parallel programming and parallel applications development.
- Design and implement compute intensive applications on HPC platform.

Module-I : Parallel Programming & Computing – Introduction   [08 Periods]
Era of Computing, Parallel Computing, Multiprocessors and Multicomputer Architectures, Scalar VS Vector Processing, Multivector and Superscalar Machines, Pipelined Processors, SIMD Computers, Conditions of parallelism, Program flow mechanisms, Types of Parallelism – ILP, PLP, LLP, Program Partitioning and scheduling.

Module-II : Introduction to High Performance Computing   [07 Periods]
Era of Computing, Scalable Parallel Computer Architectures, towards low-cost computing, Network of Workstations project by Berkeley, Cluster Computing Architecture, Components, Cluster Middleware and SSI, Need of Resource Management and Scheduling, Programming Environments

Module-III: Cluster Computing   [08 Periods]
Clustering Models, Clustering Architectures, Clustering Architectures key factors, types of clusters, Mission critical Vs Business Critical Applications, Fault Detection and Masking Algorithms, Check pointing, Heartbeats, Watchdog Timers, Fault recovery through Failover and Failback Concepts

Module-IV : High Speed Networks & Message Passing   [07 Periods]
Introduction to High-Speed Networks, Lightweight Messaging Systems, Xpress Transport Protocol, Software RAID and Parallel File systems, Load Balancing Over Networks – Algorithms and Applications, Job Scheduling approaches and Resource Management in Cluster

Module-V: CUDA Programming: [08 Periods]
Introduction to CUDA architecture for parallel processing, CUDA Parallelism Model, Foundations of Shared Memory, Introduction to CUDA-C, Parallel programming in CUDA-C, Thread Cooperation and Execution Efficiency, Constants memory and events, memory management, CUDA C on multiple GPUs, Hashing and Natural Parallelism, Scheduling and Work Distribution, Atomics, Barriers and Progress, Transactional Memory

Text Books
1.Rajkumar, High Performance Cluster Computing: Architectures and Systems, Vol. 1 Pearson Education
2.Georg Hager and Gerhard Wellein, Introduction to High Performance Computing for Scientists and Engineers, CRC Press
Reference Books

1.Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw Hill International Editions

CO	Statement	Blooms Taxonomy Level
CO1	Understand High Performance Computing (HPC) system architectures and various computational models.	Understand
CO2	Learn basics of CUDA programming.	Understand
CO3	Apply parallel execution models and methodologies for parallel programming and parallel applications development.	Apply
CO4	Design and implement compute intensive applications on HPC platform.	Apply

	Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	3	2	2	1	2	3	2	3
CO2	2	2	3	2	2	2	3	2	3	2	2	2
CO3	2	3	3	3	2	2	3	2	2	2	2	2
CO4	3	3	2	2	2	3	3	2	3	3	3	3

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0536	**Software Testing Methodologies**	**L**	**T**	**P**
Credits:3	**[Professional Elective-IV]**	**3**	**-**	**-**

Prerequisites
1. Software Engineering

Course Objectives
• To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
• To develop skills in software test automation and management using the latest tools.

Module–I Introduction: [09 Periods]
Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

Module–II Transaction Flow Testing: [10 Periods]
transaction flows, transaction flow testing techniques. Data Flow testing: Basics of data flow testing, strategies in data flow testing, application of data flow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

Module–III Paths, Path products and Regular expressions: [10 Periods]
path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

Module–IV [09 Periods]
State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

Module–V [10 Periods]
Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like Jmeter/selenium/soapUI/Catalon).

Text Books:
1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

Reference Books:
1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

COURSE OUTCOMES:

Course Outcomes:

At the end of the course, students will be able to

CO	Statement	Blooms Taxanomy Level
CO1	Understand purpose of testing and path testing	Understand
CO2	Understand strategies in data flow testing and domain testing	Understand
CO3	Develop logic-based test strategies	Apply
CO4	Understand graph matrices and its applications	Understand
CO5	Implement test cases using any testing automation tool	Apply

CO-PO,PSO Mapping (3/2/1 Indicates Strength Of Correlation) 3-Strong, 2-Medium, 1-Weak															
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO-1	-	-	-	-	-	-	-	-	3	3	-	-	3	-	3
CO-2	2	3	-	-	-	-	-	-	-	3	-	-	3	2	-
CO-3	-	-	3	3	-	-	-	-	-	2	-	-	-	3	-
CO-4	-	-	-	2	3	-	-	-	-	-	-	-	2	-	-
CO-5	-	-	-	-	-	2	3	3	-	-	-	-	3	3	-

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0544	Advanced Operating Systems	L	T	P
Credits:3	[Professional Elective-IV]	3	-	-

Prerequisites: Operating System

Course Objectives

- To study, learn, and understand the main concepts of advanced operating systems (parallel

processing systems, distributed systems, real time systems, network operating systems, and open source operating systems)

- Hardware and software features that support these systems.

MODULE - I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives.

Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

MODULE - II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token –

Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm,

Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

MODULE - III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

MODULE - IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling.

Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

MODULE - V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration

Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOK:

1. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata McGraw-Hill Edition 2001

REFERENCE BOOK:

1. Distributed Systems: Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall, Edition – 2, 2007

Course Outcomes

CO	Statement	Blooms Taxonomy Level
CO1	Understand the design approaches of advanced operating systems	Understand
CO2	Analyze the design issues of distributed operating systems.	Analyze
CO3	Evaluate design issues of multi processor operating systems.	Apply
CO4	Identify the requirements Distributed File System and Distributed Shared Memory.	Analyze
CO5	Formulate the solutions to schedule the real time applications.	Apply

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0547	**Adhoc & Sensor Networks**	**L**	**T**	**P**
Credits:3	**[Professional Elective-IV]**	**3**	**-**	**-**

Prerequisites
- Computer Networks
- Distributed Systems
- Mobile Computing

Course Objectives
- To understand the challenges of routing in ad-hoc and sensor networks
- To understand various broadcast, mutlicast and geocasting protocols in ad hoc and sensor networks
- To understand basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN

Module–I   **[10 Periods]**
Introduction to Ad Hoc Networks Characteristics of MANETs, Applications of MANETs and Challenges of MANETs. Routing in MANETs Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; Position- based routing algorithmsLocation Services-DREAM, Quorum-based, GLS; Forwarding Strategies, Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

Module–II   **[10 Periods]**
Data Transmission Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Areabased Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

Module–III   **[09 Periods]**
Geocasting Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

Module–IV   **[10 Periods]**
Basics of Wireless Sensors and Lower Layer Issues-Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

Module–V   **[10 Periods]**
Upper Layer Issues of WSN Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

Text Books

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P.Aggarwal, World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

Reference Books:
1. C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.

COURSE OUTCOMES:

CO	Statement	Blooms Taxanomy Level
CO1	Understand the concepts of sensor networks and applications	Understand
CO2	Understand and compare the MAC and routing protocols for adhoc networks	Understand
CO3	Understand the transport protocols of sensor networks	Understand

COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

OPEN ELECTIVE – II

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0560	**Cloud Computing Lab**	**L**	**T**	**P**
Credits:2		-	-	2

Prerequisites :Nil

Course Objectives:
- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service oriented architectures, cloud programming and software environments, resource management.

List of Experiments:
1. Install Virtualbox/VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Create an Amazon EC2 instance and set up a web-server on the instance and associate an IP address with the instance.
4. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like word count.
9. Create a database instance in the cloud using Amazon RDS.
10. Create a database instance in the cloud using Google Cloud SQL

Text Book:
1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

Reference Books:
1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand various service types, delivery models and technologies of a cloud computing environment.	Understand
CO2	Understand the ways in which the cloud can be programmed and deployed.	Understand
CO3	Understand cloud service providers like Cloudsim, Globus Toolkit etc.	Understand
CO4	Examine various programming paradigms suitable to solve real world and scientific problems using cloud services.	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOS**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1															
CO2															
CO3															
CO4															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C00P2	**Project Stage-I**	**L**	**T**	**P**
Credits:3		-	-	6

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C1215	**Intrusion Detection Systems**	L	T	P
Credits:3		3	-	-

Prerequisites: Computer Networks, Computer Programming

Course Objectives:

1. Compare alternative tools and approaches for Intrusion Detection through quantitative analysis to determine the best tool or approach to reduce risk from intrusion.

2. Identify and describe the parts of all intrusion detection systems and characterize new and emerging IDS technologies according to the basic capabilities all intrusion detection systems share.

MODULE – I   **[8 Periods]**

The state of threats against computers, and networked systems-Overview of computer security solutions and why they fail-Vulnerability assessment, firewalls, VPN's -Overview of Intrusion Detection and Intrusion Prevention, Network and Host-based IDS.

MODULE – II   **[9 Periods]**

Classes of attacks - Network layer: scans, denial of service, penetration Application layer: software exploits, code injection-Human layer: identity theft, root access-Classes of attackers-Kids/hackers/sop Hesitated groups-Automated: Drones, Worms, Viruses.

MODULE – III   **[9 Periods]**

A General IDS model and taxonomy, Signature-based Solutions, Snort, Snort rules, Evaluation of IDS, Cost sensitive IDS.

MODULE – IV   **[9 Periods]**

Anomaly Detection Systems and Algorithms-Network Behavior Based Anomaly Detectors (ratebased)-Host-based Anomaly Detectors-Software Vulnerabilities-State transition, Immunology, Payload Anomaly Detection

MODULE – V   **[8 Periods]**

Attack trees and Correlation of alerts- Autopsy of Worms and Botnets-Malware detection - Obfuscation, polymorphism- Document vectors. Email/IM security issues-Viruses/Spam-From signatures to thumbprints to zero-day detection-Insider Threat issues-Taxonomy-Masquerade and Impersonation Traitors, Decoys and Deception-Future:Collaborative Security

TEXT BOOKS:

1. Peter Szor, The Art of Computer Virus Research and Defense, Symantec Press ISBN 0-321-30545-3.

2. Markus Jakobsson and Zulfikar Ramzan, Crimeware, Understanding New Attacks and Defenses.

REFERENCE BOOKS:

1. Saiful Hasan, Intrusion Detection System, Kindle Edition.

2. Ankit Fadia, Intrusion Alert: An Ethical Hacking Guide to Intrusion Detection.

Online Websites/Materials:

1. https://www.intechopen.com/books/intrusion-detection-systems/

Online Courses:

1. https://www.sans.org/course/intrusion-detection-in-depth

2. https://www.cybrary.it/skill-certification-course/ids-ips-certification-training-course

Course Outcomes: After completion of the course, students will be able to:

CO	Statement	Blooms Taxonomy Level
CO1	Understand what vulnerability is and how to address most common vulnerabilities.	Understand
CO2	Know basic and fundamental risk management principles as it relates to Cyber Security and Mobile Computing.	Understand
CO3	Have the knowledge needed to practice safer computing and safeguard your information Using Digital Forensics.	Understand
CO4	Understand basic technical controls in use today, such as firewalls and Intrusion Detection systems.	Understand
CO5	Understand legal perspectives of Cyber Crimes and Cyber Security.	Understand

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C1216	**Real Time Systems**	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course objectives:
This is a course on the design and applications of all real time aspects of various system components, like OS, memory, communication and an introduction to reliability evaluation methods. This is a course on the design and applications of all real time aspects of various system components, like OS, memory, communication and an introduction to reliability evaluation methods.

UNIT I - Introduction To Task Scheduling   [9 Periods]
Introduction - Issues in Real Time Computing, Structure of a Real Time System, Task classes,
Performance Measures for Real time Systems, Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms, RM algorithm with different cases-Priority ceiling precedence constraints- using of primary and alternative tasks.

UNIT II - Uni And Multi Processor Scheduling   [9 Periods]
Uniprocessor scheduling of IRIS tasks, Task assignment, Utilization balancing – Next fit- Bin
packing- Myopic off-line - Focused addressing and bidding- Buddy strategy- Fault Tolerant Scheduling.-Aperiodic scheduling - Spring algorithm, Horn algorithm- Bratley. - Sporadic scheduling.

UNIT III - Real Time Communication   [9 Periods]
Introduction – VTCSMA – PB CSMA- Deterministic collision resolution protocol- DCR for multipacket messages- dynamic planning based- Communication with periodic and aperiodic messages.

UNIT IV - Real Time Databases   [9 Periods]
Basic Definition, Real time Vs General purpose databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Twophase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time System.

UNIT V - Real-Time Modeling And Case Studies   [9 Periods]
Petrinets and applications in real-time modeling, Air traffic controller system – Distributed air
defense system.

Preferences
1. C.M. Krishna, Kang G. Shin, "Real Time Systems", Tata McGraw - Hil, 2010.
2. Giorgio C. Buttazzo , "Hard real-time computing systems: predictable scheduling
algorithms and applications" , Springer, 2008.
3. C. Siva Ram Murthy, G. Manimaran, "Resource management in real-time systems and
networks", PHI, 2009.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Study the basic of tasks and scheduling	Understand
CO2	Understand programming languages and databases	Understand
CO3	Analyze real time communication	Analyze
CO4	Analyze evaluation techniques and reliability models for Hardware Redundancy	Analyze
CO5	Understand clock synchronization	Understand

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C6610	**Deep Learning**	**L**	**T**	**P**
Credits:3		**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:

• To understand deep Learning algorithms and their applications in real-world data

Module–I: **Machine Learning Basics**   **[10 Periods]**

Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning Deep Feedforward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

Module–II: **Regularization for Deep Learning**   **[10 Periods]**

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and UnderConstrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, MultiTask Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier, Optimization for Training Deep Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates

Module–III: **Convolutional Networks**   **[10 Periods]**

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features

Module–IV: **Recurrent and Recursive Nets**   **[10 Periods]**

Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for LongTerm Dependencies, Explicit Memory

Module–V: **Practical Methodology**   **[10 Periods]**

Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition

Applications:

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

Text Book:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.

 Reference Books:
1. The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3. Bishop. C.M., Pattern Recognition and Machine Learning, Springer, 2006.
4. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
5. Golub, G.,H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.
6. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand machine learning basics and neural networks	Understand
CO2	Understand optimal usage of data for training deep models	Understand
CO3	Apply CNN and RNN models for real-world data	Apply
CO4	Evaluate deep models	Analyze
CO5	Develop deep models for real-world problems	Create

Co-Po Mapping (3/2/1 Indicates Strength Of Correlation) 3-Strong, 2-Medium, 1-Weak														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3	2	-	1	1	-	-	1	1	-	3	2	3	-
CO-2	3	3	3	2	2	2	-	-	1	2	-	3	2	3	-
CO-3	3	3	3	1	2	2	-	1	2	2	1	3	2	3	2
CO-4	3	3	3	1	2	2	-	1	2	2	1	3	2	3	2
CO-5	3	3	3	-	2	2	-	1`	2	2	1	3	2	3	2

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0558	**Human Computer Interaction**	**L**	**T**	**P**
Credits:3		3	-	-

Course Objectives:

To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing; become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans.

MODULE – I   **[09 Periods]**

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

MODULE – II   **[09 Periods]**

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

MODULE – III   **[09 Periods]**

Windows – New and Navigation schemes selection of window, selection of devices based and screenbased controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

MODULE – IV   **[09 Periods]**

HCI in the software process, The software life cycle Usability engineering Iterative design and

prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

MODULE – V   **[09 Periods]**

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus:

Getting the size right.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2, 3

2. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg,

Pearson Education Units 4,5

REFERENCE BOOKS:

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen , Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Ability to apply HCI and principles to interaction design.	Understand
CO2	Ability to design certain tools for blind or PH people.	Understand

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0550	Software Process & Project Management	L	T	P
Credits:3		3	-	-

COURSE OBJECTIVE:

It gives an in-depth knowledge of software project management and project planning. It also coversthe Step Wise framework in project planning.

Module-I: Introduction to Software Project Management [10 Periods]

Software engineering problem and software product, software product attributes, Definition of aSoftware Project (SP), SP Vs. other types of project's activities covered by SPM, categorizing SPs,Project management cycle, SPM framework, types of project plan.

Module-II: Activity Planning and Scheduling [9 Periods]

Objectives of activity planning, Work breakdown structure, Bar chart, Network planning model:Critical path method (CPM), Program evaluation and review technique (PERT), Precedence diagramming method (PDM), Shortening project duration, Identifying critical activities.

Module-III: Resource Allocation [9 Periods]

Identifying resource requirements, resource allocation, resource smoothening and resourcebalancing.

Monitoring and control

Introduction, collecting data, visualizing progress, cost monitoring, earned value analysis, projectcontrol

Module-IV: Managing Contracts and People [9 Periods]

Introduction, types of contracts, stages in contract, placement, typical terms of a contract, contract management, acceptance, managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises.

Module-V: Software Quality Assurance and Testing [10 Periods]

Testing principles and objectives, test plan, types and levels of testing, test strategies, program verification and validation, software quality, SEI-CMM, SQA activities, QA organization structure,SQA plan.

RECOMMENDED BOOKS

1. Bob Hughes and Mike Cotterell, Software Project Management, Tata McGraw Hill, (2009)
2. Roger Pressman, A practitioner's Guide to Software Engineering, Tata McGraw Hill, (2014)
3. Head First PMP: A Brain Friendly Guide to Passing the Project Management Professional Exam(2013)

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Apply the basics of Software Project Management in order to manage and deliver qualifiedproduct	Analyze
CO2	Identify the Problem Effectively and Efficiently with proper documentation for the use indifferent software teams and organization.	Create
CO3	Comprehend and be able to carry on Technical as well as Cost Benefit Analysis and plan theactivities within time schedules with CPM and PERT Analysis.	Analyze
CO4	Competent to design Communication Plans, Procurement of Resources and Human ResourceManagement.	Evaluate
CO5	Perform Software Quality Assurance, Testing and Configuration Management effectively	Analyze

	CO- PO Mapping															
	Programme Outcomes (POs)												PSOs		
COs	**PO1**	**PO**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1					1					2		2			
CO2										1		2			
CO3		1		1						2		2			
CO4					1	1			1	2		2			
CO5				1	1				1	2		2			

Prerequisites:

• Data structures and compiler design

Course Objectives:

• Introduction to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Module–I: Finding the Structure of Words   **[09 Periods]**

Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

Module–II: Syntax I   **[09 Periods]**

Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

Module–III: Syntax II   **[09 Periods]**

Models for Ambiguity Resolution in Parsing, Multilingual Issues Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

Module–IV: Semantic Parsing II   **[09 Periods]**

Predicate-Argument Structure, Meaning Representation Systems

Module–V: Language Modeling   **[09 Periods]**

Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

Text Books:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication

Reference Book:

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson Publications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.	Understand

CO2	Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems	Understand
CO3	Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.	Understand
CO4	Able to design, implement, and analyze NLP algorithms; and design different language modeling Techniques.	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes(POs)												PSOS		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															

Prerequisite: Data Structure and Algorithm, Operating System, Computer Network

COURSE OBJECTIVES:

A distributed system is a system whose components are located on different networked computers, which communicate and coordinate their actions by passing messages to one another. The components interact with one another in order to achieve a common goal. Three significant characteristics of distributed systems are: concurrency of components, lack of a global clock, and independent failure of components. From this course, students may learn foundations of distributed systems, idea of peer to peer services and file system, and security issues in distributed system.

Module-I:Introduction [09 Periods]

Fundamentals of Distributed System: Definition of a Distributed System, Goals of a DistributedSystem, Types of Distributed Systems, Basics of Operating System and Networking.
Basics of Architectures, Processes, and Communication: **Architectures**-Types of System Architectures, Self Management in Distributed Systems; **Processes**-Basics of Threads, Virtualization, Roles of Client and Server, Code Migration; **Communication**-Types of Communications, Remote Procedure Calls, Message-Oriented Communication, Stream-Oriented Communication, Multicasting

Module-II: Naming, Synchronization Naming: [09 Periods]
Names, Identifiers, and Addresses, Flat Naming, Structured Naming, Attribute BasedNaming
Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning OfNodes, Election Algorithms.

Module-III: Consistency, Replication and Fault Tolerance [10 Periods]
Introduction to Replication, Data Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols, Basics of Fault Tolerance, Process Resilience, ReliableClient Server Communication, Reliable Group Communication, Distributed Commit, Recovery **Module-IV: Security** [10 Periods]
Introduction to Security- Security Threats, Policies, and Mechanisms, Design Issues, Basics of Cryptography, Secure Channels- Authentication, Message Integrity and Confidentiality, Secure Group Communication; Access Control- General Issues in Access Control, Firewalls, Secure Mobile Code, Denial of Service; Security Management-Key Management, Secure Group Management, Authorization Management.

Module-V: Categories of Distributed System [09 Periods]
Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security: Distributed Object-based System; Distributed File System; Distributed Web-based System; Distributed Coordination based System

TEXT BOOKS:

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design",3rd Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, "Principles and

Pardigms", PearsonEducation, 2002.

REFERENCES:

1. Sape Mullender, "Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", springer, Verlag,1994.
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.

E- REFERENCES

1. http://www.gecg.in/papers/ds5thedn.pdf
2. https://cs.uwaterloo.ca/~bernard/courses/cs454/0.Begin.pdf
3. https://www.cs.helsinki.fi/u/jakangas/Teaching/DistSys/DistSys-08f-1.pdf
4. https://courses.cs.ut.ee/MTAT.08.009/2014_fall/uploads/Main/slides10-2.pdf

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Structuring distributed applications: using client-server and remote procedure calls	Understand
CO2	Learns inter process communication and distributed objects	Analyze
CO3	Design Cryptographic Algorithms and security issues for distributed systems	Analyze
CO4	Assess distributed file systems	Apply
CO5	Ordering of events: using logical and physical clocks	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3		3								3	1	
CO2	1	3		2									2	1	
CO3			3	2	3				3				2	3	
CO4	2	3											2		
CO5	2	2			2								3		

Prerequisite: Nil

Course Objectives:
• Provide a foundation to the fast growing field of AR and make the students aware of the various AR concepts.
• To give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

Module–I: Introduction to Augmented Reality: [10 Periods]
Augmented Reality - Defining augmented reality, history of augmented reality, Examples, Related fields Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial Display Model, Visual Displays Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors

Module–II: Computer Vision for Augmented Reality: [10 Periods]
Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Outdoor Tracking. Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on Real Surfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction Software Architectures: AR Application Requirements, Software Engineering Requirements, Distributed Object Systems, Dataflow, Scene Graphs

Module–III: Introduction to Virtual Reality: [10 Periods]
Defining Virtual Reality, History of VR, Human Physiology and Perception The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, The Human Eye, Cameras, Displays

Module–IV: The Physiology of Human Vision: [10 Periods]
From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color Visual Rendering: Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

Module–V: Motion in Real and Virtual Worlds: [10 Periods]
Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Interaction: Motor Programs and Remapping, Locomotion, Social Interaction R22 B.Tech. IT Syllabus JNTU Hyderabad Page 148 of 154 Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering

Text Books:

1. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India;First edition (12 October 2016),ISBN-10: 9332578494
 2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

Reference Books:
1. Allan Fowler-AR Development‖, 1st Edition, A press Publications, 2018, ISBN 978-1484236178
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381
5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0 6. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Describe how AR systems work and list the applications of AR.	Understand
CO2	Understand the software architectures of AR.	Understand
CO3	Understand the Visual perception and rendering in VR	Understand
CO4	Understand the interaction, auditory perception and rendering in VR	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOS**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1															
CO2															
CO3															
CO4															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C7320	**Web Security**	**L**	**T**	**P**
Credits:3	**[Professional Elective-VI]**	**3**	**-**	**-**

Prerequisites :Nil

Course Objectives:
- Give an Overview of information security
- Give an overview of Access control of relational databases

Module–I [10 Periods]
The Web Security, The Web Security Problem, Risk Analysis and Best Practices Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification

Module–II [10 Periods]
The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications

Module–III Database Security: [10 Periods]
Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems

Module–IV Security Re-engineering for Databases: [10 Periods]
Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and

Module–V Future Trends Privacy in Database Publishing: [10 Periods]
A Bayesian Perspective, Privacy-enhanced Location Based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment

Text Books:
1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia

COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Understand the Web architecture and applications	Understand
CO2	Understand client side and service side programming	Understand
CO3	Understand how common mistakes can be bypassed and exploit the application	Understand
CO4	Identify common application vulnerabilities	Understand

COs	CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0548	Blockchain Technology	L	T	P
Credits:3	[Professional Elective-VI]	3	-	-

PREREQUISITES: NIL

COURSE OBJECTIVES:

This course provides a broad overview of the essential concepts of blockchain technology – by initially exploring the Bitcoin protocol followed by the Ethereum protocol – to lay the foundation necessary for developing applications and programming.

1. To understand the history, types and applications of Blockchain
2. To acquire knowledge about cryptography and consensus algorithms.
3. Deploy projects using Web3j and design blockchain based applications.

Module I: Introduction to Blockchain   **[9 Periods]**

Distributed DBMS–Limitations of Distributed DBMS, Introduction to Block chain–History, Definition, Distributed Ledger, Blockchain Categories–Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.

Module II: Blockchain Architecture   **[9 Periods]**

Operation of Bitcoin Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET)

Module III: Blockchain-Based Futures System   **[8 Periods]**

Project presentation- Futures smart contract: Blockchain oracles- Web3j: Setting up the Web3J- Installing web3j- Wallet creation, Java client: The wrapper generator- Initializing web3j- Setting up Ethereum accounts- Deploying the contract

Module IV: Blockchain in Business and Creating ICO   **[10 Periods]**

Public versus private and permissioned versus permission less blockchains- Privacy and anonymity in Ethereum- Why are privacy and anonymity important? - The Ethereum Enterprise Alliance- Blockchain-as-a-Service- Initial Coin Offering (ICO): Project setup for ICO implementation- Token contracts- Token sale contracts-Contract security and testing the code

Module V: Distributed Storage IPFS and Swar   **[8 Periods]**

Ethereum Virtual Machine- Swarm and IPFS: Installing IPFS, Hosting our frontend: Serving your frontend using IFPS, Serving your frontend using Swarm, IPFS file uploader project: Project setup theweb page

TEXT BOOKS:

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained", 2nd Edition, Packt Publishing Ltd, March 2018.
2. Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, "Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger",

Packt Publishing Limited, 2018.

REFERENCE BOOKS:

1. Andreas M. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'ReillyMedia Inc, 2015
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.

E-REFERENCES:

1. https://www.velmie.com/practical-blockchain-study
2. https://www.udemy.com/course/build-your-blockchain-az/
3. https://blockchainhub.net/blockchains-and-distributed-ledger-technologies-in-general/
4. https://blog.todotnet.com/2019/03/solving-real-world-problems-with-distributed-ledger-technology/

COURSE OUTCOME:

CO	Statement	Blooms Taxonomy Level
CO1	Contentedly discuss and describe the history, types and applications of Blockchain	Understand
CO2	Gains familiarity with cryptography and Consensus algorithms.	Analyze
CO3	Create and deploy projects using Web3j.	Analyze
CO4	Implement an ICO on Ethereum	Apply
CO5	Design blockchain based application with Swarm and IPFS	Understand

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	1	1	-	-	1	1	-	3	2	3	-
CO2	3	3	3	2	2	2	-	-	1	2	-	3	2	3	-
CO3	3	3	3	1	2	2	-	1	2	2	1	3	2	3	2
CO4	3	3	3	1	2	2	-	1	2	2	1	3	2	3	2
CO5	3	3	3	-	2	2	-	1`	2	2	1	3	2	3	2

OPEN ELECTIVE – III

2022-23 Onwards (MR22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VIII Semester		
Code: C0P03	**Project Stage-II including Seminar**		**L**	**T**	**P**
Credits:9+2			-	-	22