ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2022-23 onwards

Course Structure and Syllabus
for
B.Tech. Computer Science and Engineering (CSE) Programme.
(MR22 Regulations – Effective from Academic Year 2022-23 onwards)

For

B.Tech. - Four Year Degree Programme

MALLA REDDY ENGINEERING COLLEGE

(An UGC Autonomous Institution, Approved by AICTE and Affiliated to JNTUH, Hyderabad)
Recognized under section 2(f) &12 (B) of UGC Act 1956, Accredited 3rd time by NAAC with 'A++' Grade, NIRF Rank Band 201-250, ARIIA Band Performer, NBA Tier-I Accredited (B.Tech.- CE, EEE, ME, ECE &CSE, M.Tech. - SE, EPS, TE)
Maisammaguda (H), Dhulapally (Post Via Kompally), Medchal - Malkajgiri District, Secunderabad– 500100.
Telangana State. e-mail: principal@mrec.ac.in, Website: www.mrec.ac.in

MALLA REDDY ENGINEERING COLLEGE

COURSE STRUCTURE – B.Tech. Computer Science and Engineering (CSE)Programme.

(MR22 Regulations - Effective from Academic Year 2022 – 23 onwards)

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

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

III SEMESTER MR22							
S. No	**Category**	**Course Code**	**Course Title**	**Contact hours/week**			**Credits**
				L	**T**	**P**	
1	PCC	C0507	Discrete Mathematics	3	-	-	3
2	PCC	C0508	Digital Logic Design	3	-	-	3
3	PCC	C0509	Computer Organization and Architecture	3	-	-	3
4	PCC	C0510	Data Structures	3	-	-	3
5	PCC	C0511	Object Oriented Programming through Java	3	-	-	3
6	PCC	C0512	Data Structures Lab	-	-	3	1.5
7	PCC	C0513	Object Oriented Programming through Java Lab	-	-	3	1.5
8	PCC	C0514	Data visualization- R Programming/ Power BI	-	1	2	2
9	MC	C00M2	Environmental Science	2	-	-	-
Total				**17**	**1**	**8**	**20**
Total Contact Hours				**26**			

IV SEMESTER MR22							
S. No	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
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 and Analysis of Algorithms	3	-	-	3
5	PCC	C0518	Software Engineering & Modeling	3	-	-	3
6	PCC	C0519	Database Management Systems Lab	-	-	2	1
7	PCC	C0520	Operating Systems Lab	-	-	2	1
8	PCC	C0521	Real-time Research Project/ Societal Related Project	-	-	2	1
9	PCC	C0522	Node JS/ React JS/ Django Lab			2	1
10	MC	C00M1	Gender Sensitization	-	-	**2**	-
Total				**16**	**-**	**10**	**20**
Total Contact Hours				**26**			

V SEMESTER							
S. No.	Category	Course Code	Name of the Course	Contact Hours / week			Credits
				L	T	P	
1	PCC	C0532	DevOps	3	-	-	3
2	PCC	C6201	Computer Networks	3	-	-	3
3	PCC	C6637	Artificial Intelligence	3	-	-	3
4	Professional Elective –I						
	PEC-I	C0523	Quantum Computing	3	-	-	3
		C0524	Advanced Computer Architecture				
		C6711	Data Analytics				
		C0525	Computer Graphics				
		C0526	Principles of Programming Languages				
5	Professional Elective –II						
	PEC-II	C0527	Image Processing	3	-	-	3
		C0528	Embedded Systems				
		C1222	Information Retrieval Systems				
		C0529	Distributed Databases				
		C6611	Natural Language Processing				
6	PCC	C6202	Computer Networks Lab	-	-	2	1
7	PCC	C6638	Artificial Intelligence Lab	-	-	4	2
8	PCC	C0530	UI design- Flutter	-	-	2	1
9	PCC	C0537	DevOps Lab	-	-	2	1
10	MC	C00M3	Quantitative Aptitude and Verbal Reasoning - I	2	-	-	-
11	MC	C00M6	Intellectual Property Rights	3	-	-	-
Total				20	-	10	20
Total Contact Hours				30			

VI SEMESTER							
S. No.	Category	Course Code	Name of the Course	Contact Hours / week			Credits
				L	T	P	
1	HSMC	C0531	Formal Languages and Automata Theory	3	-	-	3
2	PCC	C6625	Machine Learning	3	-	-	3
3	HSMC	C0H08	Business Economics and Financial Analysis	3	-	-	3
4	Professional Elective -III						
	PEC-III	C0533	Full Stack Development	3	-	-	3
		C6917	Internet of Things				
		C0534	Scripting Languages				
		C0535	Mobile Application Development				
		C0536	Software Testing Methodologies				
5	OEC-I		Open Elective-I	3	-	-	3
6	PCC	C6626	Machine Learning Lab	-	-	2	1
7	HSMC	C0H03	Advanced English Communication Skills Lab	-	-	2	1
8	Professional Elective-III Lab						
	PEC-III	C0538	Full Stack Development Lab	-	-	2	1
		C6918	Internet of Things Lab				
		C0539	Scripting Languages Lab				
		C0540	Mobile Application Development Lab				
		C0541	Software Testing Methodologies Lab				
9	PRJ	C00P1	Industrial Oriented Mini Project/ Internship/ Skill Development Course (Big data-Spark)	-	-	4	2
10	MC	C00M5	Constitution of India	3	-	-	-
11	MC	C00M4	Quantitative Aptitude and Verbal Reasoning – II	2	-	-	-
			Total	20	-	10	20
			Total Contact Hours	30			

[#] Courses in PE - III and PE - III Lab must be in 1-1 correspondence.

VII SEMESTER							
S. No.	Category	Course Code	Name of the Course	Contact Hours / week			Credits
				L	T	P	
1	PCC	C0542	Compiler Design	3	-	-	3
2	PCC	C6203	Cryptography and Network Security	3	-	-	3
3	Professional Elective -IV						
	PEC-IV	C0543	Graph Theory	3	-	-	3
		C0544	Advanced Operating Systems				
		C0545	Soft Computing				
		C0546	Cloud Computing				
		C0547	Ad hoc & Sensor Networks				
4	Professional Elective-V						
	PEC-V	C0548	Advanced Algorithms	3	-	-	3
		C0549	Agile Methodology				
		C0550	Blockchain Technology				
		C0551	Robotic Process Automation				
		C0552	Software Process & Project Management				
5	OEC-II		Open Elective-II	3	-	-	3
6	PCC	C6204	Cryptography and Network Security Lab	-	-	2	1
7	PCC	C0557	Compiler Design Lab	-	-	2	1
8	PRJ	C00P2	Project Stage - I	-	-	6	3
Total				1	2	1	20
Total Contact Hours				27			

VIII SEMESTER							
S. No.	Category	Course Code	Name of the Course	Contact Hours / week			Credits
				L	T	P	
1	HSMC	C0H09	Organizational Behavior	3	-	-	3
2	Professional Elective-VI						
	PEC-VI	C0558	Computational Complexity	3	-	-	3
		C6627	Deep Learning				
		C0559	Distributed Systems				
		C0560	Human Computer Interaction				
		C0561	Cyber Forensics				
3	OEC-III		Open Elective-III	3	-	-	3
4	PRJ	C00P3	Project Stage – II including Seminar	-	-	22	11
Total				9	-	22	20
Total Contact Hours				31			

Open Elective -1:

1	ESC	C0510	Data Structures	3	-	-	3
2	ESC	C0515	Database Management Systems	3	-	-	3
3	ESC	C0564	Relational Data Base Management Systems	3	-	-	3

Open Elective -2:

3	ESC	C0516	Operating Systems	3	-	-	3
4	ESC	C0518	Software Engineering & Modeling	3	-	-	3

Open Elective -3:

5	ESC	C0503	Algorithms Design and Analysis	3	-	-	3
6	ESC	C0505	Introduction to Computer Networks	3	-	-	3
7	ESC	C0563	Fundamentals of Python Programming	3	-	-	3

Other department offered PCCs:

1	PCC	C0562	Cloud Computing Lab	3	-	-	3
2	ESC	C0553	Basic Python Programming Lab	-	1	2	2
3	ESC	C0554	Fundamentals of Data Structures Lab	-	1	2	2
4	ESC	C0555	Object Oriented Programming Lab	-	1	2	2
5	ESC	C0556	Fundamentals of Database Management Systems Lab	-	1	2	2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0B01	Linear Algebra and Numerical Methods (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Matrices, Differentiation and Integration.

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; Moduleary 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; Singular Value Decomposition.

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.

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. Gauss seidel Iteration method.

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 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.

Numerical Integration: Trapezoidal Rule, Simpson's $1/3^{rd}$ Rule, Simpson's 3/8 Rule.

Course Outcomes:

1. The student will be able to find rank of a matrix and analyze solutions of system of linear equations.
2. The student will be able to 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.
3. The student will be able to find the root of a given equation by various methods.
4. The student will be able to estimate the value for the given data using interpolation.
5. The student will be able to find the numerical solutions for a given ODE's and evaluations of integrals using numerical techniques.

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,5^{th} Edition, PHI Learning Private Limited

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, Affiliated East–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=PLbMVogVj5nJRILpJJO7KrZa8Ttj4_ZAgl
   (Numerical Solution of ODE)
9. https://www.youtube.com/watch?v=hizXlwJO1Ck (Numerical Integration)

CO- PO Mapping

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0H01	ENGLISH (Common for All)	L	T	P
Credits: 3		3	-	-

Course Objectives: This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary,Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoreticaland practical components of the syllabus.

MODULE – I

Chapter entitled '***Toasted English*' by R.K.Narayan** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.

Poem: "Mother to Son" by Langston Hughes

*This poem is for internal evaluation purpose(s).

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents

MODULE – II

Chapter entitled **'ApproJRD' by Sudha Murthy** from ***"English: Language, Context and Culture"published*** by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement andSubject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events
– Classifying- Providing Examples or Evidence.

Module – III

Chapter entitled **'Lessons from Online Learning' by F.HaiderAlvi, Deborah Hurst et al** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.

Poem: "Father Returning Home" by Dilip Chitre

*This poem is for internal evaluation purpose(s).

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises forPractice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter ofRequisition, Email Etiquette, Job Application with CV/Resume.

MODULE – IV

Chapter entitled **'Art and Literature' by Abdul Kalam** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion - Précis Writing.

MODULE – V

Chapter entitled "After Twenty Years" by O' Henry

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (*Covering all the other aspects of grammar which were notcovered in the previous Modules*)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of ReportsFormats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report

Note: *Listening and Speaking Skills which are given under Module-6 in AICTE Model Curriculum are coveredin the syllabus of ELCS Lab Course.*

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note**: **2**. Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

Course Outcomes:

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

1. use written and spoken English considerably well for academic purposes.
2. communicate in Enrich accurately and fluently.

3. employ extensive and intensive reading skills.
4. gain confidence in writing for academic and real life situations.
5. use standard grammar, punctuation, and spelling in technical documents.

Course Outcomes: Students will be able to:

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
6. Acquire basic proficiency in reading and writing modules of English.

TEXTBOOK:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022.Print.

Reference Books:

1. MREC English Complementary Materials.
2. Effective Academic Writing by Liss and Davis (OUP)
3. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
4. Wood,F.T. (2007). Remedial English Grammar. Macmillan.
5. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language,Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
6. (2019). Technical Communication. Wiley India Pvt. Ltd.
7. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students.Mc Graw-Hill Education India Pvt. Ltd.
8. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

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.

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0201	Basic Electrical and Electronics Engineering (Common for All)	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 [09 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 [09 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: BJT and Junction Field Effect Transistor (JFET) [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.

Course Outcomes:

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

1. Apply basic laws in electrical circuit.
2. Analyze the single phase circuits
3. Comprehend the construction and Operation of DC and AC machines
4. Know the practical importance of Diode and its characteristics
5. Recognize the construction and operation of BJT and JFET

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. Mehtha 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", 3rd 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/

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	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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0501	Programming for Problem Solving (Common for All)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems

MODULE I: Introduction to Programming [10 Periods]

Compilers, compiling and executing a program.

Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode withexamples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.Command line arguments

MODULE II: Arrays, Strings, Structures and Pointers: [09 Periods]

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation) Enumerationdata type

MODULE III: Preprocessor and File handling in C: [10 Periods]

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell andrewind functions.

MODULE IV: Function and Dynamic Memory Allocation: [09 Periods]

Functions: Designing structured programs, Declaring a function, Signature of a function,

Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

MODULE V: Searching and Sorting: [10 Periods]

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs.

Outcomes:

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

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C programs.
3. To code and test a given logic in the C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs.
6. Searching and sorting problems

TEXTBOOKS

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

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

http://onlinevideolecture.com/ebooks/?subject=C-Programming**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	2	2	2				2	1	1	3	3	2	2
CO2	3	3	2	2	2				2	1	1	3	3	2	1
CO3	3	3	3	2	2				1			3	3	2	1
CO4	3	2	3	2	2				1		1	2	3	2	1
CO5	3	3	3	2	2				1	1	1	2	3	2	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0H02	English Language and Communication skills Lab (Common for All)	L	T	P
Credits: 1		-	-	3

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

COURSE OBJECTIVES:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportModuley for practice in speaking
- To improve the fluency of students in spoken English and neutralize the impact of dialects.
- To train students to use language appropriately for public speaking, group discussions and interviews

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
    - Role play – Individual/Group activities
    - Just A Minute (JAM) Sessions.

The following course content is prescribed for the **English Language and Communication**

Skills Lab.**Exercise – I**

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise –

II CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:

Understand: Group Discussion

Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

a. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration
ii) High Fidelity Headphones

b. 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. or LCD, a digital stereo –audio & video system and camcorder etc.

Source of Material (Master Copy):

- *Exercises in Spoken English. Part 1,2,3*. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10^{th} Edition.

- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

Course Outcomes: Students will be able to:

- Understand the nuances of English language through audio- visual experience and group activities
- Neutralise their accent for intelligibility
- Speak with clarity and confidence which in turn enhances their employability skills

Reference Books:

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* CengageLearning India Pvt. Ltd.
2. Shobha, KN&Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* CambridgeUniversity Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford UniversityPress
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* CambridgeUniversity Press

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/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf

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	1	3		3				1		1	2	2	1	
CO2	2	1	2		3							1	1		
CO3	2		2		2							3			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0202	Basic Electrical and Electronics Engineering Lab (Common for ALL)	L	T	P
Credits: 1		-	-	2

Prerequisites: NIL

Course Objectives:
To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyse 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. Analyze electrical circuits by applying basic laws
2. Analyze the performance of DC Motor, three phase Induction motor and transformer
3. Understand V-I Characteristics of various diodes
4. Design Different Rectifier Circuits
5. Differentiate the Transistors and their Operations

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				1		1	2	2	1	
CO2	2		2		3							1	1		
CO3	2		2		2							3			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0502	Programming for Problem Solving Lab (Common for ALL)	L	T	P
Credits: 1		-	-	2

Prerequisites: NIL

Software Requirements: C

[Note:The programs may be executed using any available Open Source/ Freely available IDESome of the Tools available are:
CodeLite: https://codelite.org/
Code:Blocks:
http://www.codeblocks.org/
DevCpp :
http://www.bloodshed.net/devcpp.htm
lEclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Objectives: The students will learn the following:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

List of Programs:

PRACTICE SESSIONS:

a. Write a simple program that prints the results of all the operators available in C (including pre/post increment , bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion andcasting. Take the values from standard input.

SIMPLE NUMERIC PROBLEMS:

a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction.Read percentage from standard input.

d. Write a program that prints a multiplication table for a given number and the number of rows inthe table. For example, for a number 5 and rows = 3, the output should be:
e. 5 x 1 = 5
f. 5 x 2 = 10
g. 5 x 3 = 15
h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

EXPRESSION EVALUATION:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performsthe operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given numberis palindrome.
e. 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. Writea C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value. i. 1-x/2 +x^2/4-x^3/6
j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometricprogression: 1+x+x^2+x^3+ +x^n. For example: if n is 3 and x is 5, then the program
computes 1+5+25+125.

ARRAYS, POINTERS AND FUNCTIONS:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in asingle dimension array.
c. Write a C program that uses functions to perform the following:
d. Addition of Two Matrices
e. Multiplication of Two Matrices
f. Transpose of a matrix with memory dynamically allocated for the new matrix as row and columncounts may not be the same.
g. Write C programs that use both recursive and non-recursive functions
h. To find the factorial of a given integer.
i. To find the GCD (greatest common divisor) of two given integers.
j. To find x^n
k. Write a program for reading elements using a pointer into an array and display the values

usingthe array.

l. Write a program for display values reverse order from an array using a pointer.
m. Write a program through a pointer variable to sum of n elements from an array.

FILES:

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters withtheir uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file nameand the character are supplied as command line arguments.
d. Write a C program that does the following:
   It should first create a binary file and store 10 integers, where the file name and 10 values aregiven in the command line. (hint: convert the strings using atoi function)
   Now the program asks for an index and a value from the user and the value at that index shouldbe changed to the new value in the file. (hint: use fseek function)
   The program should then read all 10 values and print them back.
e. Write a C program to merge two files into a third file (i.e., the contents of the first file followedby those of the second are put in the third file).

STRINGS:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string into a given main string from a given position.
e. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in bothdirections with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘tcontain ch.
h. Write a C program to count the lines, words and characters in a given text.

MISCELLANEOUS:

a. Write a menu driven C program that allows a user to enter n numbers and then choose betweenfinding the smallest, largest, sum, or average. The menu and all the choices are to be functions.Use a switch statement to determine what action to take. Display an error message if an invalidchoice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * * *
                                 4 4 4 4    * *
                                            *
```

SORTING AND SEARCHING:

a. Write a C program that uses non recursive function to search for a Key value in a given
b. list of integers using linear search method.
c. Write a C program that uses non recursive function to search for a Key value in a given
d. sorted list of integers using binary search method.
e. Write a C program that implements the Bubble sort method to sort a given list of
f. integers in ascending order.
g. Write a C program that sorts the given array of integers using selection sort in descending order
h. Write a C program that sorts the given array of integers using insertion sort in ascending order
i. Write a C program that sorts a given array of names

Outcomes:

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

1. formulate the algorithms for simple problems
2. translate given algorithms to a working and correct program
3. correct syntax errors as reported by the compilers
4. identify and correct logical errors encountered during execution
5. represent and manipulate data with arrays, strings and structures
6. use pointers of different types
7. create, read and write to and from simple text and binary files
8. modularize the code with functions so that they can be reused

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

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	2	
CO2	3	3	3										2	2	
CO3	2	2	2										2	2	

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C1201	Engineering and IT Workshop (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 2		-	1	2

Pre requisites: NIL

Course Objectives:
The Engineering and IT Workshop for engineers is a training lab course spread over 60 hours. Themodules include training on PC Hardware, Internet & World Wide Web and Productivity tools includingWord, Excel, PowerPoint and Publisher and Engineering workshop trades.

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:
Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the blockdiagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructorshould verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructorsshould verify the installation and follow it up with a Viva

Internet & World Wide Web
Task1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsersto block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX

and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a 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.

Task 3: 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.

Task 4: 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, Paragraphsand Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill,Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditionalformatting

POWERPOINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

Course Outcomes:

- Perform Hardware troubleshooting
- Understand Hardware components and inter dependencies
- Safeguard computer systems from viruses/worms
- Document/ Presentation preparation
- Perform calculations using spreadsheets
- Perform Engineering workshop practice.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan– CISCO Press, Pearson Education.

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	1		3							3	2		
CO2	3	3	1		3							3	2		
CO3	3	3	1		3							3	2		

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B17	Engineering Chemistry (Common for All)	L	T	P
Credits: 4		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 path way 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, Modules 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

A. Electrochemistry: [7 Periods]

Introduction to Electrochemistry-Conductance (Specific and Equivalent) and Modules. 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) and Electroless 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 of n-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.

MODULE-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.

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

a) Understand water treatment, specifically hardness of water and purification of water by various methods.
b) Analyze microscopic chemistry in terms of atomic and molecular orbital's splitting and band theory related to conductivity.
c) Acquire knowledge on electrochemical cells, fuel cells, batteries and their applications.
d) Acquire basic knowledge on the concepts of stereochemistry, reaction mechanisms and interpretation of NMR in organic molecules.
e) Acquire the knowledge of various fuels and identify a better fuel source of less pollution.

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.
3. A.Jaya Shree, "Text book of Engineering Chemistry", Wiley, New Delhi, 2018.

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.
3. K. P. C. Volhardt and N. E. Schore, **"Organic Chemistry: Structure and Function"**, 5th Edition, 2006.

e-Resources:

a) Concerned Website links:

1) https://books.google.co.in/books?isbn=0070669325 (Engineering chemistry by Sivasankar).
2) https://www.youtube.com/watch?v=yQUD2vzfgh8 (Hot dipping Galvanization).
3)https://archive.org/stream/VollhardtOrganicChemistryStructureFunction6th/Vollhardt_Organic_Chemistry_Structure_Function_6th_djvu.txt.

b) Concerned Journals/Magazines links:

1) http://americanhistory.si.edu/fuelcells/sources.htm (Fuel Cell Information Sources)
2) https://www.abctlc.com/downloads/courses/WaterChemistry.pdf (Water Chemistry)

c) NPTEL Videos:

1) nptel.ac.in/courses/113108051/ (corrosion & electrochemistry web course)
2) https://www.youtube.com/watch?v=V7-8EOfZKeE (Stereochemistry)

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		3				1		1	2	2	1	
CO2	2	2	2		3		1					1	1		
CO3	2		2		2							3			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B02	Probability and Statistics (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Basic Probability

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: **[12 Periods]**

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

MODULE II: Random variables: **[12 Periods]**

Discrete Probability distributions. Bernoulli, Binomial, Poission, Geometric distributions of their mean and variance, moment generating function–related problems. Continuous probability distributions: Normal distribution, Uniform distribution of their mean and variance, moment generating function, Central Limit theorem.

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
(ii) Test of significance for difference of means
(iii) Test of significance for single proportion
(iv) Test of significance for difference of proportions

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]

Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression. Multiple regression for three variables.

Course Outcomes:

1. The students will understand and appreciate the role of P&S in data analytics and big data analysis.
2. Students would be able to find the Probability in certain realistic situation
3. Students would be able to 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.

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. 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

a) Concerned Website links:

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)

b) 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)

4. The student would be able to calculate mean and proportions (large and small sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.
5. Students will understand how to forecast the future observations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3		3		2	2			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

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B09	Semiconductor Physics (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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: Quantum Mechanics [8 Periods]

Introduction, Plank's theory of black body radiation, deduction of Wien's 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 Characteristics; 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.

Course Outcomes:

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

1. Explain the dual nature of the matter and evaluate the energy of a particle trapped in 1D infinite potential well.
2. Classify the materials into conductors, semiconductors and insulators based on the outcomes of Kronig - Penney model.
3. Analyze the working of semiconductor devices like PN junction diode, Photodiode, LED and Solar cell.
4. Compare and contrast Ruby, He-Ne, Semiconductor Lasers and discover the working principle of optical fibers besides and elucidating their applications.
5. Describe the Boolean algebra and examine various logic gates.

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 Revised Edition, 2014.
3. P Horowitz and W. Hill, "The Art of Electronics" Cambridge University Press, 3rd edition, 2015.
4. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
5. 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

Journals :

1. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094
2. http://www.springer.com/physics/journal/340

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3		3		2	2			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

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0504	Python Programming (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Nil

Course Objectives: This course will enable students to

1. Learn syntax and semantics along with the basic data structures of Python
2. Python functions to facilitate code reuse, Handle modules
3. Use Python to read and write files, Explore Python's object-oriented features
4. Understand Exception handling and multithreaded programming in Python.
5. Build GUI programming in Python.

MODULE - I **[10 Periods]**

Introduction: Introduction to Python, Input and Output Functions, Comments, Variables, Data Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Type conversions, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass.

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries.

MODULE - II **[9 Periods]**

Functions: Functions, Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Lambda Functions Recursion.

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

MODULE - III **[10 Periods]**

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.

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 – IV **[10 Periods]**

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

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

MODULE - V **[9 Periods]**

GUI Programming: Introduction, Tkinter and Python Programming, Creating Your First Python GUI Application With Tkinter, Adding a Widget, Text and Images With Label Widgets, Clickable Buttons With Button Widgets, User Input With Entry Widgets, Multiline User Input With Text Widgets, Widgets to Frames With Frame Widgets, Standard attributes, Layout Controlling With Geometry Managers, pack(),place()grid().

Course Outcomes

At the end of the course, students will be able 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. Implement regular expressions and exemplary applications related to GUI Programming in Python.

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.
4. Reema Thareja, Python Programming: Using Problem Solving Approach, OUP, 2017.

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/101EfoBUcccV1SQHw
3. “Basics of Python for Data Science”, https://olympus.greatlearning.in/courses/11265
4. “Beginners Guide / Programmers - Python Wiki”, https://wiki.python.org/moin/Beginn

ersGuide/Programmers

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

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				1		1	2	2	1	
CO2			2		3							1	1		
CO3			2		2							2			2
CO4	1	2	3	2	3		1		3		1	2			3
CO5					3						1	2			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0305	ENGINEERING DRAWING (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		2	-	2

Prerequisites: Nil

Course Objectives:

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

MODULE I: **10 Periods**

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 Cycloid and Involutes.

Scales: Plane Scale, Diagonal scale.

MODULE II: **10 Period**

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 one reference plane.

MODULE III: **9 Periods**

Projection of Planes: Axis inclined to one reference plane.

Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone by rotatingobject method. Axis inclined one reference plane.

MODULE IV: **10 Periods**

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: **9 Periods**

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 International Publishers, 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, 3rd Edition, 2011.

E - RESOURCES

1. http://nptel.ac.in/courses/112103019/
2. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
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)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3		3		2	2			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

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: C0B18	**Engineering Chemistry Lab (Common for All)**	**L**	**T**	**P**
Credits: 1		**-**	**-**	**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^H metry.
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:

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

1. Estimate the hardness of given water samples.
2. Select lubricants for various purposes.
3. Prepare advanced polymers & drug materials.
4. Know the strength of an acid present in batteries.
5. Calculate the amount of Mn^{+2} present in unknown substances/ores using instrumental methods.

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				1		1	2	2	1	
CO2	2		2		3							1	1		
CO3	2		2		2							3			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0B11	Applied Physics Lab (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI, CSIT, EEE and ECE)	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:

1. At the end of the course, students will able to
2. Develop skills to impart practical knowledge in real time solution.
3. Understand principle, concept, working, application and comparison of results with theoretical calculations.
4. Design new instruments with practical knowledge.
5. Understand measurement technology.
6. Use new instruments and real time applications in engineering studies.

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				1		1	2	2	1	
CO2	2		2		3							1	1		
CO3	2		2		2							3			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: C0506	**Python Programming Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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 demonstrate different number data types in Python
b)Write a program to purposefully raise Indentation Error and correct it.
c)Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).

2 a) Write a program to perform different Arithmetic Operations on numbers in Python.
b) Write a program to create, concatenate and print a string and accessing sub-string from a given string

3 a) Write a program to count the numbers of characters in the given string and store them in a dictionary data structure
b)Write a program to combine two lists into a dictionary.

4 a) Write a Program for checking whether the given number is even number or not.
b)Write a Python script that prints prime numbers less than N (N to be taken from user), and print the sum of all primes.

5 a) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
b) write a program, that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . ., 1/10, using for loop.

6 a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

b) Write a python program to define a module and import a specific function of that module to another program.

7 a)Write a function dups to find all duplicates in the list.
b)Write a function unique to find all the unique elements of a list.
c)Write a function reverse to reverse a list. Without using the reverse function.

8 a) Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
b)Write a program to print each line of a file in reverse order.
c)Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

9 a) Write a program to compute the number of characters, words and lines in a file.
   b) Find mean, median, mode for the given set of numbers in a list.
10 a) Write a program to perform addition of two square matrices
   b) Write a program to perform multiplication of two square matrices
11 Write a python program to simulate the banking operations using Class.
12 Write a GUI for an Expression Calculator using tk

Course Outcomes

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

1. Able to understand basic fundamentals of writing Python scripts
2. Able to learn core Python scripting elements such as variables and flow control structures
3. Able to know how to work with lists and sequence data
4. Able to write Python functions to facilitate code reuse
5. Able to use Python to read and write files

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. VamsiKurama, "Python Programming: A Modern Approach", Pearson India, 2017.
3. Mark Lutz, "Learning Python", Fifth Edition, O'rielly Publishers, 2013.

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				1		1	2	2	1	
CO2			2		3							1	1		
CO3			2		2							3			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0507	Discrete Mathematics (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

- Introduces elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

MODULE I: **[10 Periods]**

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

MODULE II: **[09 Periods]**

Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions

MODULE III: **[09 Periods]**

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

MODULE IV: **[10 Periods]**

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

MODULE V: **[10 Periods]**

Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

Course Outcomes:

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

- Understand and construct precise mathematical proofs
- Apply logic and set theory to formulate precise statements
- Analyze and solve counting problems on finite and discrete structures
- Describe and manipulate sequences
- Apply graph theory in solving computing problems

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.

2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCES:

1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co.

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/yVCWqd6u7wgye1qwH9xY7xPG734QA9tMJN2ncqS12ZbN7pUSSlWCxSgPOZJEokyWJlxQLYsrFyeITA70W9C8Pg
4. http://nptel.ac.in/courses/106106094/

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0508	Digital Logic Design (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: This course aims at through understanding of binary number system, logic gates, combination logic and synchronous and asynchronous logic.

MODULE - I: **[10 PERIODS]**

BOOLEAN ALGEBRA AND LOGIC GATES: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.
Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

MODULE - II: **[9 PERIODS]**

GATE – LEVEL MINIMIZATION: The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive – Or function.

MODULE - III: **[10 PERIODS]**

COMBINATIONAL LOGIC: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

MODULE - IV: **[9 PERIODS]**

SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure**.** Registers, shift Registers, Ripple counters, synchronous counters, other counters.

MODULE – V: **[10 PERIODS]**

MEMORIES AND ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices. Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and FlowTables, Race-Free state Assignment Hazards, Design Example.

TEXT BOOKS:

1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw HillEdition.
3. Fundamentals of Logic Design, Roth, 5th Edition, Thomson.

REFERENCE BOOKS:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic and Microcomputer Design, 5TH Edition, M. Rafiquzzaman JohnWiley.

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0509	Computer Organization and Architecture (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites: A Course on "DLD".

Objectives

1. The purpose of the course is to introduce principles of Digital fundamentals computer organization and the basic architectural concepts.
2. It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
3. Topics include computer arithmetic, instruction set design, microprogrammed control Module, pipelining and vector processing, memory organization and I/O systems, and multiprocessors.

MODULE – I **[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 Module.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

MODULE – II **[10 Periods]**

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control Module. Central Processing Module: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

MODULE – III **[9 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 Module, Decimal Arithmetic operations.

MODULE – IV **[10 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.

MODULE – V **[9 Periods]**

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics. Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor. Multi Processors:

Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Outcomes:

1. Understand the basics of instructions sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional Modules of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
4. Design a pipeline for consistent execution of instructions with minimum hazards.
5. Recognize and manipulate representations of numbers stored in digital computers.

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/

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0510	**Data Structures** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites: A course on "Programming for Problem Solving "

Course Objectives:

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching 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, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

MODULE-IV: **[10 Periods]**

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Quick Sort, 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.

Course Outcomes:

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

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations orcombinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, 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, 2 nd Edition, R. F. Gilberg and B.A.Forouzan,Cengage Learning

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

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0511	Object Oriented Programming through Java (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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.

Course Outcomes:

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

- Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
- Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords
- Use multithreading concepts to develop inter process communication.
- Understand the process of graphical user interface design and implementation using AWT or swings.
- Develop applets that interact abundantly with the client environment and deploy on the server.

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

COs	ProgrammeOutcomes(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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0512	**Data Structures Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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: Turbo C / C++

List of Programs:

1. Write a program that uses functions to perform the following operations on singly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linkedlist.:
   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 Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integersin ascending order
   i) Quick sort ii) Heap sort iii) Merge sort
7. Write a program to implement the tree traversal methods(Recursive and Non Recursive).
8. Write a program to implement
   i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees
   v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

Outcomes:

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

- Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

TEXT BOOKS

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/PearsonEducation.

REFERENCES

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

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	2	
CO2	2	2	3										2	3	
CO3		2	3										2	3	1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0513	Object Oriented Programming through Java Lab (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 1.5		-	-	3

Prerequisites: NIL

Software Requirements: JDK

Course Objectives:

- To write programs using abstract classes.
- To write programs for solving real world problems using the java collection framework.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands-on experience with java programming.

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the useof the Eclipse platform.

2. The list suggests the minimum program set. Hence, the concerned staff is requested to addmore problems to the list as needed.

List of Programs:

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

3. A) Develop an applet in Java that displays a simple message.
   B) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters twonumbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Resultfield when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throwa Number Format Exception. If Num2 were Zero,

the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First threadgenerates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

6. Write a Java program for the following:

   Create a doubly linked list of elements.

   Delete a given element from the above list.

   Display the contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas.
   Write a java program to display the table using Labels in Grid Layout.

10. 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).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

Course Outcomes:

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

- Able to write programs for solving real world problems using the java collection framework.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

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.

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	

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C0514	Data visualization- R Programming/ Power BI Lab (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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.

Software Requirements: Microsoft Power BI, Google data studio, Data wrapper and Tableau Public

LAB PROBLEMS:

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.

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

- Understand How to import data into Tableau.
- Understand Tableau concepts of Dimensions and Measures.
- Develop Programs and understand how to map Visual Layouts and Graphical Properties.
- Create a Dashboard that links multiple visualizations.
- Use graphical user interfaces to create Frames for providing solutions to real world
- problems.

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.

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	

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: C00M2	**Environmental Science** (Common for All)	L	T	P
Credits: NIL		2	-	-

Pre-Requisites: NIL

Objectives

An interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences, including geo systems, biology, chemistry, economics, political science and international processes. The ability to work effectively as a member of an interdisciplinary team on complex problem of environment.

Module I: Ecosystems **[**5 Periods]

Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains, food webs and ecological pyramids. Flow of energy.
Activity: Plantation.

Module II: Natural resources, Biodiversity and Biotic resources:

A: Natural Resources: [5 Periods]

Classification of Resources: Living and Non-Living resources, Renewable and non-renewable 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–case studies. Energy resources: growing energy needs, introduction to renewable and non renewable energy sources.

B: Biodiversity and Biotic resources: **[4 Periods]**

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and intrinsic values. Threats to Biodiversity (habitat loss, poaching of wildlife, man-wild life conflicts). Conservation of Biodiversity (In-situ and Ex-situ conservation),
Activity: case studies.

Module III: ENVIRONMENTAL POLLUTION AND CONTROL: **[7 Periods]**

A: Classification of pollution and pollutants, Causes, effects and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Point and non-point sources of pollution, Major pollutant of water and their sources, drinking water quality standards.

B: Soil Pollution, Soil as sink for pollutants, Impact of modern agriculture on soil, degradation of soil. Marine Pollution: Misuse of International water for dumping of

hazardous waste, Coastal pollution due to sewage and marine disposal of industrial effluents.

E-waste and its management. Activity: Field visit.

Module IV: Global Environmental Problems and Global effects: **[6 Periods]**

Green house effect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions/Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

Activity: Poster Making.

Module V: Towards sustainable future: **[5 Periods]**

Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable CommModuleies, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism(CDM).

Course Outcomes:

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

1. To enable the students to realize the importance of ecosystem, its structure, services. To make the students aware of Different natural functions of ecosystem, which helps to sustain the life on the earth.
2. To use natural resources more efficiently.
3. To make the students aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
4. To educate the students regarding environmental issues and problems at local, national and international level.
5. To know more sustainable way of living

Text Books:

1. R. Rajagopalan, **"Environmental Studies from crisis to cure"**, Oxford University Press 2nd Edition, 2005.
2. Anubha Kaushik, C.P. Kaushik, **"Environmental studies"** New age International Publishers,4th Edition,2012

Reference Books:

2. Erach Bharucha, **"Environmental studies"** University Grants Commission, and University Press, I Edition, 2005.
3. M. Anji Reddy **"Text book of Environmental Science and Technology"** 3rd Edition, 2007
4. Richard T. Wright, **"Environmental Science: towards a sustainable future"** PHL

Learning, Private Ltd. New Delhi, 2nd Edition., 2008
5. Gilbert McMasters and Wendell P. Ela, **"Environmental Engineering and science"**,3rd Edition, PHI Learning Pvt. Ltd.,2008.

E-Resources:

1. http://www.gdrc.org/uem/ait-terms.html (Glossary of Environmental terms).
2. http://www.environmentalscience.org/ (Environmental sciences Lectures series).
3. Journal of earth science and climatic change (OMICS International Journal).
4. Journal of pollution effects & control (OMICS International Journal).
6. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).
7. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html (NPTEL online video courses IIT lectures).

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		1	2	1								
CO2	2	3	2	3	1	3		2							
CO3	3	3	2	3	2	2		1							
CO4	3	2	2	1	2	1									
CO5	2	1	1			1	3	3							

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0B07	Applied Statistics and Optimization Techniques (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

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):(N: 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

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															
CO2															
CO3															
CO4															
CO5															

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0515	Database Management Systems (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites

1. A course on "Data Structures"

The purpose of learning this course is to:

- 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, transactioncontrol, concurrency control, storage structures and access techniques

MODULE I: **[10 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: **[09 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: **[10 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: **[10 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: **[09 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.

Course Outcomes:

- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

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

REFERENCES:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
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.

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

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0516	Operating Systems (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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: **[10 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: **[10 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: **[08 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.

Course outcomes

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computers and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

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.

REFERENCES:

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.

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0517	Design and Analysis of Algorithms (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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, Huffman coding.

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]

A: Dynamic Programming - General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, Longest Common Subsequence.

B: 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

Course Outcomes:

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

1. **Analyze** performance of algorithms using asymptotic notations, performance analysis, disjoint sets, spanning trees and connected components
2. **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.
3. **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.
4. **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
5. **Apply** algorithm design techniques to solve certain NP-complete problems.

TEXTBOOKS:

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 BalchandraDave,**"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. https://books.google.co.in/books?id=7qKXCzF1XC8C&printsec=frontcover&dq=T.H.Cormen,C.E.Leiserson,+R.L.Rivest,and+C.Stein,+%22Introduction+to+Algorithms%22,+second+edition,+PHI+Pvt.+Ltd./+Pearson+Education,ebook,pdf&hl=en&sa=X&ved=0ahUKEwjFupORxdXTAhXLQo8KHU7FC5cQ6AEIKjAB#v=onepage&q&f=false
3. http://en.cnki.com.cn/Article_en/CJFDTOTAL-JFYZ200208019.htm
4. http://nptel.ac.in/courses/106101060/

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	

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0518	**Software Engineering & Modeling** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL.

Course Objectives:

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Module I: **[10 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: **[10Periods]**

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.

System Models: Context models, Behavioral models, Data models, Object models, Structured methods

Module III: **[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: **[10 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: **[09Periods]**

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Course Outcomes:

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

- Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level designof a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simpletesting report

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

REFERENCES:

1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

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=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=one page&q&f=false
2. https://books.google.co.in/books?id=PqsWaBkFh1wC&printsec=frontcover&dq=software+engineering+by+ian+sommerville+FREE+download&hl=en&sa=X&ved=0ahUKEwjjv5fhpb_TAhUHOo8KHY5OAC4Q6AEIKjAB#v=onepage&q=software%20engineering%20by%20ian%20sommerville%20FREE%20download&f=false
3. http://ieeexplore.ieee.org/document/4807670/
1. https://link.springer.com/search?facet-journal id=40411&package=open accessarticles&query=&facet-sub-discipline=%22Software+Engineering%22
2. http://freevideolectures.com/Course/2318/Software-Engineering
3. http://freevideolectures.com/Course/2318/Software-Engineering/5

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

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0519	Database Management Systems Lab (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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

Software Requirements: MySQL

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

Course Outcomes:

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

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.

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

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0520	Operating Systems Lab (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 1		-	-	2

Prerequisites: A course on "Programming for Problem Solving", A course on "Computer Organizationand Architecture".

Co-requisite: A course on "Operating Systems".

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts throughsimulation
- Introduce basic Unix commands, system call interface for process management, interprocesscommunication and I/O in Unix

Software Requirements: UNIX/LINUX Operating System, Windows and Turbo C / C++

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) RoundRobin d) priority

2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close,fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores usingUNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs

6. Write C programs to illustrate the following IPC mechanisms a) Message Queues b) Shared Memory

7. Write C programs to simulate the following memory management techniques a) Paging b)Segmentation

8. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

Course Outcomes:

- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix 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

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		
CO2	2	2										2	2		
CO3	1	2										1	1		

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0521	Real-time Research Project/ Societal Related Project (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 1		-	-	2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C0522	NODE JS/ REACT JS/ DJANGO LAB	L	T	P
Credits: 1	(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	-	-	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.

Software Requirements: JDK, Tomcat Server, PHP and WAMP Server.

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.

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

- Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
- Demonstrate Advanced features of JavaScript and learn about JDBC
- Develop Server – side implementation using Java technologies like
- Develop the server – side implementation using Node JS.
- Design a Single Page Application using React.

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.

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		
CO2	2	2										2	2		
CO3	1	2										1	1		

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: C00M1	GENDER SENSITIZATION (An Activity-based Course) (Common for All)	L	T	P
Credits: NIL		-	-	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 Attitudes towards 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 and Human 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 Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Modulee [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 Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular 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%

Course Outcomes:

At the end of the course,

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be 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.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.

- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

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/10.1177/107780120000600700 4 (ISSUES OF VIOLENCE)
5. http://www.nordiclabourjournal.org/emner/likestilling (GENDER AND BIOLOGY)

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		2	3	1		
CO2						3		3	3		2	3	2		
CO3						3		3	3		2	3	1		

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0532	**DevOps** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Pre-Requisites:

1. Software Engineering
2. Software Project Management

Course Objectives:

- Understand the skill sets and high-functioning teams involved in Agile, DevOps and relatedmethods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

MODULE-I Introduction to DevOps: [09 Periods]

Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks.

MODULE-II Software development models and DevOps: [10 Periods]

DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Micro services and the data tier, DevOps,architecture, and resilience.

MODULE-III Introduction to project management: [10 Periods]

The need for source code control, the history of source code management, Roles and code, source code management system and migrations, shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

MODULE-IV Integrating the system: [09 Periods]

Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative buildservers, Collating quality measures.

MODULE-V Testing Tools and Deployment: [10 Periods]

Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development. Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker.

Course Outcomes:

- Understand the various components of DevOps environment.
- Identify Software development models and architectures of DevOps
- Use different project management and integration tools.
- Select an appropriate testing tool and deployment model for project.

TEXT BOOKS:

1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wileypublications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. AddisonWesley

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	1		1		1						1	1		
CO2	1	2	1	1	1	1						1		2	1
CO3	1	1	2	2	1	1						2		2	2
CO4	1	1	1	2	1	1						3		1	2
CO5	1	1	1	1	1	1						2		1	2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C6201	**Computer Networks** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

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 [9 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 [9 Periods]

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

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

Course Outcomes

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

1. **Understand** the Layered Architecture of Computer Networks.
2. **Conceptualize** the protocols of Data Link Layer and can build Local area networks.
3. **Apply** Subnet and Supernet concepts in the construction of computer network**.**
4. **Summarize** the protocols used in Transport Layer, QoS and Congestion control mechanisms.
5. **Analyze** different protocols of Application Layer and various security risks.

TEXT BOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4thEdition, 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/

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	
CO2			2												2
CO3						3							3		
CO4					2										

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C6637	**Artificial Intelligence** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites:

1. Programming for problem solving, Data Structures.

Course Objectives:

The student will be able to

- Know the methodology of Problem solving
- Implement basic AI algorithms
- Design and carry out an empirical evolution of different algorithms on a problem formalization

MODULE – I **[10 Periods]**

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 **[10 Periods]**

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 **[9 Periods]**

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

MODULE – IV **[9 Periods]**

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 **[10 Periods]**

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.

Course Outcomes:

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

- Understand the fundamental concepts in Artificial Intelligence
- Analyze the applications of search strategies and problem reductions
- Apply the mathematical logic concepts.
- Develop the Knowledge representations in Artificial Intelligence.
- Explain the Fuzzy logic systems.

TEXT BOOK:

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

REFERENCE BOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer 3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

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											
CO4	2	2	2	2										2	2
CO5	1	2													

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0523	**Quantum Computing** (Professional Elective –I) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Course Objectives

- To introduce the fundamentals of quantum computing
- The problem-solving approach using finite dimensional mathematics

MODULE – I **[10 Periods]**

History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

MODULE – II **[10 Periods]**

Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

MODULE – III **[9 Periods]**

Qubit: Physical implementations of Qubit. Qubit as a quantum Module of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

MODULE – IV **[10 Periods]**

Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorizationalgorithm, Grover's search algorithm.

MODULE – V **[10 Periods]**

Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

Course Outcomes

- Understand basics of quantum computing
- Understand physical implementation of Qubit
- Understand Quantum algorithms and their implementation
- Understand The Impact of Quantum Computing on Cryptography

TEXT BOOKS:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.I: Basic Concepts, Vol II
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to QuantumComputing Algorithms

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												1	1	
CO2	1	2	2										1	1	
CO3	2	2	2										1	1	
CO4	2	2	2											2	2
CO5	1	2	1										1		

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0524	**Advanced Computer Architecture** (Professional Elective –I) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Organization

COURSE OBJECTIVES:

- To impart the concepts and principles of parallel and advanced computer architectures.
- To develop the design techniques of Scalable and multithreaded Architectures.
- To Apply the concepts and techniques of parallel and advanced computer architectures todesign modern computer systems

MODULE – I **[10 Periods]**

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

MODULE – II **[10 Periods]**

Principles of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors

MODULE – III **[10 Periods]**

Shared-Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

MODULE – IV **[9 Periods]**

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivetor and SIMD computers.

MODULE – V **[9 Periods]**

Vector Processing Principles, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5.

COURSE OUTCOMES:

- Computational models and Computer Architectures.
- Concepts of parallel computer models.
- Scalable Architectures, Pipelining, Superscalar processors

TEXT BOOK

1. Advanced Computer Architecture, Kai Hwang, 2nd Edition, Tata McGraw Hill Publishers.

REFERENCE BOOKS:

1. Computer Architecture, J.L. Hennessy and D.A. Patterson, 4th Edition, ELSEVIER.
2. Advanced Computer Architectures, S.G.Shiva, Special Indian edition, CRC, Taylor &Francis.
3. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G. Wellein, CRC Press, Taylor & Francis Group.
4. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.
5. Computer Architecture, B. Parhami, Oxford Univ. Press.

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		
CO2			3										3	2	
CO3			3				2					2		3	
CO4	2	2	3				2					2	2		
CO5	2	2	3									2			2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C6711	**Data Analytics** (Professional Elective –I) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites

1. A course on "Database Management Systems".
2. 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 theaccuracy of the algorithms.
- To understand the various search methods and visualization techniques.

MODULE – I **[10 Periods]**

Data Management: 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 **[9 Periods]**

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

MODULE – III **[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 tovarious Business Domains etc.

MODULE – IV **[10 Periods]**

Object Segmentation: 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 from generated model as Height, Average Energy etc and Analyze for prediction

MODULE – V **[9 Periods]**

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, VisualizingComplex Data and Relations.

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

- Understand the impact of data analytics for business decisions and strategy
- Carry out data analysis/statistical analysis
- To carry out standard data visualization and formal inference procedures
- Design Data Architecture
- Understand various Data Sources

TEXT BOOKS:

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

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 LabsJeffrey D Ullman Stanford Univ.

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	3	1		1	3	2	1	3	3	2	3
CO2	3	2	3	3	3						2	1	3	2	2
CO3	3	3	3	3	3							3	3	2	2
CO4	3	3	3	3	3						1	3	3	2	2
CO5	2	3	3	3	3						1	3	3	2	2

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0525	**Computer Graphics** (Professional Elective –I) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites

1. 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 **[9 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 **[9 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, BSP- tree method, area sub-division method and octree method.

Course Outcomes

- Explore applications of computer graphics
- Understand 2D, 3D geometric transformations and clipping algorithms
- Understand 3D object representations, curves, surfaces, polygon rendering methods, colormodels
- Analyze animation sequence and visible surface detection methods

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 andHughes, Pearson Education.
5. Computer Graphics, Steven Harrington, TMH.

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	
CO2	3												2		
CO3				2										2	
CO4					3									2	
CO5						2									3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0526	**Principles of Programming Languages** (Professional Elective –I) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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 **[9 Periods]**

Preliminary Concepts: 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 **[10 Periods]**

Names, Bindings, and Scopes: 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 **[10 Periods]**

Subprograms and Blocks: 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 **[9 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 **[10 Periods]**

Functional Programming Languages: 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 Book 2)

Course Outcomes

- Acquire the skills for expressing syntax and semantics in formal notation
- Identify and apply a suitable programming paradigm for a given computing application
- Gain knowledge of the features of various programming languages and their comparison

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.

REFERENCE BOOKS:

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003.

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	
CO2	3												2		
CO3				2										2	
CO4					3									2	
CO5						2									3

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0527	**Image Processing** (Professional Elective –II) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites

1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge ofdigital signal processing is desirable.
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Course Objectives

- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
- The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

MODULE – I **[10 Periods]**

Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

MODULE – II **[9 Periods]**

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering,Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

MODULE – III **[10 Periods]**

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

MODULE – IV **[9 Periods]**

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

MODULE – V **[10 Periods]**

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

Course Outcomes

- Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition,sampling, and quantization.
- Demonstrate the knowledge of filtering techniques.
- Demonstrate the knowledge of 2D transformation techniques.
- Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.

TEXT BOOK:

1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson Education,2nd Ed, 2004.

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L.Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wiley, 3rd Edition, 2004.

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												1	1	
CO2	1	2	2	4		3					2		1	1	
CO3	2	3	2		4		1	4				1	1	1	
CO4	3	2	2						4	5	3			2	2
CO5	4	5	1									4	1		1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0528	**Embedded Systems** (Professional Elective –II) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Pre-requisites:

1. A course on "Digital Logic Design and Microprocessors"
2. A course on "Computer Organization and Architecture"

Course Objectives:

- To provide an overview of principles of Embedded System
- To provide a clear understanding of role of firmware, operating systems in correlation withhardware systems.

MODULE – I **[10 Periods]**

Introduction to Embedded Systems: Processor embedded into a system, Embedded Hardware Modules and devices in a system, Embedded software in a system, Design process of an embedded system, classification of embedded systems, characteristics and quality attributes of an embedded systems

MODULE – II **[10 Periods]**

Introduction to processor/microcontroller architecture, Real world interfacing, processor and memory organization, memory types, memory maps and addresses, interrupt sources and interrupt service mechanism.

MODULE – III **[9 Periods]**

On board Communication Basics: serial; communication devices, Parallel devices, Wireless devices, Real time clock, Serial bus communication Protocols - I2C, SPI; Parallel buss communication - ISA, PCI.

MODULE – IV **[10 Periods]**

Embedded Firmware Development: Overview of programming concepts - in assembly language and in high level language 'C', C Program elements- Heads, Source files, Processor Directives, Macros, Functions, Data types and Data Structures

MODULE – V **[9 Periods]**

OS Based Embedded Systems: OS services - Process/Task Management, Memory Management, I/O subsystem manager, Inter Process/Task communications - Tasks, Task states, Shared data, Signals, Message Queues, Mailbox, Pipes and concepts of Semaphores.

Course Outcomes:

- Expected to understand the selection procedure of processors in the embedded domain.

- Design procedure of embedded firm ware.
- Expected to visualize the role of realtime operating systems in embedded systems.
- Expected to evaluate the correlation between task synchronization and latency issues

TEXT BOOK:

1. Embedded Systems, Raj Kamal, 2nd edition, Tata Mc Graw Hill
2. Shibu K V, "Introduction to Embedded Systems", Second Edition, Mc Graw Hill

REFERENCE BOOKS:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, Tata McGraw-Hill
2. Frank Vahid and Tony Givargis, "Embedded Systems Design" - A Unified Hardware/Software Introduction, John Wiley
3. Lyla, "Embedded Systems" –Pearson
4. David E. Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.

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												1	1	
CO2	1	2	2	4		3					2		1	1	
CO3	2	3	2		4		1	4				1	1	1	
CO4	3	2	2						4	5	3			2	2
CO5	4	5	1									4	1		1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C1222	**Information Retrieval Systems** (Professional Elective –II) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites:

1. 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 **[10 Periods]**

Introduction to Information Retrieval Systems: 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 **[10 Periods]**

Cataloging and Indexing: 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 **[9 Periods]**

Automatic Indexing: 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 **[10 Periods]**

User Search Techniques: 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 **[9 Periods]**

Text Search Algorithms: 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

Course Outcomes:

- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

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.

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												1	1	
CO2	1	2	2	4		3					2		1	1	
CO3	2	3	2		4		1	4				1	1	1	
CO4	3	2	2						4	5	3			2	2
CO5	4	5	1									4	1		1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0529	**Distributed Databases** (Professional Elective –II) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites:

1. A course on "Database Management Systems"

Course Objectives:

- The purpose of the course is to enrich the previous knowledge of database systems and expose the need for distributed database technology to confront 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 **[10 Periods]**

Introduction; 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 **[10 Periods]**

Query processing and decomposition: 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 **[9 Periods]**

Transaction Management: 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 **[9 Periods]**

Distributed DBMS Reliability: 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 **[10 Periods]**

Distributed object Database Management Systems: 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

Course Outcomes:

- Understand theoretical and practical aspects of distributed database systems.
- Study and identify various issues related to the development of distributed database systems.
- Understand the design aspects of object-oriented database systems and related developments.

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.

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												1	1	
CO2	1	2	2	4		3					2		1	1	
CO3	2	3	2		4		1	4				1	1	1	
CO4	3	2	2						4	5	3			2	2
CO5	4	5	1									4	1		1

2022-23 Onwards (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C6611	**Natural Language Processing** (Professional Elective –II) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites:

1. Data structures and compiler design

Course Objectives:

- Introduction to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

MODULE – I **[10 Periods]**

Finding the Structure of Words: 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 **[9 Periods]**

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

MODULE – III **[10 Periods]**

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

MODULE – IV **[9 Periods]**

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

MODULE – V **[10 Periods]**

Language Modeling: 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

Course Outcomes:

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems
- Manipulate probabilities, construct statistical models over strings and trees, and

estimateparameters using supervised and unsupervised training methods.

- Design, implement, and analyze NLP algorithms; and design different language modelingTechniques.

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, PearsonPublications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

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	-	-	-	-	2	2	1	-	1	2	2	2
CO2	3	3	2	2	1	-	-	2	2	1	-	2	3	2	2
CO3	3	3	3	1	1	-	-	2	2	1	-	2	3	1	1
CO4	3	3	2	2	1	-	-	3	3	1	-	2	3	2	2
CO5	3	3	2	2	1	-	-	2	2	1	-	2	3	2	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code:C6202	**Computer Networks Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:1		-	-	2

Prerequisites: NIL

Software Requirements: Turbo C/C++

Course Objectives:

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and observe its performance
- To analyze the traffic flow and the contents of protocol frames

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
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.
10. Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.

How to run Nmap scan

Operating System Detection using Nmap

Do the following using NS2 Simulator

i. NS2 Simulator-Introduction
ii. Simulate to Find the Number of Packets Dropped
iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
iv. Simulate to Find the Number of Packets Dropped due to Congestion
v. Simulate to Compare Data Rate & Throughput.
vi. Simulate to Plot Congestion for Different Source/Destination
vii. Simulate to Determine the Performance with respect to Transmission of Packets

Course Outcomes:

- Implement data link layer farming methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- To be able to work with different network tools

TEXT BOOK:

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. PearsonEducation/PHI.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

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

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C6638	**Artificial Intelligence Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 2		-	-	4

Prerequisites: Python Programming

Software Requirements: Python

Course Objectives:

1. Explore the methods of implementing algorithms using artificial intelligence techniques
2. Illustrate search algorithms
3. Demonstrate building of intelligent agents

.

LIST OF EXPERIMENTS:

Write a program to implement the following using Python.

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:

- Apply basic principles of AI in solutions that require problem solving, knowledge representation and learning.

TEXT BOOK:

1. Artificial Intelligence a Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.

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	2									3	3	
CO2	3	3	3	2									3	2	
CO3	3	3	3	2									3	2	

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0530	UI Design-Flutter	L	T	P
Credits:1	(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	-	-	2

Prerequisites: Nil

Software Requirements: Flutter and Dart SDK

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 Module tests for UI components.
    b) Use Flutter's debugging tools to identify and fix issues.

Course Outcomes:

- Implements Flutter Widgets and Layouts
- Responsive UI Design and with Navigation in Flutter
- Create custom widgets for specific UI elements and also Apply styling using themes and custom styles.
- Design a form with various input fields, along with validation and error handling
- Fetches data and write code for Module Test for UI components and also animation

TEXT BOOK:

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

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

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C0537	**DevOps Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:1		-	-	2

Pre-requisites: Nil
Software Requirements: DevOps Tools, Git. GitHub, JDK and Selenium-IDE

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 1.
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.

Course Outcomes:

1. Understand the need of DevOps tools
2. Understand the environment for a software application development
3. Apply different project management, integration and development tools
4. Use Selenium tool for automated testing of application

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

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	
CO2			2												2
CO3						3							3		

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C00M3	Quantitative Aptitude and Verbal Reasoning – I (Common for All)	L	T	P
Credits: Nil		2	-	-

Course objectives:

The Quantitative Aptitude course is designed to equip students with essential mathematical and analytical skills required for various competitive exams, academic pursuits, and real-world problem-solving scenarios. The primary objective of this course is to enhance participants' numerical ability and logical reasoning, enabling them to tackle quantitative questions with confidence and efficiency.

MODULE - I **[8 Periods]**

Quants: Percentages, Profit and Loss.

Percentages- Percentage Increase/Decrease; Results on Population; Results on Depreciation. Profit & Loss- Cost Price; Selling Price: Profit or Gain; Gain Percentage; Loss Percentage.

Verbal: Sentence Completion

Sentence Completion- Formats of Question; Strategies to solve sentence completion questions- Proactive and reactive solving, Identifying clues- Signposts, Types of signposts, Root words, Sentence structure clues.

Logical: Blood Relation

Blood Relations- Classification of blood relations, Pointing a person, Equation related problems.

MODULE - II **[6 Periods]**

Quants: Interests

Interests- Types of interest; Simple interest; principle; Rate of interest; compound interest; interest is compounded Annually; interest is compounded Half-yearly; interest is compounded Quarterly; Rates are different for different years, say R1%, R2%, R3% for 1st, 2nd and 3rd year respectively; Present worth of Rs. x due n years.

Verbal: Articles, Interrogatives

Articles- Types of articles, Countable nouns, Uncountable nouns, Usage of articles, Omission of articles. Interrogatives- Definition, Types of Interrogatives, Question Tags.

Logical: Clocks

Clocks: Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.

MODULE - III **[6 Periods]**

Quants: Ratio and Proportion, Averages

Ratios & Proportion- The ratio of two quantities a and b in the same Modules; Proportion; The equality of two ratios is called proportion; Fourth Proportional; Mean Proportional; Comparison of Ratios; Duplicate Ratios; Variations. Averages- Average Speed, Weighted average.

Verbal: Idioms and Miscellaneous Vocabulary
Idioms- Idioms and phrasal verbs, Word Analogy, Patterns of questions on Word Analogy; Miscellaneous Vocabulary.

Logical: Coding and Decoding
Coding and Decoding- Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.

MODULE - IV **[6 Periods]**

Quants: Time and Work;
Time & Work- Work from Days: Calculate the one-day work; Days from Work: Shortcut to calculate the work in given time.

Verbal: Voices and Speech
Voices- Introduction- Sentence, Parts of a sentence, Voice of a sentence, Types of voices, Identifying the voice of a sentence, Changing the voice of a sentence.
Speech- Direct & Indirect, Identifying the speech, Change of Speech.

Logical: Directions
Directions - Introduction, Direction based questions, Shadow based problems.

MODULE - V **[6 Periods]**

Quants: Mixtures and Alligations
Alligation- Mean Price; Rule of Alligation; a container contains x of liquid from which y Modules are taken out and replaced by water;

Verbal: Reading Comprehension
Reading Comprehension- Speed reading strategies; Reading Comprehension - types of questions, tackling strategies.

Logical: Cubes
Cubes- Cube & cuboid concepts, 3-2-1-0 faced problems.

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

1. Develop Strong Mathematical Foundations: Gain a comprehensive understanding of fundamental mathematical concepts, including arithmetic, algebra, geometry, and data interpretation, providing a solid basis for tackling quantitative problems.
2. Enhance Problem-Solving Skills: Learn diverse problem-solving techniques and strategies to approach quantitative questions in a systematic manner, enabling efficient and accurate solutions.
3. Improve Speed and Accuracy on Averages: Practice through a variety of exercises and timed quizzes to enhance computational speed and precision, vital for competitive exams and time-sensitive tasks.
4. Master Time and work: Acquire skills in interpreting data from time and work scenarios decisions based on the given information.

Build Allegation and mixtures: Strengthen logical reasoning abilities to analyze and deduce patterns, aiding in solving complex quantitative problems.

Text Books:
1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal

2. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
3. "Fast Track Objective Arithmetic" by Rajesh Verma

Reference Books:

1. "Magical Book on Quicker Maths" by M. Tyra
2. "Quantitative Aptitude Quantum CAT" by Sarvesh K. Verma

e-Resources: Concerned Website links:

1. Khan Academy (https://www.khanacademy.org/):
2. MathIsFun (https://www.mathsisfun.com/)
3. GMAT Club (https://gmatclub.com/)
4. IndiaBIX (https://www.indiabix.com/)
5. Studytonight (https://www.studytonight.com/)

CO- PO-PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes(POs)												**PSOs**		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	1	2	2							2					
CO 2	1	2	2							2					
CO 3	1	2	2							2					
CO 4	1	2	2							2					
CO 5	1	2	1							2					

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: C00M6	Intellectual Property Rights (Common for All)	L	T	P
Credits: Nil		3	-	-

Course Objectives:

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

MODULE – I **[10 Periods]**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

MODULE – II **[9 Periods]**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter,selecting, and evaluating trade mark, trade mark registration processes.

MODULE – III **[10 Periods]**

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

MODULE – IV **[9 Periods]**

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations oftrade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

MODULE – V **[10 Periods]**

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international — trade mark law, copyright law, international patent law, and international development in trade secrets law.

Course Outcomes:

- Distinguish and Explain various forms of IPRs.
- Identify criteria to fit one's own intellectual work in particular form of IPRs.
- Apply statutory provisions to protect particular form of IPRs.
- Appraise new developments in IPR laws at national and international level

TEXT BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOK:

1. Intellectual property right — Unleashing the knowledge economy, prabuddha ganguli, TataMcGraw Hill Publishing company ltd.

CO- PO-PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	1	2	2							2					
CO 2	1	2	2							2					
CO 3	1	2	2							2					
CO 4	1	2	2							2					
CO 5	1	2	1							2					

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0531	**Formal Languages and Automata Theory** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Course Objectives

- To provide introduction to some of the central ideas of theoretical computer science from theperspective of formal languages.
- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- Classify machines by their power to recognize languages.
- Employ finite state machines to solve problems in computing.
- To understand deterministic and non-deterministic machines.
- To understand the differences between decidability and undecidability.

MODULE – I [10 Periods]

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the CentralConcepts 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, Moore and Melay machines

MODULE – II [10 Periods]

Regular Expressions: 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.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

MODULE – III [10 Periods]

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Trees, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

MODULE – IV [9 Periods]

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky Normal form Greibach Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

MODULE – V [9 Periods]

Types of Turing machine: Turing machines and halting

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

Course Outcomes

- Understand the concept of abstract machines and their power to recognize the languages.
- Employ finite state machines for modeling and solving computing problems.
- Design context free grammars for formal languages.
- Distinguish between decidability and undecidability.

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. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Textbook on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.

5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

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	2	2	
CO2		2	2	2	2							2	2	2	
CO3		2	2	2	2							2	2	2	
CO4		2	2	2	2							2	2	2	
CO5		2	2	2	2							2	2	2	

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C6625	**Machine Learning**	L	T	P
Credits: 3	(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	3	-	-

Course Objectives:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability-based learning techniques

MODULE – I **[10 Periods]**

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

MODULE – II **[10 Periods]**

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions — Support Vector Machines

MODULE – III **[9 Periods]**

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

MODULE – IV **[10 Periods]**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization

Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

MODULE – V **[10 Periods]**

Reinforcement Learning – Overview – Getting Lost Example

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo– Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

Course Outcomes:

- Distinguish between, supervised, unsupervised and semi-supervised learning
- Understand algorithms for building classifiers applied on datasets of non-linearly separable classes
- Understand the principles of evolutionary computing algorithms
- Design an ensembler to increase the classification accuracy

TEXT BOOKS:

1. Stephen Marsland, ―Machine Learning ― An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCE BOOKS:

1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖,First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, FirstEdition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

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	1		1		1						1	1		
CO2	1	2	1	1	1	1						1		2	1
CO3	1	1	2	2	1	1						2		2	2
CO4	1	1	1	2	1	1						3		1	2
CO5	1	1	1	1	1	1						2		1	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0H08	Business Economics and Financial Analysis (Common for All)	L	T	P
Credits: 3		3	-	-

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 and 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 [9 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 and 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: [10 Periods]

Financial Accounting: 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(Simple Problems).

MODULE - V: **[10 Periods]**

Financial Ratios Analysis: Concept of Ratio Analysis, Importance and Types of Ratios, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

Course Outcome:

The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.

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 Mc –Graw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS:

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.

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							1		3		2		
CO2	3			2	1								2		
CO3		1			2						3			2	
CO4	2	1			3									2	
CO5		1			2						3		2		

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0533	**Full Stack Development**	L	T	P
Credits: 3	(Professional Elective – III) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	3	-	-

Pre-Requisites:

1. Object Oriented Programming
2. Web Technologies

Course Objectives:

- Students will become familiar to implement fast, efficient, interactive and scalable webapplications using run time environment provided by the full stack components.

MODULE-I Introduction to Full Stack Development: [9 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: **[9 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.

Course Outcomes:

- Understand Full stack components for developing web application.
- Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.
- Use MongoDB data base for storing and processing huge data and connects with NodeJS application.
- Design faster and effective single page applications using Express and Angular.
- Create interactive user interfaces with react components.

TEXT BOOKS:

1. Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular Web Development, 2nd Edition, Addison-Wesley, 2019.
2. Mark Tielens Thomas, React in Action, 1st Edition, Manning Publications.

REFERENCE BOOKS:

3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress, 2019.
4. Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', 1st edition, Apress, 2018.
5. Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications Using React and Redux, 2nd edition, Addison-Wesley Professional, 2018.

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							1		3		2		
CO2	3			2	1								2		
CO3		1			2						3			2	
CO4	2	1			3									2	
CO5		1			2						3		2		

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C6917	**Internet of Things** (Professional Elective – III) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		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 **[9 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 Managementwith NETCONF-YANG

MODULE – III **[9 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 **[9 Periods]**

Case studies- Home Automation, Environment-weather monitoring-weather reporting- air pollution monitoring, Agriculture.

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Identify the applications of IoT in Industry.

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.

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	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3							3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3							3	3	3	3

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0534	**Scripting Languages**	L	T	P
Credits: 3	(Professional Elective – III) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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: **[9 Periods]**

Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

MODULE – III Introduction to PERL and Scripting **[10 Periods]**

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 andregular expressions, subroutines.

MODULE – IV Advanced perl **[9 Periods]**

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.

Course Outcomes:

- Comprehend the differences between typical scripting languages and typical system and application programming languages.
- Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
- Acquire programming skills in scripting language

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.Leeand 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.

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

	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	2	2	2	3	3	-	-	-	-	2	-	2	2	2	3
CO 2	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 3	2	2	2	3	3	-	-	-	-	1	-	2	1	2	2
CO 4	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 5	2	2	1	3	3	-	-	-	-	1	-	2	3	3	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0535	**Mobile Application Development**	L	T	P
Credits: 3	(Professional Elective – III) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	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 **[10 Periods]**

Introduction to Android Operating System: 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 **[10 Periods]**

Android User Interface: Measurements – Device and pixel density independent measuring Module - 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 **[10 Periods]**

Intents and Broadcasts: 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 andusing Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

MODULE – IV **[9 Periods]**

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving andretrieving data using Shared Preference

MODULE – V **[9 Periods]**

Database – Introduction to SQLite database, creating and opening a database, creating tables, insertingretrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

Course Outcomes

- Understand the working of Android OS Practically.
- Develop Android user interfaces
- Develop, deploy and maintain the Android Applications.

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

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		2	2	2						2	2	2
CO2		3		3	2	2	1				2		3	2	2
CO3	2	3	3	2	2	2	2				1		3	3	2
CO4		3		2	2	2	2							3	
CO5		3		2	2	2	2							3	

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0536	**Software Testing Methodologies** (Professional Elective – III) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		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 **[10 Periods]**

Introduction: 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 **[10 Periods]**

Transaction Flow Testing: transaction flows, transaction flow testing techniques.

Data Flow testing: Basics of data flow testing, strategies in data flow testing, application of data flowtesting.

Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfacestesting, domain and interface testing, domains and testability.

MODULE – III **[10 Periods]**

Paths, Path products and Regular expressions: 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 **[10 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).

Course Outcomes:

- Understand purpose of testing and path testing

- Understand strategies in data flow testing and domain testing
- Develop logic-based test strategies
- Understand graph matrices and its applications
- Implement test cases using any testing automation tool

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.

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	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3							3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3							3	3	3	3

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0	OEC-I	L	T	P
Credits: 3		3	-	-

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C6626	**Machine Learning Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:1		-	-	2

Pre-requisites: Python Programming
Software Requirements: Python

Course Objective:

- The objective of this lab is to get an overview of the various machine learning techniques and can demonstrate them using python.

List of Experiments:

1. Write a python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for ML application such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

Course Outcomes:

- Understand modern notions in predictive data analysis
- Select data, model selection, model complexity and identify the trends
- Understand a range of machine learning algorithms along with their strengths and weaknesses
- Build predictive models from data and analyze their performance

TEXT BOOK:

1. Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOK:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

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	
CO2		3							2		1				2
CO3		3								2	1		3		

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:C0H03	Advanced English Communication Skills Lab (Common for All)	L	T	P
Credits:1		-	-	2

Prerequisites: Nil

Software Requirements: Presentation Skills Lab Software

1. INTRODUCTION:

The introduction of the Advanced English Communication Skills Lab is considered essential at the B.Tech 3rd year level. At this stage, the students need to prepare themselves for their career which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use appropriate English and perform the following:

1. Gathering ideas and information to organise ideas relevantly and coherently.
2. Making oral presentations.
3. Writing formal letters.
4. Transferring information from non-verbal to verbal texts and vice-versa.
5. Writing project/research reports/technical reports.
6. Participating in group discussions.
7. Engaging in debates.
8. Facing interviews.
9. 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, with a focus on vocabulary
- To enable them to listen to English spoken at normal conversational speed by educated English speakers
- To respond appropriately in different socio-cultural and professional contexts
- To communicate their ideas relevantly and coherently in writing
- To prepare the students for placements.

3. Syllabus:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Listening and Reading Comprehension:** Active Listening – Development of Listening Skills Through Audio clips - Benefits of Reading – Methods and Techniques of Reading Basic Steps to Effective Reading – Common Obstacles – Discourse Markers or Linkers – Subskills of reading - Reading for facts, negative facts and Specific Details- Guessing Meanings from Context, Inferring Meaning - Critical Reading — Reading

Comprehension – Exercises for Practice.

2. **Activities on Writing Skills:** Vocabulary for Competitive Examinations - Planning for Writing – Improving Writing Skills - Structure and presentation of different types of writing – Free Writing and Structured Writing - Letter Writing –Writing a Letter of Application –Resume vs. Curriculum Vitae – Writing a Résumé – Styles of Résumé - e-Correspondence – Emails – Blog Writing - (N)etiquette – Report Writing – Importance of Reports – Types and Formats of Reports– Technical Report Writing– Exercises for Practice.
3. **Activities on Presentation Skills -** Starting a conversation – responding appropriately and relevantly – using the right language and body language – Role Play in different situations including Seeking Clarification, Making a Request, Asking for and Refusing Permission, Participating in a Small Talk – Oral presentations (individual and group) through JAM sessions- PPTs – Importance of Presentation Skills – Planning, Preparing, Rehearsing and Making a Presentation – Dealing with Glossophobia or Stage Fear – Understanding Nuances of Delivery - Presentations through Posters/Projects/Reports – Checklist for Making a Presentation and Rubrics of Evaluation
4. **Activities on Group Discussion (GD**): Types of GD and GD as a part of a Selection Procedure - Dynamics of Group Discussion- Myths of GD - Intervention, Summarizing - Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas – Do's and Don'ts - GD Strategies – Exercises for Practice.
5. **Interview Skills:** Concept and Process - Interview Preparation Techniques - Types of Interview Questions – Pre-interview Planning, Opening Strategies, Answering Strategies - Interview Through Tele-conference & Video-conference - 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
- One PC with latest configuration for the teacher
- 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.
   - **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
   - **Oxford Advanced Learner's Dictionary,** 10th Edition
   - **Cambridge Advanced Learner's Dictionary**
   - **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
   - **Lingua TOEFL CBT Insider,** by Dreamtech

Books Recommended:

1. Rizvi, M. Ashraf (2018). Effective Technical Communication. (2nd ed.). McGraw Hill Education (India) Pvt. Ltd.
2. Suresh Kumar, E. (2015). Engineering English. Orient BlackSwan Pvt. Ltd.
3. Bailey, Stephen. (2018). Academic Writing: A Handbook for International Students. (5th Edition). Routledge.
4. Koneru, Aruna. (2016). Professional Communication. McGraw Hill Education (India) Pvt. Ltd.
5. Raman, Meenakshi & Sharma, Sangeeta. (2022). Technical Communication, Principles and Practice. (4TH Edition) Oxford University Press.
6. Anderson, Paul V. (2007). Technical Communication. Cengage Learning Pvt. Ltd. New Delhi.
7. McCarthy, Michael; O'Dell, Felicity & Redman, Stuart. (2017). English Vocabulary in Use Series. Cambridge University Press
8. Sen, Leela. (2009). Communication Skills. PHI Learning Pvt Ltd., New Delhi.
9. Elbow, Peter. (1998). Writing with Power. Oxford University Press.
10. Goleman, Daniel. (2013). Emotional Intelligence: Why it can matter more than IQ. Bloomsbury Publishing.

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

	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	3	2	2	3	3	-	-	-	-	2	-	2	2	2	3
CO 2	2	2	2	3	3	-	-	-	-	1	-	1	2	2	2
CO 3	2	2	2	3	3	-	-	-	-	1	-	2	1	2	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0538	**Full Stack Development Lab**	L	T	P
Credits:1	(Professional Elective-III Lab) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	-	-	2

Pre-Requisites:

1. Object Oriented Programming
2. Web Technologies

Software Requirements: Microsoft Visual Studio, XAMPP Server, NodeJS, and MongoDB Server

Course Objectives:

- Introduce fast, efficient, interactive and scalable web applications using run time environment provided by the full stack components.

List of Experiments:

1. Create an application to setup node JS environment and display "Hello World".
2. Create a Node JS application for user login system.
3. Write a Node JS program to perform read, write and other operations on a file.
4. Write a Node JS program to read form data from query string and generate response using NodeJS
5. Create a food delivery website where users can order food from a particular restaurant listed in the website for handling http requests and responses using NodeJS.
6. Implement a program with basic commands on databases and collections using MongoDB.
7. Implement CRUD operations on the given dataset using MongoDB.
8. Perform Count, Limit, Sort, and Skip operations on the given collections using MongoDB.
9. Develop an angular JS form to apply CSS and Events.
10. Develop a Job Registration form and validate it using angular JS.
11. Write an angular JS application to access JSON file data of an employee from a server using $http service.
12. Develop a web application to manage student information using Express and Angular JS
13. Write a program to create a simple calculator Application using React JS.
14. Write a program to create a voting application using React JS.
15. Develop a leave management system for an organization where users can apply different types of leaves such as casual leave and medical leave. They also can view the available number of days using react application.
16. Build a music store application using react components and provide routing among the web pages.
17. Create a react application for an online store which consist of registration, login, product information pages and implement routing to navigate through these pages.

Course Outcomes:

- Design flexible and responsive Web applications using Node JS, React, Express and Angular.
- Perform CRUD operations with MongoDB on huge amount of data.
- Develop real time applications using react components.

- Use various full stack modules to handle http requests and responses.

TEXT BOOKS:

1. Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular Web Development, 2nd Edition, Addison-Wesley,2019.
2. Mark Tielens Thomas., React in Action, 1st Edition, Manning Publications.

REFERENCE BOOKS:

1. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd 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', 1st edition, Apress, 2018.
3. Brad Green& Seshadri. Angular JS. 1st Edition. O'Reilly Media, 2013.
4. Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications Using React and Redux, 2nd edition, Addison-Wesley Professional, 2018.

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	2	2	
CO2		2	2	2	2							2	2	2	
CO3		2	2	2	2							2	2	2	

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C6918	**Internet of Things Lab**	**L**	**T**	**P**
Credits:1	**(Professional Elective-III Lab)** **(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)**	**-**	**-**	**2**

Pre-Requisites: Nil

Software Requirements: Aurdino and Raspberry Pi 3

Course Objectives:

- To introduce the raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of distance sensor on IoT devices

List of Experiments:

1. Using Raspberry pi
    a. Calculate the distance using a distance sensor.
    b. Interface an LED and switch with Raspberry pi.
    c. Interface an LDR with Raspberrry Pi.

2. Using Arduino
    a. Calculate the distance using a distance sensor.
    b. Interface an LED and switch with Aurdino.
    c. Interface an LDR with Aurdino
    d. Calculate temperature using a temperature sensor.

3. Using Node MCU
    a. Calculate the distance using a distance sensor.
    b. Interface an LED and switch with Raspberry pi.
    c. Interface an LDR with Node MCU
    d. Calculate temperature using a temperature sensor.

4. Installing OS on Raspberry Pi
    a) Installation using PiImager
    b) Installation using image file
        - Downloading an Image
        - Writing the image to an SD card
            - using Linux
            - using Windows
        - Booting up Follow the instructions given in the URL https://www.raspberrypi.com/documentation/computers/getting-started.html

5. Accessing GPIO pins using Python

a) Installing GPIO Zero

library. update

your repositories

list:

install the package for Python 3:

b) Blinking an LED connected to one of the GPIO pin

c) Adjusting the brightness of an LED Adjust the brightness of an LED (0 to 100, where 100means maximum brightness) using the in-built PWM wavelength.

6. Create a DJANGO project and an app.
7. Create a DJANGO view for weather station REST API
8. Create DJANGO template
9. Configure MYSQL with DJANGO framework

Course Outcomes:

- Ability to introduce the concept of M2M (machine to machine) with necessary protocols andget awareness in implementation of distance sensor
- Get the skill to program using python scripting language which is used in many IoT device.

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, UniversitiesPress, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,ISBN: 9789350239759.

REFERENCE BOOKS:

1. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016
2. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

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

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0539	**Scripting Languages Lab** (Professional Elective-III Lab) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:1		-	-	2

Prerequisites: Any High level programming language (C, C++)

Software Requirements: Ruby, TCL, and Perl

Course Objectives:

- To Understand the concepts of scripting languages for developing web based projects
- To understand the applications the of Ruby, TCL, Perl scripting languages

LIST OF EXPERIMENTS:

1. Write a Ruby script to create a new string which is n copies of a given string where n is a non-negativeinteger
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter andarea.
3. Write a Ruby script which accept the users first and last name and print them in reverse order with aspace between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return theirsum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other isgreater than 100
9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student storedin a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for sorting a list using a comparison function
14. Write a TCL script to (i) create a list (ii) append elements to the list (iii) Traverse the list (iv)Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17. a) Write a Perl script to find the largest number among three numbers.
    b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.
18. Write a Perl program to implement the following list of manipulating functions
    a) Shift
    b) Unshift

c) Push

19. a) Write a Perl script to substitute a word, with another word in a string.

b) Write a Perl script to validate IP address and email address.

20. Write a Perl script to print the file in reverse order using command line arguments

Course Outcomes:

- Ability to understand the differences between Scripting languages and programming languages
- Gain some fluency programming in Ruby, Perl, TCL

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.Leeand 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.

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	-	-	-	-	2	2	1	-	1	2	2	2
CO2	3	3	2	2	1	-	-	2	2	1	-	2	3	2	2
CO3	3	3	3	1	1	-	-	2	2	1	-	2	3	1	1

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0540	**Mobile Application Development Lab** (Professional Elective-III Lab) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:1		-	-	2

Prerequisites: -- NIL

Course Objectives:

- To learn how to develop Applications in an android environment.
- To learn how to develop user interface applications.
- To learn how to develop URL related applications.

Software Requirements: Android

LIST OF EXPERIMENTS:

1. Create an Android application that shows Hello + name of the user and run it on an emulator.

(b) Create an application that takes the name from a text box and shows hello message along with thename entered in the text box, when the user clicks the OK button.

2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Datepicker), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on the right fragment instead of the second screen with the back button. Use Fragment transactions and Rotation event listeners.
4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
6. Create an application that uses a text file to store usernames and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login issuccessful. Otherwise, show the dialog with a Login Failed message.
7. Create a user registration application that stores the user details in a database table.
8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. Create an admin application for the user table, which shows all records as a list and the admin

canselect any record for edit or modify. The results should be reflected in the table.

10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.
11. Create an application that saves user information like name, age, gender etc. in shared preferenceand retrieves them when the program restarts.
12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

Course Outcomes:

- Understand the working of Android OS Practically.
- Develop user interfaces.
- Develop, deploy and maintain the Android Applications.

TEXT BOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage, 2013.

REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

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											

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C0541	**Software Testing Methodologies Lab** (Professional Elective-III Lab) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:1		-	-	2

Prerequisites: A basic knowledge of programming.

Software Requirements: JDK and Selenium - IDE

Course Objectives:

- To provide knowledge of software testing methods.
- To develop skills in automation of software testing and software test automation managementusing the latest tools.

List of Experiments:

1. Recording in context sensitive mode and analog mode
2. GUI checkpoint for single property
3. GUI checkpoint for single object/window
4. GUI checkpoint for multiple objects
5.
    a. Bitmap checkpoint for object/window
    b. Bitmap checkpoint for screen area
6. Database checkpoint for Default check
7. Database checkpoint for custom check
8. Database checkpoint for runtime record check
9.
    a. Data driven test for dynamic test data submission
    b. Data driven test through flat files
    c. Data driven test through front grids
    d. Data driven test through excel test
10.
    a. Batch testing without parameter passing
    b. Batch testing with parameter passing
11. Data driven batch
12. Silent mode test execution without any interruption
13. Test case for calculator in windows application

Course Outcomes:

- Design and develop the best test strategies in accordance with the development model.
- Design and develop GUI, Bitmap and database checkpoints
- Develop database checkpoints for different checks
- Perform batch testing with and without parameter passing

TEXT BOOKS:

1. Software Testing techniques, Baris Beizer, 2nd Edition, Dreamtech.

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.

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

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C00P1	Industrial Oriented Mini Project/Internship/ Skill Development Course (Big Data-Spark)	L	T	P
Credits: 2		-	-	4

Prerequisites: MySQL

Software Requirements: Hadoop and Spark

Course Objectives:

- The main objective of the course is to process Big Data with advance architecture like spark and streaming data in Spark

List of Experiments:

1. To Study of Big Data Analytics and Hadoop Architecture
   (i) know the concept of big data architecture
   (ii) know the concept of Hadoop architecture

2. Loading DataSet in to HDFS for Spark
   Analysis Installation of Hadoop and cluster
   management
   (i) Installing Hadoop single node cluster in ubuntu environment
   (ii) Knowing the differencing between single node clusters and multi-node clusters
   (iii) Accessing WEB-UI and the port number
   (iv) Installing and accessing the environments such as hive and sqoop

3. File management tasks & Basic linux commands
   (i) Creating a directory in HDFS
   (ii) Moving forth and back to directories
   (iii) Listing directory contents
   (iv) Uploading and downloading a file in HDFS
   (v) Checking the contents of the file
   (vi) Copying and moving files
   (vii) Copying and moving files between local to HDFS environment
   (viii) Removing files and paths
   (ix) Displaying few lines of a file
   (x) Display the aggregate length of a file
   (xi) Checking the permissions of a file
   (xii) Zipping and unzipping the files with & without permission pasting it to a location
   (xiii) Copy, Paste commands

4. Map-reducing
   (i) Definition of Map-reduce
   (ii) Its stages and terminologies Word-count program to understand map-reduce
   (iii) (Mapper phase, Reducer phase, Driver code)
5. Implementing Matrix-Multiplication with Hadoop Map-reduce
6. Compute Average Salary and Total Salary by Gender for an Enterprise.
7. (i) Creating hive tables (External and internal)
   (ii) Loading data to external hive tables from sql tables(or)Structured c.s.v using scoop
   (iii) Performing operations like filterations and updations
   (iv) Performing Join (inner, outer etc)
   (v) Writing User defined function on hive tables

8. Create a sql table of employees Employee table with id,designation Salary table (salary

,dept id) Create external table in hive with similar schema of above tables,Move data to hive using scoop and load the contents into tables,filter a new table and write a UDF to encrypt the table with AES-algorithm, Decrypt it with key to show contents

9. (i) Pyspark Definition(Apache Pyspark) and difference between Pyspark, Scala, pandas
   (ii) Pyspark files and class methods
   (iii) get(file name)
   (iv) get root directory()
10. Pyspark -RDD'S
   (i) what is RDD's?
   (ii) ways to Create RDD
   (iii) parallelized collections
   (iv) external dataset
   (v) existing RDD's
   (vi) Spark RDD's operations (Count, foreach(), Collect, join,Cache()

11. Perform pyspark transformations
   (i) map and flatMap
   (ii) to remove the words, which are not necessary to analyze this text.
   (iii) groupBy
   (iv) What if we want to calculate how many times each word is coming in corpus?
   (v) How do I perform a task (say count the words 'spark' and 'apache' in rdd3) separately oneach partition and get the output of the task performed in these partition?
   (vi) unions of RDD
   (vii) join two pairs of RDD Based upon their key

12. Pyspark sparkconf-Attributes and applications
   (i) What is Pyspark spark conf ()
   (ii) Using spark conf create a spark session to write a dataframe to read details in a c.s.v andlater move that c.s.v to another location

Course Outcomes:

- Develop MapReduce Programs to analyze large dataset Using Hadoop and Spark
- Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its components
- Perform the filter, count, distinct, map, flatMap RDD Operations in Spark.
- Build Queries using Spark SQL
- Apply Spark joins on Sample Data Sets
- Make use of sqoop to import and export data from hadoop to database and vice-versa

TEXT BOOKS:

1. Spark in Action, Marko Bonaci and Petar Zecevic, Manning.
2. PySpark SQL Recipes: With HiveQL, Dataframe and Graphframes, Raju Kumar Mishra and Sundar Rajan Raman, Apress Media.

WEB LINKS:

1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0133015058445189 12251 8 2_shared/overview
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0125838811963883 5242_s hared/overview
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0126052684230082 56169 2 _shared/overview

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		
CO2			3										3	2	
CO3			3				2					2		3	

2022-23 Onwards (MR-22)	**MALLAREDDYENGINEERING COLLEGE (Autonomous)**	**B.Tech. VI Semester**		
Code: C00M4	**Quantitative Aptitude and Verbal Reasoning – II (Common for All)**	**L**	**T**	**P**
Credits: Nil		**2**	**-**	**-**

Module – I Quants: Number System (NS) [8 Periods]

- **Number Systems-** *Factors and Multiples: The H.C.F. of two or more than two numbers; Factorization Method Division Method; Finding the H.C.F. of more than two numbers; product of two numbers = Product of their H.C.F. and L.C.M.; Co-primes; H.C.F. and L.C.M. of Fractions: Comparison of Fractions.*

Verbal: Articles, Para Jumbles

- **Articles-** *Types of articles, Countable nouns, Uncountable nouns, Usage of articles, Omission of articles.*
- **Para Jumbles**- *Para Jumbles, Types of Para Jumbles, Strategies to answer questions on Jumbled Paragraphs.*

Logical: Data Arrangements, Blood Relation

- **Data Arrangements-** *Linear Arrangement, Circular Arrangement, Multi-Dimensional Arrangement.*
- **Blood Relations-** *Classification of blood relations, Pointing a person, Equation related problems.*

Module – II [6 Periods]

Quants: Time and Distance, Pipes

- **Time & Distance-***; Km/hr to m/sec conversion; m/sec to km/hr conversion**;** man covers a certain distance at x km/hr and an equal distance at y km/hr*

Verbal: Sentence Completion, Prepositions

- **Sentence Completion-** *Formats of Question; Strategies to solve sentence completion questions- Proactive and reactive solving, Identifying clues- Signposts, Types of signposts, Root words, Sentence structure clues.*
- **Prepositions-** *Definition, Types of prepositions, Preposition of Place, Preposition of Time, Preposition of Direction, Compound Prepositions, Prepositional Phrases.*

Logical: Coding and Decoding

- **Coding and Decoding-** *Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.*

Module–III **[6 Periods]**

Quants: Ages, Progression, Logarithms

- **Ages, Progression-***; Arithmetic progression; Arithmetic mean; Geometric progression and mean*
- **Logarithms-** *Why logarithms: Properties of Logarithms: Laws of logarithm: Characteristic of logarithm:*

Verbal: Vocabulary

- **Vocabulary-** *Etymology, Root Words, Prefixes and Suffixes; Synonyms and Antonyms, Tips to solve questions on Synonyms and Antonyms; Word Analogy, Patterns of questions on Word Analogy; Miscellaneous Vocabulary.*

Logical: Data Interpretation and Data Sufficiency

- **Data Interpretation-** *Tables, Pie charts, Bar Graphs, Line graphs*
- **Data Sufficiency-** *Strategies to solve.*

Module – IV **[6 Periods]**

Quants: Permutations and Combinations, Probability

- **Permutations-** *Factorial Notation: The different arrangements; Number of Permutations: number of all permutations of n things, taken all at a time; n subjects of which p_1 are alike of one kind; p_2 are alike of another kind; p_3 are alike of third kind; Number of Combinations: The number of all combinations of n things, taken r at a time.*

Verbal: Sentence Correction

- **Sentence Correction-** *Subject-Verb Agreement; Modifiers; Parallelism; Pronoun- Antecedent Agreement; Verb Time Sequence; Comparisons; Determiners; Exercise Questions.*

Logical: Clocks and Calendars

- **Clocks:** *Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.*
- **Calendars:** *- Leap year-Non leap year, Odd days, Finding the day from date, Repeated years.*

Module - V: **[6 Periods]**

Quants: Areas and Volumes (Mensuration)

- **Areas & Volumes-** *Pythagoras Theorem Results on Quadrilaterals Perimeter; Area of a circle Circumference Length of an arc Area of a sector; Area of a triangle.*

Verbal: Reading Comprehension, Critical Reasoning

- **Reading Comprehension-** *Speed reading strategies; Reading Comprehension - types of questions, tackling strategies; Critical Reasoning.*

Logical: Directions, Cubes, Syllogisms

- **Directions -** *Introduction, Direction based questions, Shadow based problems.*
- **Cubes**- *Cube & cuboid concepts, 3-2-1-0 faced problems.*
- **Syllogisms**- *Statements and Conclusion, Syllogisms using Venn Diagrams.*

CO- PO-PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes(POs)												PSOs		
CO S	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	2	3	3	-	-	-	-	2	-	2	2	2	3
CO 2	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 3	2	2	2	3	3	-	-	-	-	1	-	2	1	2	2
CO 4	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 5	2	2	1	3	3	-	-	-	-	1	-	2	3	3	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: C00M5	Constitution of India (Common for All)	L	T	P
Credits: Nil		3	-	-

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Module - I **[8 Periods]**

History of Making of the Indian Constitution- History of Drafting Committee.

Module - II **[8 Periods]**

Philosophy of the Indian Constitution- Preamble Salient Features

Module - III **[8 Periods]**

Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Module - IV **[8 Periods]**

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Module - V **[8 Periods]**

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Module - VI **[8 Periods]**

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.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed theconceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
- Discuss the passage of the Hindu Code Bill of 1956.

Suggested Reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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

	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	2	2	2	3	3	-	-	-	-	2	-	2	2	2	3
CO 2	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 3	2	2	2	3	3	-	-	-	-	1	-	2	1	2	2
CO 4	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 5	2	2	1	3	3	-	-	-	-	1	-	2	3	3	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0542	**Compiler Design** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites

1. A course on "Formal Languages and Automata Theory".
2. A course on "Computer Organization and architecture".
3. A course on "Data Structures".

Course Objectives:

- 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, code optimization techniques, intermediate code generation, code generation and data flow analysis.

MODULE – I **[10 Periods]**

Introduction: The structure of a compiler, the science of building a compiler, programming language basics

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of aLexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

MODULE – II **[10 Periods]**

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, Using Ambiguous Grammars and Parser Generators.

MODULE – III **[10 Periods]**

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing

L-AttributedSDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

MODULE – IV **[9 Periods]**

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation

MODULE – V **[10 Periods]**

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination,Loops in Flow Graphs.

Course Outcomes:

- Demonstrate the ability to design a compiler given a set of language features.
- Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool & yacc tool for developing a scanner and parser.
- Design and implement LL and LR parsers
- Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
- Design algorithms to generate machine code.

TEXT BOOK:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

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										2	2		
CO2	3	2										2	2		

REFERENCE BOOKS:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson.

CO3	2	3										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2	2		

2022-23 Onwards (MR-22)	**MALLAREDDYENGINEERING COLLEGE (Autonomous)**	**B.Tech. VII Semester**		
Code: C6203	**Cryptography and Network Security** **(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Course Objectives:

- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection

MODULE – I **[10 Periods]**

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

MODULE – II **[9 Periods]**

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipheroperation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

MODULE – III **[10 Periods]**

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service,

Public — Key Infrastructure

MODULE – IV **[9 Periods]**

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN,IEEE 802.11i Wireless LAN Security

MODULE – V **[10 Periods]**

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations,Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

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
CO2		3							2		1			2	
CO3		3								2	1		3		
CO4		3		2	1								2		
CO5				2			3				1				

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0543	**Graph Theory** (Professional Elective -IV) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

- Understanding graphs, trees, connected paths, applications of trees and graphs.

MODULE – I **[10 Periods]**

Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

MODULE – II **[9 Periods]**

Connected graphs and shortest paths - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra‟s shortest path algorithm, Floyd-Warshall shortest path algorithm.

MODULE – III **[10 Periods]**

Trees- Definitions and characterizations, Number of trees, Cayley‟s formula, Kirchoↄ-matrix-tree theorem, Minimum spanning trees, Kruskal‟s algorithm, Prim‟s algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury‟s algorithm, Chinese Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

MODULE – IV **[9 Periods]**

Independent sets coverings and matchings– Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall‟s Theorem, K¨onig‟s Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

MODULE – V **[10 Periods]**

Vertex Colorings- Basic definitions**,** Cliques and chromatic number, Mycielski‟s theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

Course Outcomes:

- Know some important classes of graph theoretic problems;
- Prove central theorems about trees, matching, connectivity, coloring and planar graphs;
- Describe and apply some basic algorithms for graphs;
- Use graph theory as a modeling tool.

TEXT BOOKS:

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS:

1. Lecture Videos: http://nptel.ac.in/courses/111106050/13
2. Introduction to Graph Theory, Douglas B. West, Pearson.

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
CO2		3							2		1			2	
CO3		3								2	1		3		
CO4		3		2	1								2		
CO5				2			3				1				

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0544	**Advanced Operating Systems** (Professional Elective -IV) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

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 **[10 Periods]**

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 **[10 Periods]**

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 **[9 Periods]**

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 **[10 Periods]**

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 **[10 Periods]**

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, MemoryCoherence, Coherence Protocols, Design Issues

Course Outcomes

- Understand the design approaches of advanced operating systems
- Analyze the design issues of distributed operating systems.
- Evaluate design issues of multi processor operating systems.
- Identify the requirements Distributed File System and Distributed Shared Memory.
- Formulate the solutions to schedule the real time applications.

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

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 (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0545	**Soft Computing** (Professional Elective -IV) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

- Familiarize with soft computing concepts
- Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
- Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
- Learn the concepts of Genetic algorithm and its applications
- Acquire the knowledge of Rough Sets.

MODULE – I **[10 Periods]**

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

MODULE- II **[9 Periods]**

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

MODULE- III **[9 Periods]**

Fuzzy Decision Making, Particle Swarm Optimization

MODULE- IV **[10 Periods]**

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

MODULE- V **[10 Periods]**

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

Course Outcomes:

- Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
- Understand fuzzy logic and reasoning to handle and solve engineering problems
- Apply the Classification techniques on various applications.
- Perform various operations of genetic algorithms and Rough Sets.

TEXT BOOK:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha –Cengage Learning

REFERENCE BOOKS:

1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India,2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill Internationaleditions, 1995

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				3	2	2	2		2	
CO2	2	3	3									2	2		
CO3	2	3	2									2	2	1	
CO4	2	3	2									2		2	
CO5	2	3	2									2	2		

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0546	**Cloud Computing** (Professional Elective -IV) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Pre-requisites:

1. A course on "Computer Networks".
2. A course on "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 **[9 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, SoftwareDevelopment 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 **[9 Periods]**

Security in Cloud Computing, and Advanced Concepts in Cloud Computing

Course Outcomes:

- Understand different computing paradigms and potential of the paradigms and specifically cloud computing
- Understand cloud service types, cloud deployment models and technologies supporting and driving the cloud
- Acquire the knowledge of programming models for cloud and development of software application that runs the cloud and various services available from major cloud providers
- Understand the security concerns and issues in cloud computing
- Acquire the knowledge of advances 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

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											
CO4	2	2	2	2										2	2
CO5	1	2													

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0547	Ad hoc & Sensor Networks (Professional Elective -IV) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites

1. Computer Networks
2. Distributed Systems
3. 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 Introduction to Ad Hoc Networks [10 Periods]

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 algorithms- Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies, Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

MODULE - II Data Transmission [10 Periods]

Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area- based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

MODULE – III Geocasting [10 Periods]

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 Basics of Wireless Sensors and Lower Layer Issues [9 Periods]

-Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

MODULE - V Upper Layer Issues of WSN [9 Periods]

Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

Course Outcomes

- Understand the concepts of sensor networks and applications
- Understand and compare the MAC and routing protocols for adhoc networks
- Understand the transport protocols of sensor networks

TEXT BOOKS

1. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P.Aggarwal,* WorldScientific 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.

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		
CO2	3	3	3	2	1								3	2		
CO3	3	3	3	2	1								3	2		
CO4	3	3										2	3	1		
CO5	3	3	3	2	1	1						1	3	2		

2022-23 Onwards (MR-22)	MALLAREDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester			Pre-
Code: C0548	**Advanced Algorithms**	**L**	**T**	**P**	
Credits: 3	**(Professional Elective -V)** **(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)**	**3**	**-**	**-**	

Requisites: Algorithm Design and Analysis

Course Objectives:

- To familiarize advanced methods on analysis of algorithms.
- To familiarize with graphs and algorithms related shortest path
- To understand matrix computations and modulo representations
- To introduce randomized, approximation algorithms and computational complexity topics

MODULE – I **[10 Periods]**

Introduction to Algorithms, Classification of Algorithms, Asymptotic Analysis, Introduction to Recurrence equations - Linear recurrences, Non-linear recurrences, Formulation of recurrence equations, techniques for solving recurrence equations, Solving recurrence equations using polynomial reduction,Master's theorem

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-

weighted case (Dijkstra's), depth-first search and computation of strongly connected components, Multistage Graph, topological sorting

MODULE – II **[10 Periods]**

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path, Bipartite matching problem

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set, Optimal tree problems- optimal merge, huffman coding, tree vertex splitting problem. **Shortest Path in Graphs:** Floyd-Warshall algorithm, Travelling Sales Person Problem and introduction to dynamic programming paradigm. Optimal Graph Problems - Minimum Spanning Tree, Single sourceshortest path.

MODULE – III **[9 Periods]**

Flow-Networks: Maxflow - mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, Chain Matrix Multiplication, Matrix operations – Gaussian Elimination method, LUP-decomposition, Crout's method of decomposition, inverse of a triangular matrix,

MODULE – IV **[9 Periods]**

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation, interpolation problem. Multiplication of long integers by using Divide and Conquer paradigm, Schonhage-Strassen's Integer Multiplication algorithm.

String Algorithms: Naïve String, Rabin Karp, KMP, Boyer Moore, Harspool algorithms

MODULE – V **[10 Periods]**

Basics of Computational Complexity: Introduction to computational complexity, complexity classes, Satisfiability problem and Cook's theorem, Examples of NP- Complete problems

Randomized algorithms: Introduction, Types of Randomized algorithms, Example of Randomizedalgorithms.

Approximation algorithms: Introduction, Types of Approximation algorithms, Examples of Approximation algorithms

Course Outcomes:

- Familiarize with advanced methods on analysis of algorithms
- Familiarize with the graphs, graph matching and shortest path algorithms
- Understand matrix computations and modulo representations
- Understand randomized, approximation algorithms and computational complexity topics

TEXT BOOK:

1. Design and Analysis of Algorithms, S. Sridhar, Oxford University Press.

REFERENCE BOOKS:

1. Introduction to Algorithms, Cormen, Leiserson, Rivest, Stein.
2. The Design and Analysis of Computer Algorithms, Aho, Hopcroft, Ullman.
3. Algorithm Design, Kleinberg and Tardos.

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0549	**Agile Methodology** (Professional Elective -V) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

- Knowledge on concepts of agile development, releasing, planning and developing

MODULE – I **[10 Periods]**

Introduction Extreme Programming (XP) - Agile Development

Why Agile?, Understanding Success, Beyond Deadlines, Importance of Organizational Success, Introduction to Agility, Agile methods-Scrum and XP, Manifesto for Agile Software Development, Principles of Agile Process. Understanding XP (Extreme Programming) - XP life cycle, XP team, XP Concepts, Adopting XP - Knowing whether XP is suitable, Implementing XP, assessing Agility, Practicing XP - Thinking, Pair Programming, Energized work, Informative Workspace, Root cause Analysis, Retrospectives.

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	2	2	2				2	1	1	3	3	2	2
CO2	3	3	2	2	2				2	1	1	3	3	2	1
CO3	3	3	3	2	2				1			3	3	2	1
CO4	3	2	3	2	2				1		1	2	3	2	1
CO5	3	3	3	2	2				1	1	1	2	3	2	1

MODULE - II Collaborating **[10 Periods]**

Trust, Sit together, Real customer involvement, Ubiquitous language, Stand-Up meetings, coding standards, Iteration demo, Reporting.

MODULE - III Releasing **[9 Periods]**

Bugfree Release, Version Control, Ten-Minute Build, continuous integration, Collective ownership

andDocumentation.

MODULE – IV Planning [9 Periods]

Version, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories,and Estimating

MODULE - V Developing [10 Periods]

Incremental requirements, Customer tests, Test driven development, Refactoring, Incremental designand architecture, spike solutions, Performance optimization, Exploratory testing.

Course Outcomes:

- Identify basic concepts of agile methodology and Extreme programming
- Analyze real customer involvement in collaboration
- Discuss risk management and iteration planning
- Understanding incremental requirements, refactoring, incremental design and architecture

TEXT BOOK:

1. The art of Agile Development, James Shore and Shane Warden, 11th Indian Reprint, O'Reilly, 2018.

REFERENCE BOOKS:

1. Learning Agile, Andrew Stellman and Jennifer Greene, O'Reilly, 4th Indian Reprint, 2018
2. Practices of an Agile Developer, Venkat Subramaniam and Andy Hunt, SPD, 5th Indian Reprint, 2015
3. Agile Project Management - Jim Highsmith, Pearson Low price Edition 2004

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

	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	3	3	2	2	3	-	-	-	-	2	2	2	2	2	2
CO 2	3	2	2	1	2	-	-	-	-	1	2	1	2	1	2
CO 3	2	2	2	2	2	-	-	-	-	1	1	2	1	2	1
CO 4	3	2	2	2	2	-	-	-	-	1	2	2	2	2	2
CO 5	2	2	1	2	2	-	-	-	-	1	1	2	3	3	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0550	**Blockchain Technology**	L	T	P
Credits: 3	(Professional Elective -V) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	3	-	-

Prerequisites:

1. Knowledge in information security and applied cryptography.
2. Knowledge in Computer Networks

Course Objectives:

- To learn the fundamentals of Blockchain and various types of block chain and consensus mechanisms.
- To understand the public block chain system, Private block chain system and consortium blockchain.
- Able to know the security issues of blockchain technology.

MODULE-I **[9 Periods]**

Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future.

Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Typesof Blockchain, Consensus Protocol.

Cryptocurrency — Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency,Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

MODULE-II **[9 Periods]**

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The BitcoinBlockchain, Ethereum Blockchain.

Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of SmartContracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

MODULE-III **[10 Periods]**

Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Need of Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, ByzantineFault, Multichain.

Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda.

Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

MODULE-IV **[10 Periods]**

Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric.

Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain In Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

MODULE -V **[10 Periods]**

Blockchain Case Studies: Case Study 1 – Retail, Case Study 2 – Banking and Financial Services, Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities.

Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor, Basic Programming Using Python, Python Packages for Blockchain.

Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

Course Outcomes:

- Understanding concepts behind crypto currency
- Applications of smart contracts in decentralized application development
- Understand frameworks related to public, private and hybrid blockchain
- Create blockchain for different application case studies

TEXT BOOK:

1. "Blockchain Technology", Chandramouli Subramanian, Asha A. George, Abhilasj K A and Meena Karthikeyan, Universities Press.

REFERENCE BOOKS:

1. Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2. Blockchain Blueprint for Economy, Melanie Swan, SPD O'reilly.
3. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson.

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

	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	3	3	2	2	3	-	-	-	-	2	2	2	2	2	2
CO 2	3	2	2	1	2	-	-	-	-	1	2	1	2	1	2
CO 3	2	2	2	2	2	-	-	-	-	1	1	2	1	2	1
CO 4	3	2	2	2	2	-	-	-	-	1	2	2	2	2	2
CO 5	2	2	1	2	2	-	-	-	-	1	1	2	3	3	2

2022-23 Onwards (MR-22)	**MALLAREDDYENGINEERING COLLEGE (Autonomous)**	**B.Tech. VII Semester**		
Code: C0551	**Robotic Process Automation**	**L**	**T**	**P**
Credits: 3	**(Professional Elective -V)** **(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)**	**3**	**-**	**-**

Course Objectives:

- Introduce robotic process automation, techniques of automation using UIPath RPA tool.

MODULE – I **[9 Periods]**

Robotic Process Automation: Introduction**,** Scope and techniques of automation, Robotic process automation, Components of RPA, RPA platforms, About UiPath

UIPath Stack Uipath Studio, Uipath Robot, Types of Robots, UiPath Orchestrator

UIPath Studio Projects, User interface

The User Interface: Task recorder, Advanced UI interactions: Input methods, Output methods

MODULE – II **[10 Periods]**

Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control Flow, varioustypes of loops and decision making.

Data Manipulation: Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, File operation with step-by-step example, CSV/Excel to data table and vice versa

MODULE – III **[10 Periods]**

Taking Control of the Controls: Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Handling events, revisit recorder,When to use OCR, Types of OCR available, How to use OCR

Plugins and Extensions: Terminal Plugin, SAP Automation, Citrix automation and Credential management

MODULE – IV **[9 Periods]**

Handling User Events and Assistant Bots: Assistant bots, Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event.

Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Errorreporting

MODULE – V **[10 Periods]**

Managing and Maintaining the Code: Project organization, nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files

Deploying and Maintaining the Bot: Publishing using publish utility, using Orchestration Server to control bots, deploy bots, License Management, Publishing and Managing updates

Course Outcomes:

- Understand the concepts of Robotic Process Automation.
- Apply the flow chart mechanism in various calculations.
- Applying UIPath tool for debugging process
- Design system managing techniques.
- Create application for process automation using UIPath tool.

TEXT BOOK:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool — UiPath Kindle Edition

REFERENCE BOOK:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

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

	Programme Outcomes(POs)												PSOs		
CO S	**PO1**	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	3	3	2	2	3	-	-	-	-	2	2	2	2	2	2
CO 2	3	2	2	1	2	-	-	-	-	1	2	1	2	1	2
CO 3	2	2	2	2	2	-	-	-	-	1	1	2	1	2	1
CO 4	3	2	2	2	2	-	-	-	-	1	2	2	2	2	2
CO 5	2	2	1	2	2	-	-	-	-	1	1	2	3	3	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C0552	**Software Process & Project Management** (Professional Elective -V) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

- To acquire knowledge on software process management.
- To acquire managerial skills for software project development.
- To understand software economics.

MODULE – I Software Process Maturity [9 Periods]

Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process, Process Reference Models Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

MODULE – II Software Project Management Renaissance [10 Periods]

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, Life-Cycle Phases and Process artifacts

Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-basedsoftware architectures.

MODULE – III Workflows and Checkpoints of process [10 Periods]

Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments, Process Planning Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

MODULE – IV Project Organizations [10 Periods]

Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation, The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

MODULE – V **[9 Periods]**

CCPDS-R Case Study and Future Software Project Management Practices, Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

Course Outcomes:

- Understand the software process change, assessment, project plans and Quality Standards.
- Examine the life cycle phases, artifacts, workflows and checkpoints of a process.
- Design and develop software products using conventional and modern principles of software project management.
- Identify the new project management process and practices.

TEXT BOOKS:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000

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	1	1	1		1						1	1	2	1
CO2	1	2	1	2	1							1	1	2	
CO3	1	3	2	2	1	1						2	1	2	1
CO4	1	3	3	3	1	2						3	2	2	1
CO5	1	3	3	3	1	2						3	2	3	1

2022-23 Onwards (MR-22)	**MALLAREDDYENGINEERING COLLEGE (Autonomous)**	**B.Tech. VII Semester**		
Code: C6	**Open elective - II**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: C6204	**Cryptography and Network Security Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 1		-	-	2

Course Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program shouldXOR each character in this string with 0 and display the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program shouldAND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish.Create your own key using Java key tool.
8. Write a Java program to implement the RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA

Course Outcomes:

- Understand basic cryptographic algorithms, message and web authentication and security issues.
- Identify information system requirements for both of them such as client and server.
- Understand the current legal issues towards information security.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, McGraw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley

India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

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	2	
CO2	3	3	3										2	2	
CO3	2	2	2										2	2	

2022-23 Onwards (MR-22)	**MALLAREDDYENGINEERING COLLEGE (Autonomous)**	**B.Tech. VII Semester**		
Code: C0557	**Compiler Design Lab** (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Prerequisites

1. A Course on “Object Oriented Programming through Java”.

Co-requisites:

1. A course on "Web Technologies".

Course Objectives:

- To understand the various phases in the design of a compiler.
- To understand the design of top-down and bottom-up parsers.
- To understand syntax directed translation schemes.
- To introduce lex and yacc tools.

List of Experiments

1. Implementation of symbol table.
2. Develop a lexical analyzer to recognize a few patterns inc (ex. Identifiers, constants, comments, operators etc.)
3. Implementation of lexical analyzer using lex tool.
4. Generate yacc specification for a few syntactic categories.
   a) Program to recognize a valid arithmetic expression that uses operator +,-, * and /.
   b) Program to recognize a valid variable which starts with a letter followed by any numberof letter or digits.
   c) Implementation of calculator using lex and yacc.
5. Convert the bnf rules into yacc form and write code to generate abstract syntax tree.
6. Implement type checking
7. Implement any one storage allocation strategies (heap, stack, static)
8. Write a lex program to count the number of words and number of lines in a given file or program.
9. Write a 'C' program to implement lexical analyzer using c program.
10. write recursive descent parser for the grammar E->E+T E->T
    T->T*F T->FF->(E)/id.
11. write recursive descent parser for the grammar S(L) S->aL->L,S L->S
12. Write a C program to calculate first function for the grammar
    E->E+T E->T T->T*F T->F F->(E)/id
13. Write a YACC program to implement a top down parser for the given grammar.
14. Write a YACC program to evaluate algebraic expression.

Course Outcomes:

- Design, develop, and implement a compiler for any language.
- Use lex and yacc tools for developing a scanner and a parser.
- Design and implement LL and LR parsers.

TEXT BOOK:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

REFERENCE BOOKS:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson.

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	3	2										2		2	
CO3	2	2										2		2	

2022-23 Onwards (MR-22)	**MALLAREDDYENGINEERING COLLEGE (Autonomous)**	**B.Tech. VII Semester**		
Code: C00P2	**Project Stage – I (Common to All)**	**L**	**T**	**P**
Credits: 3		**-**	**-**	**6**

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0H09	Organizational Behavior (common to All)	L	T	P
Credits: 3		3	-	-

Course Objectives:

- This course demonstrates individual, group behavior aspects: The dynamics of organizational climate, structure and its impact on Organizations.

MODULE - I Organizational Behaviour [9 Periods]

Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models.

MODULE - II Individual Behaviour [10 Periods]

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 Group Behaviour [10 Periods]

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 Leadership and Power [9 Periods]

Meaning – Importance – Leadership styles – Theories of leadership – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

MODULE - V Dynamics of Organizational Behaviour [10 Periods]

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

Course Outcomes:

- Students understand their personality, perception and attitudes for overall development and further learn the importance of group behavior in the organizations.

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, 9th Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education, 2004.

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	
CO2		3							2		1				2

CO3		3								2	1		3		
CO4		3		2	1										

2022-23 Onwards (MR-22)	**MALLAREDDYENGINEERING COLLEGE (Autonomous)**	**B.Tech. VIII Semester**		
Code: C0558	**Computational Complexity** **(Professional Elective -VI)** **(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisite: Design and Analysis of Algorithms.

Course Objectives:

- Introducing computational complexity-based algorithms and their implementations

MODULE – I **[10 Periods]**

Introduction: Algorithms and complexity, Basic Complexity Classes-Deterministic time and the class P. Computational Tasks and models: Computational tasks — Search problems, Decision problems, Uniform models- Overview, General Principles, Concrete Model, Halting problem, restricted models.

MODULE – II **[10 Periods]**

P vs. NP: Efficient Computation, The Search Version (Finding vs. Checking), The Decision

Version (Proving Vs Verifying), Equivalence of the two formulations, Optimal Search Algorithms for NP Polynomial time reduction: The general notation of a Reduction, Reducing Optimization Problems to search problems, Self-Reducibility of search problems

MODULE – III **[10 Periods]**

NP – Completeness: Definition, Cook's theorem, Existence of NP Complete Problems bounded haltingand non-halting, Natural NP Complete Problems — The NP completeness of CSAT, The NP Completeness of SAT, Combinatorics and Graph Theory, additional properties of the standard reductions, Negative applications of NP Completeness, Positive applications of NP Completeness, NP Sets, Reflections on Complete problems, NP –complete optimization problems.

MODULE –IV **[10 Periods]**

Diagonalization: Time Hierarchy theorem, Space Hierarchy theorem, Non-deterministic Time Hierarchytheorem, Ladner's theorem.

Space Complexity: Definition of space bounded computation, PSPACE completeness, NL Completeness, some space complexity classes– Savitch's theorem, Savitch's theorem, The essence of PSPACE

The polynomial time hierarchy and alternations: polynomial hierarchy, time versus alternations, properties of polynomial hierarchy, Complete problems in PH.

MODULE – V **[10 Periods]**

Randomized computation: Probabilistic Turing machine, one sided and zero-sided error, Randomizedreduction, Randomized space bounded computation.

Decision trees: Graphs and Decision Trees, Monotonic Graph properties, Topological criterion, Randomized decision trees.

Course Outcomes:

- Understand the complexity of time and space for computational models
- Understand optimizational problems
- Understand NP completeness problems
- Understand hierarchical theorems

TEXT BOOKS:

1. The Basics of Computational Complexity, Oded Goldreich, Cambridge University Press
2. Computational Complexity: A Modern Approach, Sanjeev Arora and Boaz Barak, Princeton University

REFERENCE BOOKS:

1. Computational Complexity, by Christos Papadimitriou
2. Theory of Computational Complexity, Ding-Zhu Du, Ker-I Ko, WILEY

CO- PO-PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
	Programme Outcomes(POs)												PSOs		
CO S	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	2	3	3	-	-	-	-	2	-	2	2	2	3
CO 2	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 3	2	2	2	3	3	-	-	-	-	1	-	2	1	2	2
CO 4	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 5	2	2	1	3	3	-	-	-	-	1	-	2	3	3	2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C6627	**Deep Learning** **(Professional Elective -VI)** **(Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)**	L	T	P
Credits: 3		3	-	-

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 Modules, 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 Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning,

Multi- Task 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 [9 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 Modules and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long- Term Dependencies, Explicit Memory

MODULE -V [9 Periods]

Practical Methodology: 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.

Course Outcomes:

- Understand machine learning basics and neural networks
- Understand optimal usage of data for training deep models
- Apply CNN and RNN models for real-world data
- Evaluate deep models
- Develop deep models for real-world problems

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.

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	1	1	1		1						1	1	2	1
CO2	1	2	1	2	1							1	1	2	
CO3	1	3	2	2	1	1						2	1	2	1
CO4	1	3	3	3	1	2						3	2	2	1
CO5	1	3	3	3	1	2						3	2	3	1

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0559	**Distributed Systems** (Professional Elective –VI) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Prerequisites:

1. A course on "Operating Systems".
2. A course on "Computer Organization & Architecture".

Course Objectives:

- To provide an insight into Distributed systems.
- To introduce concepts related to Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory.

MODULE – I **[10 Periods]**

Characterization of Distributed Systems: Examples of Distributed systems, Resource sharing and web, challenges

System models: Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication

Distributed objects and Remote Invocation: Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

MODULE – II **[9 Periods]**

Operating System Support- OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture.
Distributed File Systems-Introduction, File Service architecture.

MODULE – III **[10 Periods]**

Peer to Peer Systems– Napster and its legacy, Peer to Peer middleware
Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.
Coordination and Agreement- Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

MODULE – IV **[10 Periods]**

Transactions and Concurrency Control- Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering.

Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commitprotocols, Concurrency control in distributed transactions
Distributed deadlocks: Transaction recovery.

MODULE – V **[9 Periods]**

Replication: Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.
Distributed shared memory: Design and Implementation issues, Consistency models.

Course Outcomes:

- Understand Transactions and Concurrency control.
- Understand distributed shared memory.
- Design a protocol for a given distributed application.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.

2. Distributed Systems, S. Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2010.

REFERENCE BOOKS:

1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

CO'S	Contribution to Program Outcomes														
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO1	3	2	2	1		1							2		2
CO2	3	2	2	1	2								2		2

CO3	3	3	3						2	1		2	2		2
CO4	3	2	2	2	2	1	1					1	2		2
CO5	3	2	2			1	1		2	1		1	2		2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0560	**Human Computer Interaction** (Professional Elective -VI) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 3		3	-	-

Course Objectives:

- To gain an overview of Human-Computer Interaction (HCI)
- Understanding the alternatives to traditional "keyboard and mouse" computing.
- Getting familiarity with the vocabulary associated with sensory and cognitive systems
- Be able to apply models from cognitive psychology to predicting user performance
- Working in small groups on a product design with invaluable team-work experience.

MODULE – I **[10 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 **[10 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 **[9 Periods]**

Windows – New and Navigation schemes selection of window, selection of devices based and screen- based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

MODULE- IV **[9 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 Multimodal interaction

MODULE- V **[10 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

Course Outcomes:

- Apply HCI and principles to interaction design.
- Design certain tools for blind or PH people
- Understand the social implications of technology and ethical responsibilities as engineers.
- Understand the importance of a design and evaluation methodology

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech.
2. Human – Computer Interaction. Alan Dix, Janet Fincay, Gregory's, Abowd, Russell Bealg, Pearson Education.

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.

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	1	1	1		1						1	1	2	1
CO2	1	2	1	2	1							1	1	2	
CO3	1	3	2	2	1	1						2	1	2	1
CO4	1	3	3	3	1	2						3	2	2	1
CO5	1	3	3	3	1	2						3	2	3	1

2022-23 Onwards (MR-22)

MALLAREDDY ENGINEERING COLLEGE (Autonomous)

B.Tech. VIII Semester

Code: C0561	Cyber Forensics (Professional Elective -VI) (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P	Prerequisites:
Credits: 3		3	-	-	

Network Security.

Course Objectives:

- A brief explanation of the objective is to provide digital evidence which is obtained from digitalmedia.
- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computers play in a certain crime.
- According to a snippet from the Moduleed States Security Service, the computer functions indifferent kinds of crimes.

MODULE- I **[9 Periods]**

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology — Steps - Activities in Initial Response, Phase after detection of an incident

MODULE- II **[10 Periods]**

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system — **Forensic Duplication:** Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

MODULE- III **[10 Periods]**

Forensics analysis and validation: Determining what data to collect and analyze, validating forensicdata, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

MODULE- IV **[10 Periods]**

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and

server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

MODULE- V **[10 Periods]**

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoftstartup tasks, MS-DOS startup tasks, virtual machines.

Course Outcomes:

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportModuley to students to continue their zeal in research in computer forensics

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

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		1	3								3		3	
CO2		2	2		2								2		
CO3	2	3		1	1								2	3	
CO4		3	3									1	3	2	
CO5	3		2	3	3							2		1	

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0	Open Elective-III	L	T	P
Credits: 3		3	-	-

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C00P3	Project Stage – II including Seminar (Common to All)	L	T	P
Credits: 11		-	-	22

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: C0510	DATA STRUCTURES (Open Elective – I)	L	T	P
Credits: 3		3	-	-

Prerequisites: A course on "Programming for Problem Solving "

Course Objectives:

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.

- Introduces sorting and pattern matching 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, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

MODULE-IV: **[10 Periods]**

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Quick Sort, 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.

Course Outcomes:

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

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees.

TEXT BOOKS:

6. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
7. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education

REFERENCES:

2. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning

E-RESOURCES:

6. http://gvpcse.azurewebsites.net/pdf/data.pdf
7. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
8. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
9. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
10. http://nptel.ac.in/courses/106102064/1

2022-23 Onwards (MR-22) | **MALLAREDDYENGINEERING COLLEGE (Autonomous)** | **B.Tech.**

Code: C0515 | **Database Management Systems** | **L 3** | **T -** | **P -** | **Credits: 3** | **(Open Elective – I)**

CO- PO,PSO Mapping

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

COs	Program 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	

Prerequisites

1. A course on "Data Structures"

The purpose of learning this course is to:

- 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: **[10 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: **[09 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: **[10 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: **[10 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: **[09 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.

Course Outcomes:

- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

TEXT BOOKS:

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

REFERENCES:

7. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
8. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
9. Introduction to Database Systems, C. J. Date, Pearson Education
10. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
11. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
12. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

E-RESOURCES:

7. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
8. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf
9. http://airccse.org/journal/ijdms/ijdms.html
10. http://www.springer.com/computer/database+management+%26+information+retri eval?SGWID=0-153-12-114576-0

11. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
12. http://www.nptelvideos.in/2012/11/database-management-system.html

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 (MR-22)	MALLAREDDYENGINEERINGCOLLEGE (Autonomous)	B.Tech.		
Code: C0564	Relational Data Base Management Systems (Open Elective-1)	L	T	P
Credits:3		3	-	-

Prerequisites: NIL

OBJECTIVES:

- To understand basics definitions of RDBMS.
- To learn the fundamentals of data models
- To conceptualize and depict a database system using ER diagram.
- To make a study of relational database design.
- To Interpret a given data model to query the database and transform the data into information using SQL (Structured Query Language).

MODULE – I: Introduction to Databases and Transactions [10Periods]

What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management.

MODULE-II: DATA MODELS [9 PERIODS]

The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

MODULE -III: Database Design, ER-Diagram [10Periods]

Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas.

MODULE - IV: Relational database model [9Periods]

Logical view of data, keys, integrity rules.

Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

MODULE-V: CONSTRAINTS, VIEWS AND SQL [10 PERIODS]

What is constraints, types of constrains, Integrity constraints

Views: Introduction to views, data independence, security, updates on views, comparison between tables and views

SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

TEXTBOOKS:

1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Databasemanagementsystems,Ramakrishnan,andGehrke,3rdEdition,2014,McGraw Hill

REFERENCE BOOKS:

1. Silberschatz Korth and Sudharshan,Database System Concepts, 6th Edition, Mc-GrawHill, 2013.
2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.

COURSE OUTCOMES:

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

1. Understand relational data model in terms of data and data structure.
2. Understand conceptual database models.
3. Learns Designing data structures using ER model.
4. Understand the theory behind the relational data model design concepts.
5. Interpret a given data model to query the database and transform the data into information using SQL (Structured Query Language).

CO-PO,PSOMapping (3/2/1indicatesstrengthofcorrelation)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	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 (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0516	Operating Systems (Open Elective – II)	L	T	P
Credits: 3		3	-	-

Prerequisites:

3. A course on "Computer Programming and Data Structures".
4. 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: **[10 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: **[10 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:** **[08 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.

Course outcomes

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computers and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

TEXT BOOKS:

3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
4. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCES:

6. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
7. Operating System A Design Approach- Crowley, TMH.
8. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
9. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
10. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

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 (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0518	Software Engineering & Modeling (Open Elective – II)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL.

Course Objectives

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

MODULE – I **[10 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, thecapability maturity model integration (CMMI)

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

MODULE – II **[10 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 **[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, sequencediagrams, collaboration diagrams, use case diagrams, component diagrams.

MODULE – IV **[10 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 **[09 Periods]**

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, riskprojection, risk refinement, RMMM

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Course Outcomes

- Ability to translate end-user requirements into system and software requirements, using e.g.
- UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level designof a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw HillInternational Edition.

2. Software Engineering- Sommerville, 7th edition, Pearson Education.

REFERENCE BOOKS:

1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson,Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-HillCompanies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

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

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0503	Algorithms Design and Analysis (Open Elective – III)	L	T	P
Credits: 3		3	-	-

Prerequisites: Programming for problem solving and Data Structures

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which eachtechnique is appropriate;
- Describes how to evaluate and compare different algorithms using worst, average, and bestcase analysis.
- Explains the difference between tractable and intractable problems, and introduces theproblems that are P, NP and NP complete.

MODULE - I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen'smatrix multiplication.

MODULE - II

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort **Backtracking:** General method, applications, n-queen's problem, sum of subsets problem, graphColoring, Hamiltonian cycles.

MODULE - III

Dynamic Programming: General method, applications- Optimal binary search tree, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

MODULE - IV

Greedy method: General method, applications- Job sequencing with deadlines, knapsack problem,Minimum cost spanning trees, Single source shortest path problem.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs,Connected components, Biconnected components.

MODULE - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard andNP-Complete classes, Cook's theorem.

Course Outcomes:

- Analyze the performance of algorithms
- Choose appropriate data structures and algorithm design methods for a specified application
- Understand the choice of data structures and the algorithm design methods

TEXT BOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan,University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich andR.Tamassia, John Wiley and sons.

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	2	2	2				2	1	1	3	3	2	2
CO2	3	3	2	2	2				2	1	1	3	3	2	1
CO3	3	3	3	2	2				1			3	3	2	1
CO4	3	2	3	2	2				1		1	2	3	2	1
CO5	3	3	3	2	2				1	1	1	2	3	2	1

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0505	Introduction to Computer Networks (Open Elective – III)	L	T	P
Credits: 3		3	-	-

Prerequisites

1. A course on "Programming for problem solving"
2. A course on "Data Structures"

Course Objectives

- Equip the students with the concepts and fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

MODULE - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless Transmission.

Data link layer: Design issues, framing, Error detection and correction.

MODULE - II

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols, Data link layer switching.

MODULE - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking

MODULE - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

MODULE - V

Application Layer: Domain name system, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

Course Outcomes

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Understand subnetting and routing mechanisms.
4. Familiarity with the essential application protocols of computer networks

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 6th Edition. PearsonEducation

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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	
CO2			2												2
CO3						3							3		
CO4					2										

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0563	**Fundamentals of Python Programming** (Open Elective – III)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course enables the students to understand the fundamentals of python programming, describe the various operators and control flow statements, analyze various data structures, make use of functions, discuss about MODULE s, packages in python, object oriented concepts, exception handling, illustrate advanced concepts like multithreading, graphics and generate various test cases.

MODULE I: Python Programming-Introduction [09 Periods]

Introduction- History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL (Shell) Running Python Scripts.

Data Types - Variables, Assignment, Keywords, Input-Output, Indentation-Types -Integers, Strings, Booleans.

MODULE II: Operators and Expressions [09 Periods]

Operators - Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators.

Expressions - Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue.

MODULE III: **Data Structures and Functions [10 Periods]**

A: Data Structures - Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions.

B: Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful, Functions (Function Returning Values) Scope of the Variables in a Function - Global and Local Variables.

MODULE IV: MODULEs, Packages and Exception handling [10 Periods]

MODULEs - Creating MODULE s, import statement, from. Import statement; name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor, Method, Inheritance, Overriding Methods, Data hiding.

Error and Exceptions - Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

MODULE V: Library functions and testing [10 Periods]

Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics.

Testing - Why testing is required?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Course Outcomes:

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

- Understand the basics of python programming language
- Illustrate simple programs with control structures.
- Apply advanced concepts like data structures and make use of functions
- Develop simple applications by using MODULE s, packages and exception handling mechanisms.
- Demonstrate projects that make use of libraries and generate test cases for the projects.

TEXT BOOKS

1. Vamsi Kurama, "**PythonProgramming: A Modern Approach**", Pearson Publications.
2. Mark Lutz," **Learning Python**", OriellyPublishers

REFERENCES

1. Allen Downey, "**Think Python**", Green TeaPress
2. W. Chun, "**Core Python Programming**", Pearson.
3. Kenneth A. Lambert, "**Introduction to Python**", Cengage

E–RESOURCES

1. http://kvspgtcs.org/wp-content/uploads/2013/08/Python-Programming-for-the- Absolute-Beginner.pdf2
2. http://www.bogotobogo.com/python/files/pytut/Python%20Essential%20Reference,% 20Fourth%20Edition%20(2009).pdf
3. https://periodicals.osu.eu/ictejournal/dokumenty/2015-02/ictejournal-2015-2-article- 1.pdf
4. http://ptgmedia.pearsoncmg.com/images/9780132678209/samplepages/0132678209.p df
5. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv163-Page1.htm

CO	POs												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	-	-	1	1	-	-	-	-	-	-	-	1	-	-
CO2	-	1	1	3	-	-	-	-	-	-	-	-	-	1	1
CO3	1	1	1	1	2	-	-	-	-	-	-	1	-	2	1
CO4	-	-	-	-	-	-	-	-	-	-	1	1	-	2	2
CO5	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0562	Cloud Computing Lab (Common for CSE, IT, CSE (AIML), CSE (CS), CSE (DS), CSE (IOT), AI and CSIT)	L	T	P
Credits: 1.5		-	-	3

Course Objectives:

1. This course provides an insight into cloud computing.
2. 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.

Course Outcomes:

1. Understand various service types, delivery models and technologies of a cloud computing environment.
2. Understand the ways in which the cloud can be programmed and deployed.
3. Understand cloud service providers like Cloudsim, Globus Toolkit etc.
4. Examine various programming paradigms suitable to solve real world and scientific problems using cloud services.

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.

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				1		1	2	2	1	
CO2			2		3							1	1		
CO3			2		2							3			2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0553	Basics of Python Programming Lab (Common for CE, EEE, ME, EEE, ECE, MiE)	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Software Requirements: Python

List of Programs:

1. a) Write a program to demonstrate different number data types in Python.
   b) Write a program to perform different Arithmetic Operations on numbers in Python.
2. a) Write a program to create, concatenate and print a string and accessing sub-string from a given string.
   b) Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, append, and remove lists in python.
4. Write a program to demonstrate working with tuples in python.
5. Write a program to demonstrate working with dictionaries in python.
6. a) Write a python program to find largest of three numbers.
   b) Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : c/5 = f-32/9]
7. a) Write a Python script that prints prime numbers less than 20.
   b) Write a python program to find factorial of a number using Recursion.
8. a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
   b) Write a python program to define a module and import a specific function in that module to another program.
9. a) Write a program that defines and print a matrix.
   b) Write a program to perform addition of two square matrices.
   c) Write a program to perform multiplication of two square matrices.
10. a) Write a function dups to find all duplicates in the list.
    b) Write a function unique to find all the unique elements of a list.
11. 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.
12. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

TEXT BOOKS

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1st Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage

Course Outcomes

After completion of the course, the student should be able to

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O

Note: The lab experiments will be like the following experiment examples

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				1		1	2	2	1	
CO2			2		3							1	1		
CO3			2		2							3			2

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0554	**Fundamentals of Data Structures Lab** (Common for CE, EEE, ME, EEE, ECE, MiE)	L	T	P
Credits: 2		-	1	2

Prerequisites: C Programming.

Course Objectives:
This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.

Software Requirements: Turbo C / C++

List of Programs:

1 Write a program to perform the following operations on matrix
   a) Addition
   b) Subtraction
   c) Multiplication
2 Write a program to create one dimensional array, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements
3 Write a program to create a single linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.
4 Write a program to create a circular linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.
5 Write a program to create a double linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.
6 Write a program to implements stack operations using Arrays
7 Write a program to implements stack operations using Linked list
8 Write a program to implements Linear Queue operations using Arrays
9 Write a program to implements Linear Queue operations using Linked list
10 Write a program to implements Circular Queue operations using Arrays
11 Write a program to implements Double-ended Queue operations using Arrays
12 Write a program to create a Binary Search Tree (BST) and perform insert and search operations on it.

Course Outcomes:

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

1. Identify the appropriate recursive algorithms and analyze the performance of algorithms.
2. Understand and implement single, double, and circular linked-lists.
3. Implement linear data structures such as Stacks and Queues using array and linked-list representations.
4. Implement non linear data structures such as trees and graphs.

TEXTBOOKS

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 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.

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	2										3	2	
CO2	2	2	3										2	3	
CO3		2	3											3	1

2022-23 Onwards (MR-22)	MALLAREDDYENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0555	Object Oriented Programming Lab (Common for CE, EEE, ME, EEE, ECE, MiE)	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives:

This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading.

Software Requirements: JDK

List of Programs:

1. Write a JAVA program to display default value of all primitive data type of JAVA.
2. Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
3. Write a Java Program to implement
   a) Default Constructor
   b) Parameterized constructor
4. Write a Java Program to implement
   a) Method overloading
   b) Method overriding
5. Write a Java program to implement
   a) Single Inheritance
   b) Multilevel Inheritance
   c) Hierarchical Inheritance
6. Write Java programs that uses the following keywords…
   a) this
   b) super
7. Write Java programs that uses the following keywords…
   a) static
   b) final
8. Write a Java program to implement
   a) abstract method
   b) Interfaces
9. Write a Java program to create user defined packages.
10. Write a Java program to implement Exception Handling using
    a) try-catch clause
    b) Multiple Catch clauses
11. Write a Java program that
    a) create user defined Thread by extending Thread class.
    b) create user defined Thread by implementing Runnable Interface
12. Write a Java program
    a) checks whether a given string is a palindrome or not.

b) for sorting a given list of names in ascending order.

Course Outcomes:

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

1. Differentiate structured programming and object oriented programming and know the concepts of classes, objects, members of a class.
2. Apply object oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface.
3. Capable of handling run time errors using Exceptional Handling and exploring strings.
4. Develop applications for concurrent processing using Thread Concept.
5. Capable of handling IO operations using Files.

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. P.J. Deitel and H.M. Deitel, "**Java for Programmers**", Pearson education.
2. P. Radha Krishna, "**Object Oriented Programming through Java**", Universities Press.
3. Bruce Eckel," **Programming in Java**", Pearson Education.
4. S. Malhotra and S. Choudhary," **Programming in Java**", Oxford Univ. Press.

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 (MR-22)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: C0556	Fundamentals of Database Management Systems Lab (Common for CE, EEE, ME, EEE, ECE, MiE)	L	T	P
Credits: 2		-	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

Software Requirements: MySQL

LIST OF EXPERIMENTS:

11. Concept design with E-R Model
12. Relational Model
13. Normalization
14. Practicing DDL commands
15. Practicing DML commands
16. A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
    B. Nested, Correlated subqueries
17. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
18. Triggers (Creation of insert trigger, delete trigger, update trigger)
19. Procedures
20. Usage of Cursors

Course Outcomes:

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

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.

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