ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2021-22 onwards

**Course Structure and Syllabus
for
B.Tech. Computer Science and Engineering (CSE) Programme.
(MR21 Regulations – Effective from Academic Year 2021-22 onwards)**

For
B.Tech. - Four Year Degree Programme

MALLA REDDY ENGINEERING COLLEGE

MALLA REDDY ENGINEERING COLLEGE
COURSE STRUCTURE – B.Tech. Computer Science and Engineering (CSE)Programme.
(MR21 Regulations - Effective from Academic Year 2021 – 22 onwards)

S. No	Category	Course Code	Name of the Subject	L	T	P	Credits
			SEMESTER – I				
1.	BSC	B0B01	Linear Algebra and Numerical Methods	3	1	-	4
2.	HSMC	B0H01	English	3	-	-	3
3.	ESC	B0201	Basic Electrical and Electronics Engineering	3	-	-	3
4.	ESC	B0501	Programming for Problem Solving	3	-	-	3
5.	HSMC	B0H02	English Language and Communication skills Lab	-	-	2	1
6.	ESC	B0202	Basic Electrical and Electronics Engineering Lab	-	-	2	1
7.	ESC	B0502	Programming for Problem Solving Lab	-	-	2	1
8.	ESC	B1201	Engineering and IT Workshop	-	1	2	2
			Total	12	2	8	18
			Total Contact Hours		22		

S. No	Category	Course Code	Name of the Subject	L	T	P	Credits
			SEMESTER – II				
1.	BSC	B0B17	Engineering Chemistry	3	1	-	4
2.	BSC	B0B02	Probability and Statistics	3	-	-	3
3.	BSC	B0B09	Semiconductor Physics	3	1	-	4
4.	ESC	B0504	Python Programming	3	1	-	4
5.	ESC	B0305	Engineering Drawing	2	-	2	3
6.	BSC	B0B18	Engineering Chemistry Lab	-	-	2	1
7.	BSC	B0B11	Applied Physics Lab	-	-	2	1
8.	ESC	B0506	Python Programming Lab	-	1	2	2
			Total	14	4	8	22
			Total Contact Hours		26		

S. No	Category	Course Code	Course Title	L	T	P	Credits
			III SEMESTER				
1	PCC	B0507	Discrete Mathematics	3	-	-	3
2	PCC	B0508	Computer Organization and Architecture	3	-	-	3
3	PCC	B0509	Data Structures	3	-	-	3
4	PCC	B0510	Object Oriented Programming	3	-	-	3
5	PCC	B0511	Operating Systems	3	-	-	3
6	PCC	B0512	Data Structures Lab	-	-	3	1.5
7	PCC	B0513	Object Oriented Programming Lab	-	-	3	1.5
8	PCC	B0514	Operating Systems Lab	-	1	2	2
9	MC	B00M1	Gender Sensitization	-	-	2	-
			Total	15	1	10	20
			Total Contact Hours		26		

S. No	Category	Course Code	Course Title	L	T	P	Credits
			IV SEMESTER				
1	BSC	B0B07	Applied Statistics and Optimization Techniques	3	-	-	3
2	PCC	B0515	Database Management Systems	3	-	-	3
3	PCC	B1202	Web Technologies	3	-	-	3
4	PCC	B0516	Design and Analysis of Algorithms	3	-	-	3
5	PEC-I		**Professional Elective –I**				
		B0517	Mobile Application Development				
		B0518	Free and Open Source Technologies				
		B0519	Artificial Intelligence	3	-	-	3
		B0522	Computer Graphics				
		B0523	Mobile Computing				
6	PCC	B0520	Database Management Systems Lab	-	1	2	2
7	PCC	B1206	Web Technologies Lab	-	-	3	1.5
8	PCC	B0521	Design and Analysis of Algorithms Lab	-	-	3	1.5
9	MC	B00M2	Environmental Science	2	-	-	-
			Total	17	1	8	20
			Total Contact Hours		26		

MALLA REDDY ENGINEERING COLLEGE (Autonomous)
III Year COURSE STRUCTURE – B.Tech. Computer Science and Engineering (CSE) Programme.
(MR21 Regulations - Effective from Academic Year 2021– 22 onwards)

S. No.	Category	Course Code	Name of the Course	L	T	P	Credits
			V SEMESTER				
				Contact Hours / week			**Credits**
1	HSMC	B0H09	Management Fundamentals	3	-	-	3
2	PCC	B6201	Computer Networks	3	-	-	3
3	PCC	B0524	Formal Languages and Automata Theory	3	1	-	4
4	PCC	B0525	Software Engineering & Modeling	3	-	-	3
			Professional Elective –II				
5	PEC-II	B0526	Advanced Databases and Security	3	-	-	3
		B0527	Cloud Computing				
		B0528	Semantic Web				
		B0529	Advanced Computer Architecture				
		B0531	Scripting Languages				
6	PCC	B6202	Computer Networks Lab	-	-	3	1.5
7	PCC	B0530	Software Engineering & Modeling Lab	-	-	3	1.5
8	MC	B00M3	Quantitative Aptitude and Verbal Reasoning - I	2	-	-	-
			Total	17	1	6	19
			Total Contact Hours		24		

S. No.	Category	Course Code	Name of the Course	L	T	P	Credits
			VI SEMESTER				
				Contact Hours / week			**Credits**
1	HSMC	B0H08	Engineering Economics and Accountancy	3	-	-	3
2	PCC	B0532	Compiler Design	3	1	-	4
			Professional Elective -III				
3	PEC-III	B0533	Distributed Systems	3	-	-	3
		B0534	Animation Techniques				
		B0535	Multimedia and Rich Internet Applications				
		B1217	Augmented Reality and Virtual Reality				
		B0536	Data Mining				
			Professional Elective -IV				
4	PEC-IV	B0537	Natural Language Processing	3	-	-	3
		B6203	Cryptography and network Security				
		B0538	Agile Methodologies				
		B6920	Adhoc and Sensor Networks				
		B0541	Image Processing				
5	OEC-I		**Open Elective-I**	3	-	-	3
6	HSMC	B0H03	English Communication and Presentation Skills Lab	-	-	2	1
7	PCC	B0543	Compiler Design Lab	-	1	2	2
8	PCC	B0544	Data Mining Lab	-	1	2	2
9	MC	B00M4	Quantitative Aptitude and Verbal Reasoning – II	2	-	-	-
			Total	17	3	6	21
			Total Contact Hours		26		

MALLA REDDY ENGINEERING COLLEGE (Autonomous)
COURSE STRUCTURE – B.Tech. Computer Science and Engineering (CSE) Programme.
(MR21 Regulations - Effective from Academic Year 2021 – 22 onwards)

S. No.	Category	Course Code	Name of the Course	L	T	P	Credits
**VII SEMESTER**							
\multicolumn{4}{c}{}	\multicolumn{3}{c}{**Contact Hours / week**}	**Credits**			
1	PCC	B0542	Big Data Analytics	3	1	-	4
2	PCC	B1210	Machine Learning	3	-	-	3
3	PCC	B6217	Cyber Security	3	-	-	3
		**Professional Elective-V**			
4	PEC-V	B0545	Block chain Technologies	3	-	-	3
		B0546	Business Analytics				
		B0547	Principles of Programming Languages				
		B6917	Internet of Things				
		B0548	Software Testing Methodologies				
5	OEC-II		**Open Elective-II**	3	-	-	3
6	PCC	B0549	Big Data Analytics Lab	-	1	2	2
7	PCC	B1212	Machine Learning Lab	-	-	2	1
8	PRJ	B00P1	Internship / Mini Project			4	2
**Total**	15	2	8	21			
\multicolumn{4}{c}{**Total Contact Hours**}	\multicolumn{3}{c}{25}				

S. No.	Category	Course Code	Name of the Course	L	T	P	Credits
**VIII SEMESTER**							
\multicolumn{4}{c}{}	\multicolumn{3}{c}{**Contact Hours / week**}	**Credits**			
1	PEC-VI	B6705	Advanced Python Programming	3	-	-	3
		B0550	Deep Learning				
		B0551	Social Networking				
		B0552	Human Computer Interaction				
		B0554	Software Quality Assurance and Testing				
2	OEC-III		**Open Elective-III**	3	-	-	3
3	PRJ	B00P3	Seminar	-	-	2	1
4	PRJ	B00P2	Major Project	-	-	24	12
**Total**	6	-	26	19			
\multicolumn{4}{c}{**Total Contact Hours**}	\multicolumn{3}{c}{32}				

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: B0B01	**Linear Algebra and Numerical Methods** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	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; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; solving system of Homogeneous and Non-Homogeneous linear equations, LU – Decomposition Method.

MODULE II: Eigen Values and Eigen Vectors [12 Periods]
Eigen values, Eigen vectors and their properties; Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem; 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 1/3rd Rule, Simpson's 3/8 Rule.

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

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_2iUCG87BLKl8eISe 4fHKdE2_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=PLbMVogVj5nJRILpJJO7K rZa8Ttj4_ZAgl

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

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.

CO- PO Mapping

<table>
<tr><td colspan="13">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COS</td><td colspan="12">Programme Outcomes(POs)</td></tr>
<tr><td>PO 1</td><td>PO 2</td><td>PO 3</td><td>PO 4</td><td>PO 5</td><td>PO 6</td><td>PO 7</td><td>PO 8</td><td>PO 9</td><td>PO 10</td><td>PO 11</td><td>PO 12</td></tr>
<tr><td>CO1</td><td>3</td><td>2</td><td>2</td><td>3</td><td>3</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>1</td></tr>
<tr><td>CO2</td><td>2</td><td>2</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>1</td></tr>
<tr><td>CO3</td><td>2</td><td>2</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>1</td></tr>
<tr><td>CO4</td><td>3</td><td>2</td><td>2</td><td>3</td><td>3</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>2</td></tr>
<tr><td>CO5</td><td>2</td><td>2</td><td>2</td><td>3</td><td>3</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>2</td></tr>
</table>

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: B0H01	**ENGLISH** (Common for CE, EEE, ME, ECE, CSE, CSE (AIML), CSE (DS), CSE (CS), CSE(IOT), IT and Min.E)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Course Objectives:

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

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

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

Module – III
Essay   : "Lucidity, Simplicity, Euphony" by W. Somerset Maugham
Poem   : "The Mask" by Maya Angelou
Grammar   : Tense and Aspect
Vocabulary   : Homonyms, Homophones, Homographs
Reading   : Reading for Topic and Theme
Writing   : Letter Writing

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

MODULE – V
Essay   **:** "Toasted English" by R. K. Narayan
Poem   **:** "If" by Rudyard Kipling
Grammar   **:** Direct and Indirect Speech, Misplaced Modifiers
Vocabulary   **:** Redundancies and Clichés
Reading   **:** Reading for Specific Purposes, Reading Comprehension practice
Writing   **:** Paraphrasing & Summarizing,
* Exercises from the texts not prescribed shall also be used for classroom tasks.

Prescribed Textbook:

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

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

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.

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: B0201	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING** (Common for CE, EEE, ME, ECE, CSE, CSE (AIML), CSE (DS), CSE (CS), CSE(IOT), IT and Min.E)	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.

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/

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

<table>
<tr><th colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">Cos</th><th colspan="12">Programme Outcomes (POs)</th><th colspan="3">PSOs</th></tr>
<tr><th>PO1</th><th>PO2</th><th>PO3</th><th>PO4</th><th>PO5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th><th>PSO3</th></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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Prerequisites: NIL

Course Objectives:
1. Understand the basic terminology, write, compile and debug programs in computer programming
2. Implement different control statements for solving problems.
3. Understand the concept of structured program and arrays.
4. Implement the idea of strings and pointers.
5. Analyse the usage of structures and different file operations.

MODULE I: Fundamentals and Introduction to 'C' Language   [10 Periods]
Introduction Fundamentals– Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

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

MODULE II: Conditional Statements and Repetition Statements   [09 Periods]
Conditional Statements: Simple if statement, if-else statement, if-elseif- ladder, nested if-else, Dangling else problem, switch statements.

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

MODULE III: Designing Structured Programs and Arrays   [10 Periods]
Designing Structured Programs-Introduction to function, Advantages, user defined functions, inter function communication-call by value, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion – recursive functions-Towers of Hanoi problem.

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

MODULE IV: Strings and Pointers   [09 Periods]
Strings: Concepts, String Input / Output functions, arrays of strings, string manipulation functions, string conversion, C program examples.

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

MODULE V: Structures and File Handling   **[10 Periods]**

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

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

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

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

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

Outcomes:
At the end of the course, students will be able to
1. Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language).
2. Apply different types of control structures to code and test a given logic in C programming language.
3. Decompose a problem into functions and to develop modular reusable code and Use arrays to formulate algorithms and programs for Searching and sorting problems.
4. Develop programs that make use of concepts such as strings, pointers.
5. Analyse structures, file operations and command line arguments.

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code: B0H02	**English Language Lab**	**L**	**T**	**P**
Credits: 1	(Common for CE, EEE, ME, ECE, CSE, CSE(AIML), CSE(DS), CSE (CS), CSE(IOT),IT and Min.E)	-	-	2

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

Course Objectives:

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

Listening Skills:

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

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

Speaking Skills:

Objectives:
1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
• Oral practice
• Describing objects/situations/people
• Just A Minute (JAM) Sessions.

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

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

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

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

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

Module - V:

CALL Lab   : Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab   : Information Transfer, Debate

Minimum Requirement of infra structural facilities for EL Lab:
1. Computer Assisted Language Learning (CALL) Lab:
The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):
Computer network with Lan with minimum 60 multimedia systems with the following specifications:
a) P – IV Processor   b) Speed – 2.8 GHZ   c) RAM – 512 MB Minimum
d) Hard Disk – 80 GB   e) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab: The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.
Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

Prescribed Lab Manual:
Rani, Sudha. *English Language Communication Skills Laboratory*. 5th edition, Pearson Publication, 2014.

Reference Books:
1. Gairns, Ruth and Redman, Stuart. *Oxford Word Skills: Learn and Practice English Vocabulary.* 2nd edition, Oxford University Press, 2008.
2. Hughes, John and Mallett, Andrew. *Successful Presentations DVD and Student's Book Pack*. Oxford University Press, 2013.
3. Hancock, Mark. *English Pronunciation in Use* (Intermediate). 2nd edition, Cambridge University Press, 2009.
4. Karia, Akash. *Public Speaking Mastery: Speak Like a Winner*. Kindle edition, 2013.
5. Lucas, Stephen. *The Art of Public Speaking.* 11th edition, Tata McGraw Hill, 2011.

Websites:
1. http://www.mindtools.com/CommSkll/ActiveListening.htm
2. http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
3. http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf

Course Outcomes:
After completion of the course, students will be able to:
1. Understand the nuances of language through audio- visual experience and group activities.
2. Neutralize the accent for intelligibility
3. realize the importance of listening skills and speaking skills and their application in real life situations.
4. Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.
5. Speak with clarity and confidence; thereby enhance employability skills of the students.

	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	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: B0202	**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	3	2	3										2	2	
CO2	3	3	3										2	2	
CO3	2	2	2										2	2	

Prerequisites: NIL

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

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

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

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

    c. Write a C program to find grade of a student using structures.

12. a. Write a C program which copies one file to another
    b. Write a C program to find sum of two numbers using command line arguments

13. a. Develop a mini project which implement the Library Management System
    b. Develop a mini project which implement the Student Record System

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

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

Outcomes:
At the end of the course, students will be able to
1. Analyze concepts in problem solving and write diversified solutions for a given problem.
2. Identify situations where computational methods and computers would be useful.
3. Understand the programming tasks using techniques learned and write pseudo-code.
4. Compare the program on a computer, edit, compile, debug, correct, recompile and execute it.
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task

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	

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

Pre requisites: NIL

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

Engineering Workshop:
Problem 1: Trades for Exercises
At least two exercises from each trade
1. House-wiring
2. Soldering

Problem 2: Trades for Demonstration & Exposure
1. Carpentry
2. Wood working lathe

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

Problem 3:
Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

Problem 4:
Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

Problem 5:
Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Problem 6:
Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. Internet & World Wide Web.

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

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

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

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

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

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

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

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

Course Outcomes:
1. Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish work assignments along with the understanding of house wiring components.
2. Apply knowledge for computer assembling and software installation and ability how to solve the trouble shooting problems.
3. Apply the tools for preparation of PPT, Documentation and budget sheet etc.

<table>
<tr><td colspan="17" align="center">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12" align="center">Programme Outcomes (POs)</td><td colspan="3" align="center">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td>3</td><td>3</td><td>1</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td><td></td><td></td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>1</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td><td></td><td></td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>1</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td><td></td><td></td></tr>
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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech II Semester		
Code: B0B17	**Engineering Chemistry** (Common for CE, EEE, ME, ECE, CSE, CSE (AIML), CSE (DS), CSE (CS), CSE (IOT), IT, AI and Min.E))	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, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale & Sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment - Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization. Desalination by Reverse osmosis and its significance.

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

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

Module III: Electrochemistry and Corrosion

A. Electrochemistry: **[7 Periods]**
Introduction to Electrochemistry-Conductance (Specific and Equivalent) and units. Types of cells-electrolytic & electrochemical cells (Galvanic Cells)-Electrode potential- cell potential (EMF).Electrochemical series and its applications, Nernst equation its applications and numerical problems. Reference electrodes - Calomel Electrode and Glass electrode-determination of pH using glass electrode. Batteries: Primary (dry cells) and secondary (Lead-Acid cell, Ni-Cd cell) - applications of batteries. Fuel cells: Hydrogen - Oxygen fuel cell and its applications.

B. Corrosion: **[7 Periods]**

Causes and effects of corrosion: Theories of corrosion - Chemical & Electrochemical

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

UNIT-V Fuels and Combustion [08 Periods]

Fuels: Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG.
Combustion: Definition, Calorific value of fuel – HCV, LCV; Calculation of air quantity required for combustion of a fuel. Determination of calorific value by Junkers gas calorimeter-Numerical problems on combustion.

Text Books:

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

Course Outcomes:

After completion of the course students will be able to:
1. Understand water treatment, specifically hardness of water and purification of water by various methods.
2. Analyze microscopic chemistry in terms of atomic and molecular orbital's splitting and band theory related to conductivity.
3. Acquire knowledge on electrochemical cells, fuel cells, batteries and their applications.
4. Acquire basic knowledge on the concepts of stereochemistry, reaction mechanisms and interpretation of NMR in organic molecules.
5. Acquire the knowledge of various fuels and identify a better fuel source of less pollution.

	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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0B02	**Probability and Statistics** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	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.

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)

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.

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.

CO- PO Mapping

	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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0B09	**Semiconductor Physics** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:
The main objective of this course is to provide an adequate exposure and develop insight about the basic principles of quantum mechanics and semiconductor physics along with their possible applications in various branches of engineering.

Module – I: Quantum Mechanics [8 Periods]
Introduction, Discussion on Black body radiation spectrum; Louis de Broglie's concept of matter waves; Davisson and Germer experiment; G P Thomson Experiment; Schrodinger's time independent wave equation; Physical significance and properties of wave function; Heisenberg's uncertainty principle - Why an electron cannot exist inside the nucleus?; Particle in one dimensional infinite potential well.

Module – II: Band Theory of Solids [8 Periods]
Qualitative discussion of Classical free electron theory; Qualitative treatment of Fermi - Dirac distribution function; Qualitative discussion of Quantum free electron theory; Density of energy states; Bloch theorem; Qualitative treatment of Kronig - Penney model; E Vs k relationship; Origin of energy band gap; Classification of materials into Conductors, Semi conductors and insulators; Concept of Effective mass.

Module –III: Semiconductor Physics [13 Periods]
A: Elemental and compound semiconductors; Intrinsic and Extrinsic Semiconductors; Expression for carrier concentration in intrinsic and extrinsic semiconductors; Qualitative treatment of Fermi energy level in Intrinsic and extrinsic semiconductors.
B. Direct and indirect band gap semiconductors; Carrier generation and Recombination; Drift and Diffusion; Equation of Continuity; P-N Junction diode - Formation & V-I Characteristics; LED - Construction and Working Principle; Solar Cell - Construction & I-V Characteristics.

Module – IV [12 Periods]
LASER: Introduction, Characteristics of LASER; Absorption, Spontaneous and Stimulated emission; Einstein's coefficients derivation; Population inversion; Pumping mechanisms; Basic components of a LASER system; three and four level LASER systems; 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.

<u>Course Outcomes:</u>
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, LED and Solar cell.
4. Explain the working of three LASERs.
5. Explain the applications of LASER and optical fibers.
6. Describe the Boolean algebra and examine various logic gates.

<u>Text Books:</u>
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.

<u>Reference Books:</u>
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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: B0504	**Python Programming** (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science), CSE (IoT) and AI)	**L**	**T**	**P**
Credits: 4		3	1	-

Course Objectives: This course will enable students to

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

MODULE - I [10 Periods]

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

MODULE - II [9 Periods]

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

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

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

MODULE - III [10 Periods]

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

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

MODULE – IV [10 Periods]

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

MODULE - V [9 Periods]

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

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

TEXT BOOKS

1. Wesley J. Chun, Core Python Programming, Second Edition, Prentice Hall, 2007.
2. Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2011.

REFERENCE BOOKS

1. Allen B. Downey, "Think Python, How to think like a Computer Scientist", First Edition, O'reilly Publishing, 2018.
2. Vamsi Kurama, "Python Programming: A Modern Approach", Pearson India, 2017.
3. Mark Lutz, "Learning Python", Fifth Edition, O'rielly Publishers, 2013.

E–RESOURCES

1. "Learn Python - Free Interactive Python Tutorial", https://www.learnpython.org/
2. "Free Python Tutorial - Python For Beginner," https://www.udemy.com/share/101EfoB UcccV1SQHw
3. "Basics of Python for Data Science", https://olympus.greatlearning.in/courses/11265
4. "Beginners Guide / Programmers - Python Wiki", https://wiki.python.org/moin/Beginn ersGuide/Programmers
5. "Introduction to Python", https://www.datacamp.com/courses/intro-to-python-for-data-science

Course Outcomes

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

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling modules, strings and file systems.
3. Create, run and manipulate Python Programs using regular expressions and multithreaded programming environments.
4. Interpret the concepts of object-oriented programming in Python.
5. Implement exemplary GUI applications related to Web Programming in Python.

COs	**CO- PO,PSO Mapping** **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**
	\multicolumn{12}{c}{**Programme Outcomes (POs)**}	\multicolumn{3}{c}{**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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester		
Code: B0305	**ENGINEERING DRAWING** (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science), CSE (IoT) and AI)		**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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. I Semester	
Code: B0B18	**Engineering Chemistry Lab** (Common for CE, EEE, ME, ECE, CSE, CSE(AIML), CSE(DS), CSE (CS), CSE(IOT), IT and Min.E)	**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	3	3	1		3							3	2		
CO2	3	3	1		3							3	2		
CO3	3	3	1		3							3	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 universal logic gates using fundamental 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.

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		

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. II Semester	
Code: B0506	**PYTHON Programming Lab** (Common for CSE, IT, CSE (Cyber Security), CSE (AI and ML), CSE (Data Science) and CSE (IoT))	L	T	P
Credits: 2		-	1	2

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

Software Requirements: Python

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

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    b) Write a function dups to find all duplicates in the list.

    c) Write a function unique to find all the unique elements of a list.

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

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

9 Create a Regular Expression and implement the following

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

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

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

10 Write a python program to implement multithreading scenarios.

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

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

TEXT BOOKS

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

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

REFERENCE BOOKS

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

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

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

Course Outcomes

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

1. Develop simple applications using python.

2. Make use of functions, methods and classes in python scripts.

3. Deploy variety of applications using necessary packages for applications.

COs	\multicolumn{12}{c}{ProgrammeOutcomes (POs)}											PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1			1	1							1	1	2	
CO2		1	2	3								3		1	1
CO3	1	1	1	1	2	1	1					3	1	2	3

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: B0507	**Discrete Mathematics** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE(DS), CSE(IOT), AIML and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL
Course Objectives:
This course provides the concepts of mathematical logic demonstrate predicate logic and Binary Relations among different variables, discuss different type of functions and concepts of Algebraic system and its properties. It also evaluates techniques of Combinatorics based on counting methods and analyzes the concepts of Generating functions to solve Recurrence equations.

MODULE I: Mathematical Logic [10 Periods]
Basic Logics - Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology.

Implications and Quantifiers - Equivalence implication, Normal forms, Quantifiers, Universal quantifiers.

MODULE II: Predicate Logic and Relations [10 Periods]
Predicate Logic - Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Proof of automatic Theorem.

Relations - Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

MODULE III: Functions and Algebraic Structures [10 Periods]
A: Functions - Inverse Function, Composition of functions, recursive Functions - Lattice and its Properties.

B: Algebraic structures - Algebraic systems Examples and general properties, Semi-groups and monoids, groups, sub-groups, homomorphism, Isomorphism, Lattice as POSET, Boolean algebra.

MODULE IV: Counting Techniques and Theorems [09 Periods]
Counting Techniques - Basis of counting, Combinations and Permutations with repetitions, Constrained repetitions

Counting Theorems - Binomial Coefficients, Binomial and Multinomial theorems, principles of Inclusion – Exclusion. Pigeon hole principle and its applications.

MODULE V: Generating functions and Recurrence Relation [09 Periods]
Generating Functions - Generating Functions, Function of Sequences, Calculating Coefficient of generating function.

Recurrence Relations - Recurrence relations, Solving recurrence relation by substitution and Generating functions. Method of Characteristics roots, solution of Non-homogeneous Recurrence Relations.

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

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

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

Course Outcomes:
At the end of the course, a student will be able to
1. **Apply** the concepts of connectives and normal forms in real time applications.
2. **Summarize** predicate logic, relations and their operations.
3. **Describe** functions, algebraic systems, groups and Boolean algebra.
4. **Illustrate** practical applications of basic counting principles, permutations, combinations, and the pigeonhole methodology.
5. **Analyze** techniques of generating functions and recurrence relations.

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	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: B0508	**Computer Organization and Architecture** (Common for CSE, CSE(DS), CSE (AI and ML), CSE(Cyber Security), CSE(IOT), AIML and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: No prerequisites

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 unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors.

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

UNIT – II   **[10 Periods]**
Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit. Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT – 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 unit, Decimal Arithmetic operations.

UNIT – 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.

UNIT – 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.

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_xn grkluevXOJLs1TbxS8q2icgUs3hL4_KAi5So5FgXcVg
3. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xAYUzYSlXl4zudlsolr-e7wQNrNXLxbgGFxbkoyx1iN3YbHuFrzI2jc_70rWMEwQ
4. http://nptel.ac.in/courses/106106092/

Outcomes:

1. Understand the basics of instructions sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units 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.

COs	\multicolumn{12}{c}{Programme Outcomes (POs)}											\multicolumn{3}{c}{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														

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

Prerequisites: A course on "Programming for Problem Solving "

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

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

MODULE-II: [09 Periods]
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash table representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

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

MODULE-IV: [10 Periods]
Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sortings: Max Heap, Min Heap,Heap Sort. External Sorting: Model for external sorting, Merge sort.

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

TEXT BOOKS:
1. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudo code approach with C ", Thomson (India), 2nd Edition, 2004.
2. Mark Allen weliss, Data Structures and Algorithms Analysis in C, Pearson Education, Second Edition, 2007

REFERENCES:

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

E-RESOURCES:

1. http://gvpcse.azurewebsites.net/pdf/data.pdf
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
5. http://nptel.ac.in/courses/106102064/1

Course Outcomes:

At the end of the course, students will be able to
1. **Implement** the linear data structures such as linked list, stacks and queues.
2. **Understand** the Dictionaries and Hash table representation.
3. **Analyze** the various non linear data structures with its operations
4. **Develop** the programs by using Graph Traversal and heap sort
5. **Apply** data structure concepts for the implementation of pattern matching and tries.

<table>
<tr><td colspan="16">CO- PO,PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">Programme Outcomes (POs)</td><td colspan="3">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td></td></tr>
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<tr><td>CO3</td><td></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>1</td></tr>
<tr><td>CO4</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td></td></tr>
<tr><td>CO5</td><td>2</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td></td></tr>
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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: B0510	**Object Oriented Programming** (Common for CSE, CSE (DS), CSE (AI and ML), CSE (Cyber Security), CSE (IOT) and IT)	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: **[9 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: **[11 Periods]**

Inheritance, Packages and Interfaces – 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, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

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

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

MODULE V: [09 Periods]

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

TEXT BOOKS:
1. Herbert Schildt, "Java The complete reference", TMH, 8th edition
2. T. Budd, "Understanding OOP with Java", updated edition, Pearson Education.
3. Joyce Farrell, Cengage, "Object Oriented Programming C++", 4th Edition, 2013.

REFERENCES:
1. P.J. Deitel and H.M. Deitel, "Java for Programmers", Pearson education.
2. P. Radha Krishna, "Object Orientd Programming through Java", Universities Press.
3. S. Malhotra and S. Choudhary, "Programming in Java", Oxford Univ. Press.
4. Bruce Eckel, "Programming in Java", Pearson Education.
5. Herbert Schildt, "The Complete Reference, C++", TMH, 4th edition.

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

Course Outcomes:

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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: B0511	**Operating Systems** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:
This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

MODULE I: Computer System and Operating System Overview   [10 Periods]
Basic System and Process Operations - Overview of Computer System hardware, Operating System Objectives and services, Operating System Structure, System Calls, System Programs.
Process Management - Process Description, Process Control Block, Process States, Inter-process Communication.

MODULE II: Scheduling and Concurrency   [9 Periods]
CPU Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms and evaluation, Threads Overview, Threading issues.
Concurrency - Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, monitors, classic problems of synchronization.

MODULE III: Deadlocks   [10 Periods]
A: Deadlocks - System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention.
B: Detection and Recovery - Deadlock avoidance, Deadlock detection, Recovery from Deadlocks.

MODULE IV: Memory   [10 Periods]
Memory Management -Basic concepts, Swapping, Contiguous memory allocation, Paging, Segmentation, Virtual memory, Demand paging, Page-replacement algorithms, Thrashing.
Secondary Storage Structure and I/O Systems - Disk structure; Disk scheduling, Disk management, Swap space Management, RAID structure, Stable storage Implementation, Tertiary Storage Structure, I/O hardware, Application I/O interface, Kernel I/O subsystem.
.

MODULE V: Files   [08 Periods]
File Management - File system-File concepts, Access methods, Directory structure, File system mounting, File sharing and Protection. Implementing file systems-File system structure and implementation, Directory implementation, Allocation methods, Free-space management, Efficiency and performance.
Security - Protection, Security threats, Viruses, Cryptography as a security tool.

TEXT BOOKS:
1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, **"Operating System Principles"** 7th Edition, John Wiley.

2. Stallings, **"Operating Systems Internal and Design Principles"**, 5th Edition, 2005, Pearson education/PHI

REFERENCES:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.
3. D M Dhamdhere, "Operating Systems: A Concept-based Approach", Second Edition, Tata McGraw-Hill Education, 2007.
4. William Stallings, "Operating Systems: Internals and Design Principles", Seventh Edition, Prentice Hall, 2011.
5. Pramod Chandra P. Bhat, **"An Introduction to Operating Systems, Concepts and Practice"**, PHI, 2003

Course outcomes

1. **Determine** the role of Operating System in a computer.
2. **Relate** the methods for providing concurrency, communication and synchronization among concurrent tasks.
3. **Illustrate** the schemes used to address the issues of deadlocks.
4. **Contrast** different memory management techniques.
5. **Examine** various file management strategies and security issues.

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		

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: B0512	**Data Structures Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 1.5		-	-	3

Prerequisites: A Course on "Programming for problem solving"

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

Software Requirements: C

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

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

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

Outcomes:
At the end of the course, students will be able to
1. Develop C programs for computing and real life applications using basic data structures like stacks, queues, linked lists, Binary Search Trees.
2. Make use of basic data structures implementing various tree and graph traversal operations and algorithms.
3. Apply the concepts of basic data structures and implement advanced operations AVL Trees, Red –Black Trees, and Splay Trees concepts.

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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester		
Code: B0513	**Object Oriented Programming Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**	
Credits: 1.5		**-**	**-**	**3**	

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, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.

Software Requirements: Java

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. Write Java Programs that implement the following.
   a) Constructor
   b) Parameterized constructor
   c) Method Overloading
   d) Constructor overloading
2. 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.
   c) that reads a line if integers and then displays each integer and the sum of all integers(use string tokenizer class of java.util).
3. Write Java programs that uses the following keywords…
   a) this
   b) super
   c) static
   d) final
4. Write a Java program to implement
   a) Method Overriding.
   b) dynamic method dispatch.
   c) multiple inheritance.
   d) access specifiers.
5. Write a Java program that

a) reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) reads a file and displays the file on the screen, with a line number before each line.

c) displays the number of characters, lines and words in a test file.

6. Write a Java program for handling
   a) Checked exceptions.
   b) unchecked exceptions.

7. Write a Java program
   a) Creates three threads. First threads displays "Good Morning "for every one Second, the second thread displays "Hello" for every two seconds, the third thread Displays "Welcome" for every three seconds.
   b) that correctly implements producer consumer problem using concept of inter thread communication.

8. Write a Java program which demonstrates the use of following collection classes
   a) Array List
   b) Hash Set
   c) Deque

9. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*,/ operations. Add a text field to display the result.

10. Write a Java program for handling
    a) mouse events.
    b) key events.

11. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields num1 and num2. The division of num1 and num2 is displayed in the result field when the divide button is clicked. If num1 or num2 were not an integer, the program would throw number format exception. If num2 were zero, the program would throw an arithmetic exception and display the exception in the message dialogue box.

12. Write a Java program that
    a) Simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on and only one light can be on at a time. No light is on when the program starts.
    b) Allows the user to draw lines rectangles and ovals.

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.

Course Outcomes:
At the end of the course, students will be able to
1. **Build** simple java progras using the basic concepts of OOP
2. **Create** user defined packages to build real time applications

3. **Develop** applications on files, exceptions, threads and applets.
4. **Construct** GUI based applications.
5. **Design** Interactive applications for use on internet.

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	

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: B0514	**Operating Systems Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: NIL

Course Objectives:
This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

Software Requirements: C++/JDK

List of Programs:
1. Simulate the following CPU scheduling algorithms
    a) FCFS b) SJF
2. Simulate the following CPU scheduling algorithms
    a) Priority b) Round Robin
3. Simulate the Producer Consumer Problem
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate MVT and MFT techniques.
6. Simulate Paging Technique of memory management
7. Simulate page replacement algorithms a) FIFO b) LRU c) Optimal
8. Simulate the following Disk Scheduling Algorithms
(a) First Come-First Serve (FCFS)
 (b)Shortest Seek Time First (SSTF)
9. Simulate the following Disk Scheduling Algorithms
(a)Elevator (SCAN)
(b) LOOK
10. Simulate all file allocation strategies a) Sequential b) Indexed c) Linked
11. Simulate File Organization Techniques
    a) Single level directory b) Two level
12. Simulate File Organization Techniques
    a) Hierarchical b) DAG

TEXT BOOKS:
1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, **"Operating System Principles"** 7th Edition, John Wiley.
2. Stallings **"Operating Systems Internal and Design Principles",** Fifth Edition-2005, Pearson education/PHI

REFERENCES:
1. Crowley," Operating **System A Design Approach",**TMH.
2. Andrew S Tanenbaum," Modern **Operating Systems",** 2nd edition Pearson/PHI.
3. Pramod Chandra P. Bhat**, "An Introduction to Operating Systems**", Concepts and Practice", PHI, 2003
4. DM Dhamdhere**," Operating Systems A concept based approach"** ,2nd Edition, TMH

Course Outcomes:

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

1. **Implement** various CPU scheduling algorithms, Bankers algorithms used for deadlock avoidance and prevention.
2. **Develop** disk scheduling algorithms and apply File organization techniques.
3. **Simulate** file allocation method

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		

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. III Semester	
Code: B00M1	GENDER SENSITIZATION (An Activity-based Course) (Common for CE, EEE, ME, ECE, MiE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	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 Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

MODULE V: GENDER AND CULTURE   [06 Periods]
Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and 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%

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

REFERENCES:
1. Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We Were Making History...' Life Stories of Women in the ToIrmgana People's Struggle. New Delhi: Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by - the-numbers-where-Indan-womenworkP
3. K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto://harooreollins.co.in/BookDetailasp? FlookCndet,3732

4. Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

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

Course Outcomes:

At the end of the course,

- 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.

	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		

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0B07	Applied Statistics and Optimization Techniques (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AIML and IT)	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):$(\infty:$ 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

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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester		
Code: B0515	**Database Management Systems** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)		L	T	P
Credits: 3			3	-	-

Prerequisites
1. A course on "Data Structures"

The purpose of learning this course is to:
1. To understand the basic concepts and the applications of database systems and Conceive the database design process through ER Model and Relational Model
2. Design Logical Database Schema and mapping it to implementation level schema through Database Language Features
3. Familiarize queries using Structure Query Language (SQL) and PL/SQL and Improvement of the database design using normalization criteria and optimize queries
4. Understand the practical problems of concurrency control and gain knowledge about failures and recovery.
5. Understand with database storage structures and access techniques

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

What is Database Management System, Advantage of DBMS over File Processing System, Introduction and applications of DBMS, Purpose of database system, Views of data, Database system Architecture, Data Independence, The evolution of Data Models, Levels of Data Abstraction in DBMS, Database Users and DBA, Database Languages,

Introduction to Database design: Database Design, Design process, Entity Relation Model, ER diagram, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Keys and Constraints, Mapping Cardinality, Extended ER - Generalization, Specialization and Aggregation, ER Diagram Issues, Weak Entity, Conceptual Design with the ER Model.

MODULE II: **[09 Periods]**

Introduction to the Relational Model: *Relational Model, Conversion of ER to Relational Table.* Structure Creation, alternation. Integrity constraint over relations, enforcing integrity constraints - Defining Constraints-Primary Key, Foreign Key, Unique, not null, check. introduction to views, destroying/altering tables and views. Transaction Control Commands, Commit, Rollback, Savepoint.

Relational Algebra – Fundamental Operators and syntax, relational algebra queries, Tuple relational calculus.

MODULE III: **[10 Periods]**

SQL Queries: form of basic SQL query, set operations: UNION, INTERSECT, and EXCEPT, Sub Queries, correlated sub queries, Nested Queries, aggregation, IN, ANY, ALL operators, NULL values, complex integrity constraints in SQL.
PL/SQL Concepts- Cursors, Stored Procedure, Functions Triggers and Exceptional Handling.

Schema Refinement and Normal Forms: **schema refinement**: Pitfalls in Relational database, decomposing bad schema, Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1Nf, 2NF, 3NF, Decomposition using FD- dependency preservation, BCNF, Multi- valued dependency, 4NF, Join dependency and 5NF.

MODULE IV: Transaction Management and Concurrency Control: **[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, Deadlock

MODULE V: Storage and Indexing: **[09 Periods]**

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:
1. Data base Management Systems, Raghu Rama krishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 6th edition, 2010.
2. Database Systems, 6th edition, R Elmasri, Shamkant,B.Navathe, Pearson Education, 7th edition, 2013

REFERENCES:
1. Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited l, 6th edition, 2011.
2. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.
3. SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
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.

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+retri eval?SGWID=0-153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

Course Outcomes:
1. Gain knowledge of fundamentals of DBMS, database design and normal forms and apply the fundamentals of data models to model an application's data requirements using conceptual modeling tools like ER diagrams
2. Apply the method to convert the ER model to a database schema based on the conceptual relational model

3. Apply the knowledge to create, store and retrieve data using Structure Query Language (SQL) and PL/SQL and apply the knowledge to improve database design using various normalization criteria and optimize queries
4. Appreciate the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
5. Familiarity with database storage structures and access techniques

<table>
<tr><td colspan="16" align="center">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12" align="center">Programme Outcomes (POs)</td><td colspan="3" align="center">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
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<tr><td>CO5</td><td>3</td><td>1</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td></tr>
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Prerequisites: Object Oriented Programming

Course Objectives:
This course enables the students to identify the fundamental concepts for developing web application, analyze how data can be transported using XML, understand, develop dynamic web applications using Servlets, build a web application which connects to database and interpret the importance of JSP over Servlets, significance of Spring framework to achieve dependency injection.

MODULE I: Basics of HTML, Cascading Style Sheet and Java Script   [09 Periods]
HTML - List, Tables, Images, Forms, Internal and External CSS, types of CSS Selectors.
Java Script - Introduction to Java Scripts, declaring variables, scope of variables, functions, event handlers, Objects in Java Script, Dynamic HTML with Java Script.

MODULE II: XML and Database Access   [10 Periods]
Introduction to XML – XML elements and attributes, XML Name space, Document Type Definition, XML Schemas, using XML Processors: DOM and SAX.
Database Access - Database Programming using JDBC, JDBC drivers, Studying javax.sql.* package, Statement and ResultSet interfaces, Prepared Statements.

MODULE III: Servlets   [10 Periods]
A: Introduction to Servlets: Servlet definition, Servlet API, Servlet Interface, Generic Servlet, HttpServlet, Servlet lifecycle, Tomcat server, how servlet works, Servlet Request, Request Dispatcher, ServletConfig, ServletContext, Attributes in servlet.
Session Tracking techniques: cookies and Http Session, Session: Login and Logout, Servlet Filter, Accessing a Database from a Servlet.

MODULE IV: JSP Programming   [10 Periods]
Introduction to JSP - The Problem with Servlet, lifecycle of JSP, JSP API, generating dynamic content using Scripting Elements, Implicit JSP Objects, JSP Directive elements.
JSP Exception, Action elements, Expression Languages, MVC in JSP, JSTL, Accessing a Database from a JSP, JSP CRUD example.

MODULE V: Java Spring Framework   [09 Periods]
Introduction of Spring: Spring Architecture, Dependency Injection, IOC Containers, Constructor Injections and setter Injections, Autowiring.
Introduction of Spring JDBC, Basics of Hibernate, Spring MVC Architecture.

TEXTBOOKS

1. Chris Bates **"Web Programming, building internet applications ",** 2nd edition, wiley Dreamtech
2. Marty Hall and Larry Brown **"Core servlets and java server pages volume 1: core technologies ",** Pearson.
3. Ranga Rao Karanam "Mastering Spring 5.0" Volume 1, Packt Publishing.

REFERENCES
1. Sebesta **"Programming world wide web",**Pearson
2. Dietel and Nieto **"Internet and World Wide Web – How to program"** PHI/Pearson Education Asia.
3. Wang-Thomson **"An Introduction to web Design and Programming"**

E-RESOURCES
1. https://www.w3schools.com/html/
2. https://www.javatpoint.com/servlet-tutorial
3. https://ndl.iitkgp.ac.in/result?q={%22t%22:%22search%22,%22k%22:%22web%20techn ologies%22,%22s%22:[],%22b%22:{%22filters%22:[]}}
4. http://nptel.ac.in/courses/106105084/

Course Outcomes:
At the end of the course, students will be able to
1. **Understand** the concepts of designing static and dynamic web pages with HTML, DHTML, java script and Cascading Styles sheets.
2. **Identify** the role of XML and dynamic web application which uses database.
3. **Create** server side web applications using Servlets.
4. **Design Contrast** on the importance of JSP in web programming.
5. **Implement** the Spring Framework and related functionalities.

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
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
CO 4	2	2	2	3	3	-	-	-	-	1	-	2	2	2	2
CO 5	2	2	1	3	3	-	-	-	-	1	-	2	3	3	2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0516	**Design and Analysis of Algorithms** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	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

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/

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.
 4. **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.
 5. **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
 6. **Apply** algorithm design techniques to solve certain NP-complete problems.

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0517	**Mobile Application Development** [Professional Elective - I] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 3		3	-	-

Prerequisites: Java

Course Objectives:

- To demonstrate the introduction and characteristics of mobile applications
- Application models of mobile application frameworks. Managing application data and User-interface design for mobile applications
- Integrating networking, the OS and hardware into mobile-applications
- Addressing enterprise requirements in mobile applications – performance, scalability, modifiability, availability and security
- Testing methodologies for mobile applications– Publishing, deployment, maintenance and management. To demonstrate their skills of using Android software development tools
- To demonstrate their ability to deploy software to mobile devices

MODULE I - The Internet of Things (IOT)   **[10 Periods]**
Introduction to mobile devices: Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile devices vs. desktop devices, ARM and Intel architectures, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store.
Development environments: XCode, Eclipse, VS2012, PhoneGAP, etc.; Native vs. web applications.
Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User.

MODULE II -   **[09 Periods]**
Android User Interface: Measurements – Device and pixel density independent measuring units
User Interface (UI) Components – Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers 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]**

Back Ground Running Process, Networking And Telephony Services: Services: Introduction to services – local service, remote service and binding the service, the communication between service and activity, Intent Service.

MultiThreading: Handlers, AsyncTask.

Android network programming: Http Url Connection, Connecting to REST-based and SOAP based Web services.

Broad cast receivers: Local Broadcast Manager, Dynamic broadcast receiver, System Broadcast. Pending Intent, Notifications.

MODULE IV – [10 Periods]

Android: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

MODULE V – [10 Periods]

Advanced Topics: Power Management: Wake locks and assertions, Low-level OS support, Writing power-smart applications.

Augmented Reality via GPS and other sensors: GPS, Accelerometer, Camera.

Mobile device security in depth: Mobile malware, Device protections, iOS "Jailbreaking", Android "rooting" and Windows' "defenestration"; Security and Hacking: Active Transactions, More on Security, Hacking Android.

Text Books:

1) Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 2nd edition, 2015.
2) Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004.
3) Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012
4) Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
5) Dawn Griffiths, David Griffiths,*"Head First: Android Development" ,OReilly2015,ISBN*: 9781449362188
6) http://developer.android.com/develop/index.html
7) Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

Reference Books:

1) Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
2) Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O'Reilly Media, 2016.

3) Brian Fling, Mobile Design and Development, O'Reilly Media, Inc., 2009.
4) Maximiliano Firtman, Programming the Mobile Web, O'Reilly Media, Inc., 2nd ed., 2013.
5) Cristian Crumlish and Erin Malone, Designing Social Interfaces, 2nd ed., O'Reilly Media, Inc., 2014.
6) Suzanne Ginsburg, Designing the iPhone User Experience: A User-Centered Approach to Sketching and Prototyping iPhone Apps, Addison-Wesley Professional, 2010.

Course Outcomes:

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

- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Use state information across important operating system events.
- Apply Java programming concepts to Android application development.
- Applying Advanced Topics like Power Management, GPS, Camera and security

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	

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0518	**Free and Open Source Software** [Professional Elective - I]	**L**	**T**	**P**
Credits: 3	(Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:
1. Familiarity with Open Source Technologies
2. Study some FOSS Projects to under the principles, methodologies of FOSS.
3. Understand the policies, licensing procedures and ethics of FOSS.

Module I: [09 Periods]
Introduction to Open Source: Open Source, need and principles of OSS, Open Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Public Domain software, History of free software, Proprietary Vs Open Source Licensing Model, use of Open Source Software.

Module II: [09 Periods]
Fault Tolerant Design: **Principles and Open Source Methodology**- History, Open Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open Source Software Development, Licenses, Copyright vs. Copy left, Patents, zero marginal cost, income-generation Opportunities, Internationalization.

Module III: [12 Periods]
Case Studies: Apache, BSD, Linux, Mozilla Firefox, Wikipedia, Git, GNU CC, Libre Office.

Module IV: [09 Periods]
Open Source Project: Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open Source Teaching (OST), Open Source Media.
What Is A License, Creation of our own Licenses, Important FOSS Licenses (Apache, BSD, PL, LGPL), copyrights and copy lefts, Patent.

Module V: [09 Periods]
Open Source Ethics: Open Source Vs. Closed Source, Open Source Government, Ethics of Open Source, Social and Financial Impact of Open Source Technology, Shared Software, Shared Source, Open Source as a Business Strategy.

TEXT BOOKS:
1. Kailash Vadera, Bhavyesh Gandhi, "Open Source Technology", University Science Press, 1st Edition, 2009.
2. Fadi P. Deek and James A. M. McHugh, "Open Source Technology and Policy", Cambridge University Press, 2008.

REFERENCES:
1. Wale Soyinka, "Linux Administration- A beginner's Guide", Tata McGraw Hills, 2009

2. Andrew M. St. Laurent, "Understanding Open Source and Free Software Licensing", O'Reilly Media, 2004.
3. Dan Woods, GautamGuliani, "Open Source for the Enterprise", O'Reilly Media, 2005.
4. Bernard Golden, "Succeeding with Open Source", Addison-Wesley Professional,2004.
5. Clay Shirky and Michael Cusumano, "Perspectives on Free and Open Source Software", MIT press, 2005.

Course Outcomes:
At the end of the course, students will be able to:
1. Differentiate between Open Source and Proprietary software and Licensing.
2. Recognize the applications, benefits and features of Open Source Technologies.
3. Understand and demonstrate Version Control System along with its commands.
4. Gain knowledge to start, manage open source projects.
5. Understand and practice the Open Source Ethics.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		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	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0519	**Artificial Intelligence** [Professional Elective - I] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Discrete Mathematics

COURSE OBJECTIVES:

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

MODULE I: INTRODUCTION [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: Problem Solving [09 Periods]

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a*, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games.

MODULE III: Logic Concepts and Knowledge Representation [10 Periods]

A: Logic Concepts - Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

B: Knowledge Representation - Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

MODULE IV: Expert System and Applications [10 Periods]

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.

MODULE V: Uncertainty Measure [09 Periods]

Probability theory: Introduction, Bayesian belief networks, certainty factor theory, dempster-shafer theory.

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

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

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

E-RESOURCES:
1. https://i4iam.files.wordpress.com/2013/08/artificial-intelligence-by-rich-and- knight.pdf
2. https://books.google.co.in/books?id=pVR9W5LEZUwC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. https://www.journals.elsevier.com/artificial-intelligence/
4. http://www.ceser.in/ceserp/index.php/ijai
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7_M07uyea_7zp_zR G3BvdUVy2TIab45fvPeNJfynQsAbmBEgDSUqzidwcse6xwotJA
6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRBg_vrHK12- lgOzTVbb5oZ6eQOBjCWDfRvquHJLEOFENjI5AmOqRc9Ar3eJF4CGFrw

COURSE OUTCOMES:
At the end of the course, students will be able to
1. **Describe** the key components of the Artificial Intelligence field.
2. **Identify** various problem-solving strategies.
3. **Construct** the solution for the problem using various logic and knowledge representation techniques.
4. **Interpret** the knowledge in various domains using expert systems.
5. **Discover** the solutions by using the probability theory and fuzzy logic.

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		

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0522	**Computer Graphics** [Professional Elective - I] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 3		3	-	-

Prerequisites: NIL

Course objectives:

This course allows the students to:

1. Understand the fundamental concepts and theory of computer graphics
2. Understand modeling, and interactive control of 3D computer graphics applications
3. The underlying parametric surface concepts be understood
4. Learn multimedia authoring tools.
5. Understand 3-D Geometric Transformations

Module I: Introduction: [9 Periods]

Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

Module II: Output Primitives: [9 Periods]

Output Primitives: Points and lines, line drawing algorithms, mid-point circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm.

Module III: 2-D Geometrical Transformations and 2-D Viewing: [12 Periods]

2-D Geometrical Transformations: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

2-D Viewing: The viewing pipe-line, viewing coordinate reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm

Module IV: 3-D Object Representation: [9 Periods]

spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, Solid modeling Scalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms

Module V: 3-D Geometric Transformations: [9 Periods]

3-D Geometric Transformations: Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting.

Text Books:
1. Computer Graphics C version/ Donald Hearn and M. Pauline Baker/Pearson/PHI, 2002
2. Computer Graphics Principles & Practice, Second edition in C/ Foley, VanDam, Feiner and Hughes/Pearson Education, 2013

References:
1. Computer Graphics Second edition, Zhigandxiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw hill edition,2002.
2. Procedural elements for Computer Graphics, David F Rogers, Tata McGraw hill, 2nd edition,1988.
3. Principles of Interactive Computer Graphics, Neuman and Sproul, TMH, 1979.
4. Computer Graphics, Steven Harrington, TMH, 1987.

E-RESOURCES:
1. http://www.hiteshpatel.co.in/ebook/cg/Computer_Graphics_C_Version.pdf
2. http://ptgmedia.pearsoncmg.com/images/9780321399526/samplepages/0321399528.pdf
3. http://social.cs.uiuc.edu/papers/pdfs/g5kar.pdf
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7y_TqI7sLJ_1X3zVWNHh VwSwBCdfRRvSTrPP45TFWuzrxWT5ea_k_dP1rirZCeNbWw

Course outcomes:
Upon successful completion of the course, students will be able to:

1. Use the principles and commonly used paradigms and techniques of computer graphics
2. Write basic graphics application programs including animation
   3. Design programs to display graphic images to given specifications
   4. Design programs to display3D graphic images
   5. Design programs to display3D Geometric Transformations

COS	**CO- PO, PSO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak			
	\multicolumn{12}{c}{**Programme Outcomes (POs)**}		\multicolumn{3}{c}{**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

Prerequisites: NIL.
Course objectives: To understand the Wireless communication Environment, GSM and MANNET.

MODULE I: Introduction [09 Periods]
Introduction to Mobile Communications and Computing-Mobile Computing (MC): Introduction to MC, Novel applications, Limitations, and Architecture.
GSM-Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

MODULE II: MAC [09 Periods]
A:Motivation for a Specialized MAC (Hidden and Exposed Terminals, Near and Far Terminals).
B:SDMA, FDMA, TDMA, CDMA, MAC Protocols for GSM.

MODULE III: Mobile IP Network Layer [09 Periods]
Mobile IP (Goals, assumptions, entities and terminology, IPpacket delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

MODULE IV: Mobile IP Transport Layer [09 Periods]
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP,Fast retransmit/fast recovery, Transmission/ time-out freezing, Selective retransmission, Transaction oriented TCP.

MODULE V: Data Base Issues and Data Dissemination [12 Periods]
Database Issues - Hoarding techniques, caching invalidation mechanisms.
Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

TEXT BOOKS:
1. Stojmenovic and Cacute "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002,
2. "Mobile Communications", Jochen Schiller, Addison-Wesley, Second Edition, 2004.

REFERENCES:
1. Reza Behravanfar "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University Press, Oct2004.
2. "Mobile Computing", Raj Kamal, Oxford University Press, 2007
3. "Mobile and Wireless Design Essentials", Martyn Mallick, Wiley DreamTech

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

1. Learn the different wireless communication technologies, understand the protocols used in the layered architecture.
2. Define WLAN and different WLAN transmission technologies.
3. Explain different types of WLANs, learn about GSM.
4. Explain different Wireless Medium Access Control Protocols, explain Mobile Network and Transport Layer Protocols.
5. Explain different routing algorithms used in Mobile Ad hoc Networks (MANET).

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		

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0520	**Database Management Systems Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 2		-	1	2

Co-requisites
1. Co-requisite of course "Database Management Systems"

Course Objectives:
This course enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example project.
1. The student is expected to practice the designing a database system using ER diagram, developing and querying a relational database using normalization techniques in the context of example database.
2. Students are expected to Learn SQL basics for data definition and data manipulation using "MySQL" database.
3. Students are expected to apply the learn developing database applications using procedures, cursors and triggers.

List of experiments:

1	Railway Reservation System -(Redesigning IRCTC database) **Train** (train Number, name, source, destination, start_time, reach_time, traveltime, distance, class, days, type) **Ticket** (PNRNo, Transactionid, from_station, To_station, date_of_journey, class date_of_booking, total_ticket_fare, train number) **Passenger** (PNR No, Serial no, Name, Age, Reservation_status) **Train_Route**(Train_No, route_no, station_code, name, arrival_time, depart_time, distance, day) **Train_Ticket_fare**(Train_No, class, base_fare, reservation_charge, superfast_charge, other_charge, tatkal_charge, service_tax)
	Create all the tables specified above. Make underlined columns as primary key.(use number, number(m,n), varchar(n), date, time, timestamp data types appropriately) Insert atleast 5 rows to each table. (Check www.irctc.co.in website for actual data) 1. Use Interactive insertion for inserting rows to the table. 2. Use ADT (varray) for class and days column in Train table.
2	Write simple DDL/DML Queries to 1. Remove all the rows from Passenger table permanently. 2. Change the name of the Passenger table to Passenger_Details. 3. List all train details. 4. List all passenger details. 5. Give a list of trains in ascending order of number. 6. List the senior citizen passengers details. 7. List the station names where code starts with 'M'. 8. List the trains details within a range of numbers. 9. Change the super fast charge value in train fare as zero, if it is null. 10. List the passenger names whose tickets are not confirmed. 11. List the base_fare of all AC coaches available in each train. Find the ticket details where transaction id is not known. 1) Use Interactive updation for updating the seat no for particular PNR NO. 2) Find the train names that are from Secunderabad to Mumbai, but do not have the source or destination in its name. 3) Find the train details that are on Thursday (Use the ADT column created).

3	Create (Alter table to add constraint) the necessary foreign keys by identifying the relationships in the table. 1) Add a suitable constraint to train table to always have train no in the range 10001 to 99999. 2) Add a suitable constraint for the column of station name, so that does not take duplicates. 3) Change the data type of arrival time, depart time (date -> timestamp or timestamp to date), and do the necessary process for updating the table with new values. 4) Add a suitable constraint for the class column that it should take values only as 1A, 2A, 3A, SL, C. 5) Add a not null constraint for the column distance in train_route.
4	Use SQL PLUS functions to. 1. Find the passengers whose date of journey is one month from today. 2. Print the train names in upper case. 3. Print the passenger names with left padding character. 4. Print the station codes replacing K with M. 5. Translate all the LC in class column (Train_fare) to POT and display. 6. Display the fare details of all trains, if any value is ZERO, print as NULL value. 7. Display the pnrno and transaction id, if transaction id is null, print 'not generated'. 8. Print the date_of_jounrney in the format '27th November 2010'. 9. Find the maximum fare (total fare). 10. Find the average age of passengers in one ticket. 11. Find the maximum length of station name available in the database. 12. Print the fare amount of the passengers as rounded value. 13. Add the column halt time to train route. 14. Update values to it from arrival time and depart time. High Level: 15. Update values to arrival time and depart time using conversion functions. 16. Display the arrival time, depart time in the format HH:MI (24 hours and minutes).
5	Write Queries to. Use SET Operators 1. Find the train numbers for which reservation have not yet been made. 2. Find the train names that donot have a first AC class coach. 3. Print all the PNR nos available in the database. 4. Find passenger names who have booked to 'Pune'. Use Nested Query(in Operators) 1. Find the train names that stop in 'Warangal'. 2. Find the train names that are superfast and the service tax is zero. 3. Find the Passenger name who have booked for the train that starts from 'Secunderabad'. 4. Find the trains names that have all the AC coaches and the base fare is less than 3000 for each case.
6	Use Join Query 1. Find the train names that stop in 'Warangal'. 2. Find the train names that are superfast and the service tax is zero. 3. Find the Passenger name (and train name) who have booked for the train that starts from 'Secunderabad'. 4. Display the trains names, each type of class and the total fare for each type of class. 5. Display all the train details and the ticket details (if booked any). 6. Create a sequence to provide values for the PNR no.

	7. Write a query for full outer join using any of the tables above. Write Queries to. Use Coorelated (and nested) Query 1. Find the train names for which ten tickets have been reserved. 2. Find the trains that have more than ten substations. 3. Find the passengers who do not pass through 'Kachiguda'. 4. Find passengers who have booked for super fast trains.
7	Complex queries (use groupby/groupby having/join/nested) 1. Take the start station code and end station code and display the train details. 2. List the train names and the number of sub stations it has. 3. List the stations where all types of trains stop. 4. List the trains names that has atleast four bookings. 5. Create a table cancellation history (Insert values from ticket and passenger table). 6. Create a table for all the train numbers and class available in train_ticket_fare with total seats. 1. Find the station name that has highest number of trains stopping at.
8	Write a simple PL/SQL block to. 1. Print the fibonacci series. 2. Print the factorial of a given number. 3. Print 'NOT confirmed' based on the reservation status, of a particular passenger. 4. Print the total seats available for a particular train and for a particular class.
9	Write a cursor for the following. 1. Retrieve the passenger details for ―X train number and given journey date. 2. Display the train name (once) and the substation names. 3. Display the fare details of a particular train(use basic exceptions) 4. Write a cursor to update the reservation status of the passengers (generate seat number, if seats have reached maximum, put waiting list number (30% of total seats), if waiting list number reaches maximum, put PQWL (10%of total seats), RAC-20%)

10	1. Write a PL/SQL procedure to.
	  a. List the details of passengers who has reserved next to ―Mr. X.
	  b. PNR No. of a passengers for a given source and a destination.
	 2. Write a PL/SQL function to.
	  a. Get the PNRNo and return the total ticket fare.
	  b. Get the Passenger name, train no and return the total journey time in hours andminutes.

11	Write a Trigger for the following: 1) When a passenger cancels a ticket, do the necessary process and update the cancellation history table. 2) When train number is changed, update it in referencing tables. 3) When a passenger record is inserted reservation status should be automatically updated.
12	1) Use TCL commands for your transactions. (commit,rollback, savepoint) 2) Create a role named 'clerk', and give permission for him to select only the trains starting from 'Warangal' along with fare details. 3) Create a nested table containing trainno,name,source,destination and passengers who have booked for it (PNR no,sno, name,age). Find the passengers whose name start with 'S' and train starts from 'Warangal'

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

References:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.
2. SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,
3. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
4. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

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

COs	\multicolumn{12}{c}{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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B1206	**Web Technologies Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 1.5		-	-	3

Course Objectives:

This course enables the students to identify the fundamental concepts for developing web application, analyze how data can be transported using XML, develop dynamic web applications using Servlets, build a web application which connects to database and interpret the importance of JSP over Servlets, understand the significance of Java Spring Framework.

Software Requirements: JDK, and Tomcat Server

List of Programs:

1. a) Write an html program to embed an image into web document and to create hyperlinks to other documents
   b) Write an html program to demonstrate the working of ordered and unordered lists.
2. a) Write an html program to create Time Table using table tag.
   b) Write an html program to demonstrate the use of form tag and create login form with includes following attributes such as text, password, radio button, checkbox, date, file, month, week, URL.
3. a) Write a program to create an internal cascading style sheet using Id Selectors, Class Selector and Group selector.
   b) Write a program to create an external Cascading style sheet which includes background properties, border properties, font properties and margin properties.
4. a) Write a JavaScript to validate the student registration form which includes username, password validation, retype password verification, mobile number and email validation, and age restriction(between 17-28 years).
   b) Write a Javascript program to perform call by value and call by reference mechanisms.
5. a) Write an XML program to create internal DTD and external DTD for an XML document for employee details.
   b) Write an XML program to create XSD for an XML document for student details.
6. Write a JDBC program to create the employee table and to perform the CRUD operations on it. CRUD means insertion/creation of new record, retrieval of records, update and delete the existing records.
7. a) Install the Apache Tomcat Server. Create the user defined the servlet class using Generic Servlet and/or HttpServlet class and execute the "Hello Servlet" message.
   b) Design a static HTML form in the Servlet application for Student details such as sname, hall ticket number, email, mobile number, internal & external marks and calculate total marks using doPost() method.
8. a) Implement the Servlet Request Dispatch Techniques to bypass the client request using forward() and include() methods.
   b) Demonstrate the Session Tracking techniques using HttpSession for Employee Login and Logout operations.

9. a) Write a JSP application of Bank customer details using JSP scripting elements which includes scriplet tag, expression tag and declaration tag.

   b) Demonstrate the e-voting systems based on the age of the person using JSP Action tags. If the person is major then eligible for voting and use jsp:include tag otherwise consider minor then use jsp:forward tag.

10. a) Demonstrate how to use the Cookies in session tracking of JSP application.

    b) Create the Simple bean and reuse the bean in multiple JSP pages using JSP action tags.

11. a) Create an Employee database and manage the employee details using JSP Model View Controller (MVC) for the organization.

    b) Implement JSP CRUD operations for user database which includes add a user, edit a user, view users, delete user.

12. Design a Student application using the following Spring Dependency Injection techniques: a) Constructor Injection b) Setter Injection

TEXTBOOKS
1. Chris Bates "**Web Programming, building internet applications**", 2nd edition, WILEY Dreamtech
2. Marty Hall and Larry Brown "**Core servlets and java server pages volume 1: core technologies**", Pearson.
3. Ranga Rao Karanam "Mastering Spring 5.0" Volume 1, Packt Publishing.

REFERENCES
1. Sebesta "**Programming world wide web**",Pearson education.
2. Dietel and Nieto "**Internet and World Wide Web – How to program**" PHI/Pearson Education, Asia
3. Wang-Thomson,"**An Introduction to Web Design and Programming**", Brooks/Cole,Thompson Learning, Pacific Grove

Course Outcomes:
 At the end of the course, students will be able to
1. **Demonstrate** the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
2. **Design** and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
3. **Utilize** the concepts of JavaScript and Java.
4. **Use** web application development software tools i.e Servlets, JSP and XML etc. and identify the environments currently available on the market to design web sites.

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B0521	**Design and Analysis of Algorithms Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 1.5		-	-	3

COURSE OBJECTIVES:

This course will make students

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

Software Requirements: Turbo C

LIST OF PROGRAMS:

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

TEXTBOOKS

1. EllisHorowitz,SatrajSahniandRajasekharan,**"FundamentalsofComputerAlgorithms"** Galgotia publications pvt. Ltd
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, **"Introduction to Algorithms"**, second edition, PHI Pvt. Ltd./ PearsonEducation
3. Parag Himanshu Dave, Himanshu BalchandraDave,**"Design and Analysis ofalgorithms"** Pearson.

REFERENCES

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

COURSE OUTCOMES:

At the end of the course, students will be able to
1. **Analyze** asymptotic performance of algorithms, understand different methods
2. **Develop** solutions to Job sequencing problems, Knapsack algorithm, shortest path algorithms,
3. **Implement** solutions traveling sales person.
4. **Apply** dynamic programming method N-Queen'sProblem.
5. **Apply** synthesizing branch and bound NP problems.

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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: B00M2	**Environmental Science**	L	T	P
Credits: NIL	(Common for CE, EEE, ME, ECE, MiE, CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT) and IT)	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   7 Periods
POLLUTION AND CONTROL:

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   **6 Periods**
Problems and Global effects:
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 Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism(CDM).

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:

1. Erach Bharucha, **"Environmental studies"** University Grants Commission, and University Press, I Edition, 2005.
2. M. Anji Reddy **"Text book of Environmental Science and Technology"** 3rd Edition, 2007
3. Richard T. Wright, **"Environmental Science: towards a sustainable future"** PHL Learning, Private Ltd. New Delhi, 2nd Edition., 2008
4. 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).
5. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).
6. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html (NPTEL online video courses IIT lectures).

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

<table>
<tr><td colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COS</td><td colspan="12">Programme Outcomes (POs)</td><td colspan="3">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
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<tr><td>CO5</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td>1</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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Prerequisites: NIL

Course Objectives:
Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization.

MODULE – I: Management and Principles of Management   [09 Periods]
Introduction to Management: Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.
Management Theories: Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Corporate Social responsibility.

MODULE – II: Planning, Organization and types of Structures   [10 Periods]
Planning: Need for planning- -Steps in the process of planning-Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).
Organization and types of Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE – III: Staffing and controlling   [10 Periods]
A. **Staffing:** Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.
B. **Controlling:** process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE – IV: Operations and Materials Management   [09 Periods]
Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.
Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

MODULE – V: Project Management and Contemporary Practices   [10 Periods]
Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path,

Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

Contemporary Management Practices: Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), six sigma and Capability Maturity Model (CMM) Levels, Bench marking, Balanced Score card.

TEXT BOOKS:
1. Aryasri, **Management Science**, 4th edition TMH, 2004. (UNITS I,II,III,IV,V)
2. Stoner, Freeman, Gilbert, **Management,** Pearson Education, New Delhi, 6th Ed, 2004. (UNITS I,II)

REFERENCES*:*
1. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
2. Koontz &Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
3. Thomas N.Duening& John M. Ivancevich **"Management - Principles and Guidelines"**, Biztantra, 5th edition 2003.
4. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
5. Samuel C. Certo, **"Modern Management"**, PHI, 9th edition, 2005.

E RESOURCES:
1. http://freevideolectures.com/Course/2689/Management-Science
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=human-resource-management
3. http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing-fundamental
4. http://freevideolectures.com/Course/2371/Project-and-Production-Management
5. http://nptel.ac.in/courses/110105034/

Course Outcomes:
At the end of the course, students will be able to
1. Understand the various concepts, principles and theories of management.
2. Understand the basic concepts of planning and various structures of organizations.
3. Understand the process of staffing and controlling
4. Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization.
5. Understand the various contemporary management practices. Also the project management techniques.

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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
		V Semester		
Code: B6201	COMPUTER NETWORKS	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

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

MODULE I: Basics of Networking and Physical layer   [10 Periods]
Basics of Networking - Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSImodel, TCP/IP model.
Physical layer - Digital transmission, Multiplexing, Transmission Media, Switching, CircuitSwitched Networks, Datagram Networks, Virtual Circuit Networks.

MODULE II: Data link layer   [11 Periods]
Functionalities of Data link layer - Introduction, Framing, Error Detection and Correction
– Parity – LRC – CRC- Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. Random access, Controlled access, Channelization, Collision Free Protocols.
LAN - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11

MODULE III: Network Layer   [09 Periods]
A:Basics of Network Layer - Logical Addressing, Internetworking, Tunneling, Address mapping,
B: Communication Protocols - ICMP, IGMP, Forwarding, Unicast Routing Protocols, Multicast Routing Protocols.

MODULE IV: Transport Layer   [09 Periods]
Connection Oriented and Connectionless Protocols -Process to Process Delivery, UDP and TCP protocols, SCTP.
Congestion Control - Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

MODULE V: Application layer   [09 Periods]
DNS - Domain name space, DNS in internet, Electronic mail
Protocols and Network Security - FTP, WWW, HTTP, SNMP, Network Security, Cryptography.

TEXT BOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4thEdition,TMH, 2006.
2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, PearsonEducation/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-DownApproach Featuring the Internet"**, 3rd Edition, Pearson Education.

E-RESOURCES:

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

Course Outcomes:
At the end of the course, students will be able to
- **Understand** the Layered Architecture of Computer Networks.
- **Conceptualize** the protocols of Data Link Layer and can build Local areanetworks.
- **Apply** Subnet and Supernet concepts in the construction of computer network**.**
- **Summarize** the protocols used in Transport Layer, QoS and Congestion controlmechanisms.
- **Analyze** different protocols of Application Layer and various security risks.

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										

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0524	FORMAL LANGUAGES AND AUTOMATA THEORY	L	T	P
Credits: 4		3	1	-

Prerequisites: NIL

Course Objectives:
This course enables the students to define basic properties of formal languages, explain the Regular languages and grammars, inter conversion, Normalizing CFG, describe the context free grammars, minimization of CNF, GNF and PDA, designing Turing Machines and types of Turing Machines, church's hypothesis counter machines, LBA, P & NP problems and LR grammar.

MODULE I: **Introduction** [10 Periods]
Basics of Formal Languages - Strings, Alphabet, Language, Operations, Chomsky hierarchy of languages, Finite state machine Definitions, finite automation model, acceptance languages.
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: Regular Languages [10 Periods]

Representation of Regular Expressions - Regular Sets, Regular Expressions, identity Rules, Constructing Finite automata for the given regular expressions, Conversion of Finite automata to regular expressions.

Pumping Lemma - Pumping lemma of regular sets, closure properties of regular sets (proofs not required). Regular Grammars – right linear and left linear grammars, equivalence between regular grammar and FA.

MODULE III: CFG and PDA [10 Periods]

A: Context Free Grammar - Derivation trees, sentential forms, right most and left most derivations of strings. Ambiguity in Context frees Grammars. Minimization of Context free grammars, CNF, GNF, Pumping Lemma for Context Free Languages.

B: Push Down Automata - Definition, model, acceptance of CFL, Acceptance by final state, acceptance by empty state and its equivalence, Equivalence of CFL and PDA (proofs not required), Introduction to DCFL and DPDA.

MODULE IV: Computable Functions [09 Periods]

Turing Machine - Definition, model, Design of TM, computable functions. Recursive Enumerable Languages and Theorems - Recursively enumerable languages, Church's hypothesis, counter machine, types of Turing Machines (proofs not required)

MODULE V: Computability Theory   [09 Periods]

Linear Bounded Automata - Linear Bounded Automata and context sensitive languages, LR (0) grammar, decidability of problems, Universal TM. P and NP Problems - Undecidable problems about Turing Machine – Post's Correspondence Problem, The classes P and NP.

TEXT BOOKS:

1. H.E. Hopcroft, R. Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.
2. KVN SUNITHA N Kalyani, "Formal languages and Automata Theory", Pearson Education

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003
2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

E-RESOURCES:
1. https://books.google.co.in/books?isbn=8184313020
2. https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf
3. http://www.jalc.de/
4. https://arxiv.org/list/cs.FL/0906
5. http://freevideolectures.com/Course/3379/Formal-Languages-and-Automata- Theory
6. http://nptel.ac.in/courses/111103016/

Course Outcomes:
At the end of the course, students will be able to
1. **Define** the theory of automata types of automata and FA with outputs.
2. **Differentiate** regular languages and applying pumping lemma.
3. **Classify** grammars checking ambiguity able to apply pumping lemma for CFL various types of PDA.
4. **Illustrate** Turing machine concept and in turn the technique applied in computers.
5. **Analyze** P vs NP- Class problems and NP-Hard vs NP-complete problems, LBA, LR Grammar, Counter machines, Decidability of Problems.

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

Module I: Introduction to Software Engineering   **[09 Periods]**
Basics terms of Software Engineering: Evolving role of software, changing nature of Software, Software Myths. A Generic View of Process:-Software engineering-A layered technology, The Capability Maturity Model Integration (CMMI)
Process Models: The water fall model, Incremental process models, evolutionary process models, and the unified process.

Module II: Requirements of Software Engineering   **[09Periods]**
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: Phases of Software Engineering   **[09 Periods]**
Design Engineering: Design process and design quality, design concepts the design model Creating an
Architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

Module IV: Test Strategies   **[09 Periods]**
Methods of Testing: A strategic approach to software testing, Black box and White box Testing, Validation Testing, System Testing.
Product Metrics: Software Quality, Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance Metrics for process and products: Software measurement, Metrics for software quality

Module V: Risk Management   **[09Periods]**

Management of Risk Process: Reactive Vs proactive risk strategies, Software risks, Risk identification, Risk projection Risk refinement, RMMM, RMMM plan 95

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

TEXT BOOKS:
1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw Hill International Edition, 5th edition, 2001.
2. Ian Summerville, Software engineering, Pearson education Asia, 6th edition,2000.

REFERENCES:
1. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag,1997.
2. James F Peters and WitoldPedryez, ―Software Engineering – An Engineering Approach, John Wiley and Sons, New Delhi,2000.
3. AliBehforooz and Frederick J Hudson, ―Software Engineering Fundamentals, Oxford University Press, New Delhi,1996.

E RESOURCES:
1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=softwa re+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0 ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=one page&q&f=false
2. https://books.google.co.in/books?id=PqsWaBkFh1wC&printsec=frontcover&dq=softwar e+engineering+by+ian+sommerville+FREE+download&hl=en&sa=X&ved=0ahUKEwjj v5fhpb_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

Course Outcomes:
At the end of the course, students will be able to:
1. Analyze the customer business requirements and choose the appropriate Process model for the given project
2. Elicit functional and non-functional requirements using rigorous engineering methodology
3. Conceptualize and achieve requirements defined for the system using Architectural styles and Design patterns
4. Design test cases and define metrics for standardization.
5. Assess, mitigate and monitor the risks and assuring quality standards

CO's	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak
	\multicolumn{12}{c}{Programme Outcomes(POs)}	\multicolumn{3}{c}{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	

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0526	ADVANCED DATABASES AND SECURITY [Professional Elective –II]	L	T	P
Credits: 3		3	-	-

Prerequisites: Database Management Systems

Course Objectives:
- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design.
- To learn about Protection of new generation Database Systems
- To learn about Protection of active database systems

Module I: Introduction: [10 Periods]

Introduction to Databases Security Problems in Databases Security Controls Conclusions Security Models -1: Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

Module II : Security Models [9 Periods]

Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion Security Mechanisms: Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

Module III: Security Software Design [10 Periods]

Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion Detection Systems: Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls Evaluation Criteria for Control Comparison. Introduction IDES System RETISS System ASES System Discovery

Module IV: Models for the Protection of New Generation Database Systems-1

[10 Periods]

Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases

Module V: Models for the Protection of New Generation Database Systems -2

[9 Periods]

A Model for the Protection of New Generation Database Systems: the Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

TEXT BOOKS
1. Database Security by Castano, Pearson Edition
2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

REFERENCES

1. Database security by Alfred basta, melissazgola, CENGAGE learning.

E-RESOURCES

1. https://books.google.co.in/books?id=qNCmBRufKBAC&dq=Parallel+Systems-+Distributed+Systems+%E2%80%93+Parallel+Databases:+I/O+Parallelism+%E2%80%93+Inter+and+Intra+Query+Parallelism&hl=en&sa=X&ved=0ahUKEwj83K-18bncAhUMLY8KHX2qCI8Q6AEIKDAA.
2. http://www.inf.ed.ac.uk/teaching/courses/adbs/slides/adbs.pdf
3. https://books.google.co.in/books?id=qNCmBRufKBAC&dq=Parallel+Systems-+Distributed+Systems+%E2%80%93+Parallel+Databases:+I/O+Parallelism+%E2%80%93+Inter+and+Intra+Query+Parallelism&hl=en&sa=X&ved=0ahUKEwj83K-18bncAhUMLY8KHX2qCI8Q6AEIKDAA.
4. http://nptel.ac.in/courses/106104135/

Course Outcomes:

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

- Ability to carry out a risk analysis for large database
- Ability to set up, and maintain the accounts with privileges and roles.
- Ensure that only authorized user has access to the data
- Able to Design and Implement secure database systems.
- Solve Complex Problems in a Team of database works

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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. IV Semester	
Code: B0527	**Cloud Computing** [Professional Elective - II]	L	T	P
Credits: 3		3	-	-

Prerequisites
1. A course on "Operating Systems"

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.

Module – I: [10 Periods]
Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

Module – II: [9 Periods]
Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

Module – III: [10 Periods]
Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

Module – IV: [9 Periods]
Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

Module – V: [10 Periods]
Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue, service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud,

Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform.

Textbook:
1. Essentials of cloud Computing : K.Chandrasekhran , CRC press, 2014

References:
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 Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.

E-RESOURCES:
1. https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/
2. https://en.wikipedia.org/wiki/Cloud_computing
3. https://opencirrus.org/cloud-computing-important/
4. https://www.inforisktoday.com/5-essential-characteristics-cloud-computing-a-4189
5. https://www.sam-solutions.com/blog/four-best-cloud-deployment-models-you-need-to-know/
6. https://medium.com/@chrysaliss.transformation/cloud-computing-architecture-components-cloud-based-delivery-865c33f51cd2
7. https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/July-Could-Computing/S3_M_I_Deen.pdf
8. https://www.fingent.com/blog/cloud-service-models-saas-iaas-paas-choose-the-right-one-for-your-business/
9. https://www.bluepiit.com/blog/different-types-of-cloud-computing-service-models/
10. https://data-flair.training/blogs/cloud-service-providers-companies/
11. https://www.salesforce.com/products/service-cloud/features/

Course Outcomes:
At the end of the course, students will be able to
1. Ability to understand various service delivery models of a cloud computing architecture.
2. Ability to understand the ways in which the cloud can be programmed and deployed.
3. Understanding cloud service providers.

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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0528	SEMANTIC WEB	L	T	P
Credits: 3	[Professional Elective –II]	3	-	-

Course Overview:

The Semantic Web is an extension of the traditional web in the sense that information in the form of natural language text in the web will be complemented by its explicit semantics based on a formal knowledge representation, Semantic Web technologies enable people to create data stores on the Web, build vocabularies, write rules for handling data which have the power to aid in the analysis of the social Web and the design of a new class of applications that combine human intelligence with machine processing. Social Network Analysis and the emerging Semantic Web are also the fields that stand to gain most from the new Web in achieving their full potential. On the one hand, the social Web delivers social network data at an extraordinary scale, with a dynamics and precision that has been outside of reach for more traditional methods of observing social structure and behavior. In realizing this potential, the technology of the Semantic Web provides the key in aggregating information across heterogeneous sources. The Semantic Web itself benefits by incorporating user-generated metadata and other clues left behind by users.

Prerequisite(s): Basics of Web Technologies

Course Objectives:
1. To introduce students to the basics of web technologies with semantic models, ontologies and Inference systems.
2. To develop the basic understanding of knowledge representation for the semantic web.
3. To identify suitable applications for Semantic Web technologies and show some awareness of Existing applications.
4. To develop skills of semantic search technologies, languages and schemas used to describe Semantic Web information.
5. To develop professional and ethical attitude, multidisciplinary approach and an ability to relate Semantic web issues to broader social context.

Module – I (10 Lectures)
Web Intelligence: Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of today's Web, The Next Generation Web, Artificial Intelligence, Machine Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee WWW, Semantic Road Map, Logic on the semantic Web. (T1: Ch-1,3,4)

Module – II (10 Lectures)
Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web -Resource Description

Framework(RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema. (T2: Ch-4)

Module – III **(14 Lectures)**

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping. (T1: Ch-7)

Logic, Rule And Inference: Logic and inference, Monotonic and Non monotonic rules, Description logic, Inference engines, RDF Inference engine. (T1: Ch-8)

Module – IV **(10 Lectures)**

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods. (T1: Ch 10,11,12)

Module – V **(9 Lectures)**

Social Network Analysis and Semantic Web: What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis - Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features. (T2: Ch 2, 3, 6)

Course Outcomes:

At the end of the course, students will be able to
1. **Develop** web applications using semantic techniques.
2. **Relate** knowledge representation methods for semantic web.
3. **Explain** the key aspects of ontology engineering**.**
4. **Design** web services and its applications.
5. **Analyze** and build a social network.

TEXT BOOK(S):
1. Berners Lee, Godel, Turing, H. Peter Alesso Craig F. Smith (2009), *Thinking on the Web*, Wiley interscience.
2. Peter Mika (2007), *Social Networks and the Semantic Web*, Springer, USA.

REFERENCE BOOK(S):
1. J. Davies, Rudi Studer, Paul Warren (2006), *Semantic Web Technologies, Trends and Research in Ontology Based Systems*, John Wiley & Sons, England.
2. Liyang Yu (2007), *Introduction to the Semantic Web and Semantic Web Services*, Chapman & Hall / CRC , USA.

E-RESOURCES:
1. http://as.wiley.com/WileyCDA/WileyTitle/productCd-0471768669.html
2. http://www.springer.com/in/book/9780387710006
3. https://research.vu.nl/ws/portalfiles/portal/2312133
4. http://nptel.ac.in/courses/106105077/18

COS	Programme Outcomes(POs)												PSOs		
	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	
CO4			2	2	2				3					2	
CO5	2	3			1								2		

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0529	ADVANCED COMPUTER ARCHITECTURE [Professional Elective – II]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Organization.

Course Objectives:

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

MODULE I: [09 Periods]

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

MODULE II: [09 Periods]

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

MODULE III: [10 Periods]

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

MODULE IV: [10 Periods]

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

MODULE V: [10 Periods]

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

TEXT BOOKS:

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

REFERENCES:

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

Course Outcomes:

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

1. Understand and apply concept and principle of cache memory and virtual memory to high -performance computer architecture.
2. Understand pipelining and its speed advantage & design pipelined logic.
3. Proficient in fault-tolerant design techniques and examine various methods of error detection and correction such as TMR and Hamming Codes.
4. Identify tradeoffs between complex instruction set computers (CISC) and reduced instruction set computers (RISC).
5. Analyze and perform tradeoffs between the cost, performance, and reliability of alternative computer architectures.

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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B0531	**Scripting Languages**	**L**	**T**	**P**
Credits: 3	[Professional Elective - II] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	3	-	-

Prerequisites: Object Oriented Programming

Course Objectives:
The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing real time data. Also this course gives the capability and knowledge to analyze requirements of software systems for the purpose of determining the suitability of implementing in Perl, PHP or Ruby.

MODULE I: INTRODUCTION [09 Periods]
What is a scripting language, Motivation for and applications of scripting, how scripting languages differ from non-scripting languages, Types of scripting languages, client and server side web scripting
Introduction to PERL and Scripting: PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

MODULE II: Advanced PERL [09 Periods]
Finer points of looping, pack and unpack, file system, eval, data structures, packages, MODULEs, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

MODULE III: PHP Basics [10 Periods]
PHP BASICS - Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

MODULE IV: Advanced PHP Programming - [10 Periods]
PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

MODULE V: Ruby [10 Periods]
What is Ruby, Ruby features, Installation of Ruby, Hello Ruby Program, Operators, data types, control statements, looping statements, break next, redo retry.
Ruby Object class, Methods, Blocks, Modules, Strings, Arrays, Exception Handing.

TEXTBOOKS
1. David Barron, **'The World of Scripting Languages'**, Wiley Publications.
2. Jason Gilmore, **'Beginning PHP and MySQL',** 3" Edition, A press Publications (Dream tech.).

REFERENCES
1. J.Lee and B.Ware, **'Open Source Web Development with LAMP using Linux, Apache, MySQL, Pen and PHP'**, (Addison Wesley) Pearson Education.
2. Julie Meloni and Matt Telles, **'PHP 6 Fast and Easy Web Development',** Cengage Learning Publications.
3. Larry Wall, T.Christiansen and J.Orwant,O'Reilly, **'Programming Perl',** SPD
4. V.Vaswani, **'PHP Programming solutions'**, TMH

E-RESOURCES
1. https://www.w3schools.com/php/
2. https://www.tutorialspoint.com/perl/
3. International journal of Programming Languages and Applications
4. International Journal of Advanced and Innovative Research
5. http://nptel.ac.in/courses/117106113/
6. http://nptel.ac.in/courses/106106145/

Course Outcomes:
At the end of the course, students will be able to
1. **Understand** the significance of various scripting languages.
2. **Apply** your knowledge to work on PERL Internet applications.
3. **Implement** the basic web applications using PHP.
4. **Design** and implement web applications and database connectivity using PHP.
5. **Demonstrate** the programs on Ruby scripting language.
   .

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: B6202	COMPUTER NETWORKS LAB	L	T	P
Credits: 1.5		-	-	3

Prerequisites: NIL

Course Objectives:

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

Software Requirements: Turbo C/JDK

LIST OF PROGRAMS:
1. Implement the data link layer farming methods:
   • Character Count
   • Character stuffing and destuffing.
   • Bit stuffing and destuffing
2. Implement on a data set of characters the three CRC polynomials: CRC-12, CRC-16 and CRC-32.
3. Implement Parity Check using the following techniques
   • Single Dimensional Data
   • Multi Dimensional Data
4. Implement the Even and Odd parity.
5. Impelementation of Data Link Protocols
   • Unrestricted Simplex Protocol
   • Stop and wait Protocol
   • Noisy Channel
6. Impelementation of Sliding Window Protocols
   • One bit sliding window protocol
   • Go Back N sliding window protocol
   • Selective Repeat sliding window protocol
7. Write a code simulating ARP /RARP protocols
8. Impelementation of Routing Protocols
   • Dijkstra's algorithm
   • Distance Vector routing protocol
   • Link State routing protocol
9. Implement the congestion algorithms
   a. Token bucket algorithm

b. Leaky bucket algorithm
10. Implement RSA algorithm.

TEXT BOOKS:

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

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

REFERENCES:

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

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

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

COURSE OUTCOMES:

At the end of the course, students will be able to
1. **Implement** the various protocols.
2. **Analyze** various Congestion control mechanisms.
3. **Implement** encryption mechanisms using Symmetric Key and Asymmetric Keyalgorithms.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
CO1			3										2		
CO2		3												2	

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Course Objectives:
1. To understand the software engineering methodologies involved in the phases for project development.
2. To gain knowledge about open source tools used for implementing software engineering methods.
3. To exercise developing product startups implementing software engineering methods

Open source Tools: StarUML /UMLGraph / Topcased.

Prepare the following documents and develop the software project startup, prototype model, using software engineering methodology for at least two real time scenarios or for the sample experiments.
- Problem Analysis and Project Planning -Thorough study of the problem –Identify Project scope, Objectives and Infrastructure.
- Software Requirement Analysis – Describe the individual Phases/modules of the project and Identify deliverables. Identify functional and non-functional requirements.
a. Data Modeling – Use work products – data dictionary.
b. Software Designing – Develop use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams.
c. Prototype model – Develop the prototype of the product.

The SRS and prototype model should be submitted for end semester examination.

List of Sample Experiments:
Course management system (CMS)
A course management system (CMS) is a collection of software tools providing an online environment for course interactions. A CMS typically includes a variety of online tools and environments, such as:
  a. An area for faculty posting of class materials such as course syllabus and handouts
  b. An area for student posting of papers and other assignments
  c. A grade book where faculty can record grades and each student can view his or her grades
  d. An integrated email tool allowing participants to send announcement email messages to the entire class or to a subset of the entire class
  e. A chat tool allowing synchronous communication among class participants
  f. A threaded discussion board allowing asynchronous communication among participants

In addition, a CMS is typically integrated with other databases in the university so that students enrolled in a particular course are automatically registered in the CMS as participants in that course.

The Course Management System (CMS) is a web application for department personnel, Academic Senate, and Registrar staff to view, enters, and manage course information formerly submitted via paper. Departments can use CMS to create new course proposals, submit changes for existing courses, and track the progress of proposals as they move through the stages of online approval.

Easy Leave
This project is aimed at developing a web based Leave Management Tool, which is of importance to either an organization or a college.

The Easy Leave is an Intranet based application that can be accessed throughout the organization or a specified group/Dept. This system can be used to automate the workflow of leave applications and their approvals. The periodic crediting of leave is also automated. There are features like notifications, cancellation of leave, automatic approval of leave, report generators etc in this Tool.

Functional components of the project:
There are registered people in the system. Some are approvers. An approver can also be a requestor. In an organization, the hierarchy could be Engineers/Managers/Business Managers/Managing Director etc. In a college, it could be Lecturer/Professor/Head of the Department/Dean/Principal etc.

Following is a list of functionalities of the system: A person should be able to
a. login to the system through the first page of the application
b. change the password after logging into the system
c. see his/her eligibility details (like how many days of leave he/she is eligible for etc)
d. query the leave balance
e. see his/her leave history since the time he/she joined the company/college
f. apply for leave, specifying the from and to dates, reason for taking leave, address for communication while on leave and his/her superior's email id
g. see his/her current leave applications and the leave applications that are submitted to him/her for approval or cancellation
h. approve/reject the leave applications that are submitted to him/her
i. withdraw his/her leave application (which has not been approved yet)
j. Cancel his/her leave (which has been already approved). This will need to be approved by his/her Superior
k. get help about the leave system on how to use the different features of the system
l. As soon as a leave application /cancellation request /withdrawal /approval /rejection /password-change is made by the person, an automatic email should be sent to the person and his superior giving details about the action

m. The number of days of leave (as per the assumed leave policy) should be automatically credited to everybody and a notification regarding the same be sent to them automatically

n. An automatic leave-approval facility for leave applications which are older than 2 weeks should be there. Notification about the automatic leave approval should be sent to the person as well as his superior

E-Bidding

Auctions are among the latest economic institutions in place. They have been used since antiquity to sell a wide variety of goods, and their basic form has remained unchanged. In this dissertation, we explore the efficiency of common auctions when values are interdependent the value to a particular bidder may depend on information available only to others-and asymmetric. In this setting, it is well known that sealed-bid auctions do not achieve efficient allocations in general since they do not allow the information held by different bidders to be shared.

Typically, in an auction, say of the kind used to sell art, the auctioneer sets a relatively low initial price. This price is then increased until only one bidder is willing to buy the object, and the exact manner in which this is done varies. In my model a bidder who drops out at some price can "reenter" at a higher price. With the invention of Ecommerce technologies over the Internet the opportunity to bid from the comfort of one's own home has seen a change like never seen before. Within the span of a few short years, what may have began as an experimental idea has grown to an immensely popular hobby, and in some cases, a means of livelihood, the Auction Patrol gathers tremendous response every day, all day. With the point and click of the mouse, one may bid on an item they may need or just want, and in moments they find that either they are the top bidder or someone else wants it more, and you're outbid! The excitement of an auction all from the comfort of home is a completely different experience.

Society cannot seem to escape the criminal element in the physical world, and so it is the same with Auction Patrols. This is one area where in a question can be raised as to How safe Auction Patrols.

Proposed system
• To generate the quick reports
• To make accuracy and efficient calculations
• To provide proper information briefly
• To provide data security
• To provide huge maintenance of records Flexibility of transactions can be completed in time

Electronic Cash counter

This project is mainly developed for the Account Division of a Banking sector to provide better interface of the entire banking transactions. This system is aimed to give a better out look to the user interfaces and to implement all the banking transactions like:
• Supply of Account Information
• New Account Creations
• Deposits
• Withdraws

• Cheque book issues
• Stop payments
• Transfer of accounts
• Report Generations.

Proposed System:
The development of the new system contains the following activities, which try to automate the entire process keeping in view of the database integration approach. User friendliness is provided in the application with various controls. The system makes the overall project management much easier and flexible. Readily upload the latest updates, allows user to download the alerts by clicking the URL. There is no risk of data mismanagement at any level while the project development is under process. It provides high level of security with different level of authentication

Course Objectives: The student should take up the case studies of ATM system, Online Reservation System and Model it in different views i.e. Use case view, logical view, component view, Deployment view.

Week 1
Design a Use case Diagram for ATM system, Online Reservation System
Week 2
Design a Sequence Diagram for ATM system, Online Reservation System. Design a Collaboration Diagram for ATM system, Online Reservation System.
Week 3
Design a Activity Diagram for ATM system, Online Reservation System.
Design a State Chart Diagram for ATM system, Online Reservation System.
Week 4
Design a Class Diagram for ATM system, Online Reservation System.
Week 5
Design a Component Diagram for ATM system, Online Reservation System.
Week 6
Design a Deployment Diagram for ATM system, Online Reservation System.

Course Outcomes:
Upon completion of this course, students should be able to:
1. Analyze the requirements through Use-Case View
2. Identify all structural and behavioral concepts of the entire system
3. Develop a model using UML concepts by different types of diagrams like Use case Diagram, Class Diagram, Sequence Diagram etc

	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

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 units; 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 units 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.

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/)

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

<table>
<tr><td colspan="16">CO- PO-PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium,
1-Weak</td></tr>
<tr><td rowspan="2">CO S</td><td colspan="12">Programme Outcomes(POs)</td><td colspan="3">PSOs</td></tr>
<tr><td>PO1</td><td>PO 2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO 1</td><td>1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO 2</td><td>1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO 3</td><td>1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO 4</td><td>1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO 5</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Prerequisites: NIL

Course Objectives: EEA is a think beyond program which will make the student to examine the application of microeconomics theory as applied to the manager's responsibilities in an organization. To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making. This course should emphasize the quantitative and qualitative applications of economic principle to business analysis

MODULE-1 Business Environment and Managerial Economics   [10 Periods]

Business Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Latest trends in Business Environment (Entrepreneurship).

Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand, Types, Significance of Elasticity of Demand, Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

MODULE – II   Theory of Production and Cost Analysis   [10 Periods]

Theory of Production: Production Function – ISOquants and ISOcosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

MODULE – III   Market structures and Pricing Policies   [09 Periods]

A. Introduction to Markets & Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

B. Pricing Policies & Methods: Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, PLC based pricing methods.

MODULE – IV   Capital and Capital Budgeting   [09 Periods]

Capital: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Capital Budgeting: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

MODULE – V Financial Accounting and Ratios   [10 Periods]

Financial Accounting: Introduction, Accounting principles, Accounting Cycle, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis Through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXTBOOKS:
1. Aryasri, "**Managerial Economics and Financial Analysis**", TMH, 2nd edition, 2005.
2. Varshney &Maheswari, "**Managerial Economics**", 5th edition Sultan Chand, 2003

REFERENCES:
1. H. Craig Peterson & W. Cris Lewis, "**Managerial Economics**", PHI, 4th Edition.
2. Domnick Salvatore, "**Managerial Economics In a Global Economy**", Thomson, 4th Edition.
3. Raghunatha Reddy &Narasimhachary, "**Managerial Economics& Financial Analysis**", 4th Edition Scitech.
4. S.N.Maheswari& S.K. Maheswari, "**Financial Accounting**", 6th Edition Vikas.
5. Dwivedi, "**Managerial Economics**", Vikas, 6th Edition.

E-RESOURCES:
1. http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm
2. http://nptel.ac.in/courses/110105067/
3. http://nptel.ac.in/courses/110107073/
4. http://nptel.ac.in/courses/110101005/
5. http://nptel.ac.in/courses/109104073/

Course Outcomes:
At the end of the course, students will be able to
1. Understand the concepts of managerial economics and their application in evaluating the demand.
2. Evaluate the production function and identifies the least cost combination to control the costs of production.
3. Understand the structures of various market types and their pricing policies.
4. Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques.
5. Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.

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		

Prerequisites: Formal Languages and Automata Theory.

Course Objectives:
- To study 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
- To learn to develop algorithms to generate code for a target machine

MODULE I: [09 Periods]
Language Processors, 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 a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

MODULE II: Syntax Analysis: [10 Periods]
Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Recursive and Non recursive top down parsers, Bottom-Up Parsing,
Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

MODULE III: [10 Periods]
Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

MODULE IV: [10 Periods]
Run-Time Environments: Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.
Machine-Independent Optimizations: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

MODULE V: [09 Periods]
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 CodeGenerator.

Machine-dependent Optimizations: Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

TEXT BOOKS:
1) Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.
2) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

REFERENCES:
1) Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
2) The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
3) Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.

E-RESOURCES:
1) https://nptel.ac.in/courses/106/104/106104123/

Course Outcomes:
At the end of the course, the students will be able to:
- 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
- Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity
- Apply algorithms to generate machine code

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

Prerequisites: Computer Networks, DBMS and Operating Systems
Course Objectives:
1. Student will be able to learn fundamental aspects of Distributed systems
2. Analyzebasics of Architectural and Fundamental Models.
3. To identify various types of requirements and the process for Distributed objects.
4. To make use of various OS layers to conceptualize and construct a system
5. To demonstrate different file systems tactics and define Events and time ordering in distributed transactions.

MODULE I: Basic Concepts   [09 Periods]
Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges- System Models-Architectural and Fundamental Models-Networking and Internetworking-Types of Networks – Internet Protocols

MODULE II: Processes and Distributed Objects   [09 Periods]
Inter-process Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client -Server Communication - Group Communication - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications -

MODULE III: Operating System Issues I   [10 Periods]
The OS Layer- Protection - Processes and Threads - Communication and Invocation- OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Distributed File Systems- File Service Architecture- Sun Network File System-The Andrew File System.

MODULE IV: Operating System Issues II   [10 Periods]
Name Services-Domain Name System - Directory and Discovery Services -Global Name Service - Clocks - Events and Process States - Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States - Distributed Debugging - Distributed Mutual Exclusion – Elections.

MODULE V: Distributed Transaction Processing   [10 Periods]
Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery.

COURSE OUTCOMES:

At the end of the course, students will be able to:
1. Design architectural models of distributed systems.
2. Summarize communication between Distributed Objects.
3. Apply security algorithms on distributed systems.
4. Categorize various name services.
5. Examine transaction recovery and concurrency control in distributed transactions

TEXTBOOKS:

1. George Coulouris, Jean Dollimore and Tim Kindberg , "Distributed Systems Concepts and Design", 3rd Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, "Principles and Pardigms", Pearson Education, 2002.

REFERENCES:

1. Sape Mullender, " Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", springer, Verlag, 1994 .
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.

E- **REFERENCES:**

1. http://www.gecg .in/papers/ds5thedn.pdf
2. https://cs. uwaterloo.ca /~bemard/courses /cs454 /0.Begin.pdf
3. https://www.cs.helsinki.fi   /u/jakangas/Teaching/DistSys/DistSys-08f- l.pdf
4. https: //courses.cs.ut.ee /MTAT.08.009/2014 fall/uplo ads /Main/slides 10-2.pdf

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0534	**Animation Techniques** **[Professional Elective - III]** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

PREREQUISITES: NIL

Course Objectives:
This course will enable the students to learn the fundamental concepts of animation,
1. creating flash animation concepts,
2. learn the 3d animation technique with concepts and apply the motion capture software in animation techniques.
3. Outline 3D Animation and its Concepts and Tracking Applications and Software of 3D Animation.
4. It also introduces students with the advanced scripting skills necessary for implementing Script Animation among the Software
5. The course allows students to Story Developing Audio and Video Color Model Device Independent Color Model's

MODULE I: Introduction   [09 **Periods**]
What is mean by Animation, Why we need Animation, History of Animation, Uses of Animation, Types of Animation, Principles of Animation, Some Techniques of Animation, Animation on the WEB, 3D Animation, Special Effects -Creating Animation?

MODULE II: Creating Animation in Flash   [10 Periods]
Introduction to Flash Animation, Introduction to Flash, Working with the Timeline and Frame based Animation, Working with the Time line and Twin-based animation, Understanding Layers, Actionscript.

MODULE III: 3D Animation Effects   [09 Periods]
A: 3D Animation and its Concepts Types of 3D Animation Skeleton   and   Kinetic3D Animation-
B: Texturing and Lighting of 3D Animation 3D Camera Tracking Applications and Software of 3D Animation.

MODULE IV: Motion Capture   [10 **Periods**]
Motion Caption, Formats, Methods, Usages, Expression   Motion   Capture;s – Script Animation Usage, Different Language of Script Animation among the Software.

MODULE V: **Animated movies**   [10 **Periods**]
Concept Development, Story Developing, Audio and Video Color, – Model   Device

Independent Color Model, Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TEXTBOOKS:

1. 1. Juke Parent, Animation: Algorithms and Techniques 3rd Edition, (Hard cover, RickParent).
2. Williams Richars, The Animator's Survival Kit--Revised Edition: A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Faber and Faber, 2012.

REFERENCES:

1. Ranjan Parekh, Principles of Multimedia TMH,2007.
2. Ashok Banerji, Ananda Mohan Ghosh, Multimedia Technologies McGraw Hill.

E- RESOURCES:

1. http://www.bkstr.com/floridastore/home Autodesk Maya 2016
2. https://itunes.apple.com/us/app/the-animators-survival-kit/id627438690?mt=8
3. http://ieeexplore.ieee.org/document/7239940/
4. nptel.ac.in/courses/106102063/25

Course Outcomes:

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

- Develop Fundamental concepts of animation
- Analyze the flash animation and scripting concepts
- Outline the scripting concepts in 3D animation methods.
- Understand the different language of scripting animation techniques
- Apply the story developing and color model in 3D animated movies

COs	CO-PO,PSO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak														
	POs												PSOs		
	Po1	Po2	Po3	Po4	Po5	Po6	Po7	Po8	Po9	Po10	Po11	Po12	Pso1	Pso2	Pso3
CO 1	3	1	1	-	-	-	-	-	-	-	-	1	3	2	-
CO 2	3	3	1	1	1	-	-	-	-	-	-	1	3	2	1
CO 3	2	1	1	1	1	-	-	-	-	-	-	1	3	2	-
CO 4	2	1	-	-	-	-	-	-	-	-	-	1	3	1	1
CO 5	3	2	1	1	1	-	-	-	-	-	-	1	3	2	1

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester	
Code: B0535	**Multimedia and Rich Internet Applications**		L	T	P
Credits: 3	[Professional Elective - III] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)		3	-	-

Prerequisites: NIL
Course Objectives:

1. This course aims to further develop students' competency in producing dynamic and creative graphic solutions for multimedia productions.
2. It provides students with the basic concepts and techniques of interactive authoring.
3. It also introduces students with the advanced scripting skills necessary for implementing highly interactive, rich internet applications using multimedia technologies and authoring tools.
4. Students will develop aesthetic value and competencies in multimedia authoring.
5. Artistic visual style and layout design are stressed, as well as the editing and integration of graphic images, animation, video, and audio files.
6. The course allows students to master industry-wide software and technologies to create highly interactive, rich internet applications.
.

MODULE I: [09 Periods]
MRIA Fundamental concepts in Text and Image Multimedia and hypermedia, World Wide Web, overview of Multimedia software tools. Graphics and Image data represent from graphics Image data types, file formats. color in image and Video colors science, color Models in images color Models in video

MODULE II: [10 Periods]
Fundamental concepts in video and digital audio: Types of Video signals analog video, digital video, and digitization of sound MIDT, quantization and transmission of audio Multimedia Data compression Lossless compression algorithms, lossy Compression algorithms. Image compression standards

MODULE III: [12 Periods]
Basic video compression techniques. Case study: MPEG video coding I, Basic Audio compression techniques case study MPEG Audio compression, web 2.0 what is web 2.0, search, content Networks, user Generated content, Blogging.. Social Networking, social Media. Tagging, Social Marking, Rich Internet Applications, web services. Marshups, Location Based Services, XMC, RSS, Atom, json, and VOIP web 2.0 Monetization and Business Models, Future of the web

MODULE IV: [14 Periods]
Rich Internet Applications (RIAS) with Adobe Flash: Adobe Flash - Introduction, Flash Movie Development, Learning Flash with Hands-on Examples Publish your Flash(with Hands-on Examples) Movie, creating special effects with Flash Creating a website splash screen, action Script, web sources. Rich Internet Application (RIAS) with Flex 3- Introduction, Developing with Flex 3, working with components, Advanced Component Development, visual effects and Multimedia

MODULE V: [10 Periods]

Ajax-Enabled Rich Internet Application: Introduction, Traditional web Applications us Ajay Applications, Rich Internet Application with Ajax, History of Ajax Raw Ajax example using xml http request object. Using XML, Creating a full scale Ajax Enabled application. Dojo Toolkit.

TEXT BOOKS:
1. Multimedia Communications: Protocols and Applications, Franklin F Kuo, J.Joaquin Garcia, Wolf gang Effelsberg, Prentice Hall Publications.
2. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Addison Wesley Publications.
3. AJAX, Rich Internet Applications, and Web Development for Programmers, Paul J Deitel and Harvey M Deitel, Deitel Developer Series, Pearson education.

REFERENCE BOOKS:
1. Professional Adobe Flex 2, Rich Tretola, Simon barber and Renaun Erickson, Wrox, Wiley India Edition.
2. Multimedia Information Networking, Nalin K Sharda, PHI Learning.
3. Multimedia Computing, Communications & Applications, Ralf Steinmetz and Klara Nahrstedt, Pearson Education.
4. Multimedia Communication Systems: techniques, standards and networks, K.R.Rao, Bojkovi and Milovanovic, PHI Learning.
5. Programming Flex 3, C. Kazoun and J. Lott, SPD.
6. Dojo, J.E. Harmon, Pearson Education.
7. Adobe Flex 3: Training from the Source, Tapper & others, Pearson Education.
8. Principles of Multimedia, R.Parekh, TMH.
9. Mastering Dojo, R. Gill, C. Riecke and A. Russell, SPD.

Outcomes
- Understand the basic MRIA Fundamental concepts
- Ability to understand the fundamental concepts in video and digital audio
- Analyze the Rich Internet Applications (RIAS) with Adobe Flash
- Ability to create and design rich internet applications.
- Ability to develop different multimedia tools to produce web based and independent user interface

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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VI Semester	
Code: B1217	**Augmented Reality and Virtual Reality**		L	T	P
Credits: 3	[Professional Elective - III] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	3	-	-

Prerequisites: Fundamentals of Image Processing

Course Objectives:

1. To describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.
2. To explore the concepts of Virtual reality and develop 3D virtual environment.
3. To foundation to the fast growing field of AR and make the students aware of the various AR devices.
4. To help students build various types of VR experiences and use Unity to develop VR applications.
5. To expose students to the world of research, technology and innovation.

MODULE-I [10 Periods]

Introduction: The three I's of virtual reality, commercial VR technology and the five classic components of a VR system.

Input Devices: Trackers, Navigation, and Gesture Interfaces, Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.

MODULE-II [9 Periods]

Output Devices: Graphics displays, sound displays & haptic feedback.

Modeling: Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management

MODULE-III [10 Periods]

Human Factors: Methodology and terminology, user performance studies, VR health and safety issues.

Applications: Medical applications, military applications, robotics applications.

MODULE-IV [10 Periods]

VR Programming-I: Introducing Java 3D, loading and manipulating external models, using a lathe to make shapes.

MODULE-V [9 Periods]

VR Programming-II: 3D Sprites, animated 3D sprites, particle systems.

TEXT BOOKS :

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.,
2. Killer Game Programming in Java, Andrew Davison, Oreilly-SPD, 2005.

REFERENCES :
1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier(Morgan Kaufmann).
2. 3D Modeling and surfacing, Bill Fleming, Elsevier(Morgan Kauffman).
3. 3D Game Engine Design, David H.Eberly, Elsevier.
4. Virtual Reality Systems, John Vince, Pearson Education.

E-RESOURCES:
1. http://lavalle.pl/vr/book.html
2. https://nptel.ac.in/courses/106/106/106106138
3. https://www.coursera.org/learn/introduction-virtual-reality
4. https://www.vttresearch.com/sites/default/files/pdf/science/2012/S3.pdf
5. https://docs.microsoft.com/en-us/windows/mixed-reality/
6. https://docs.microsoft.com/en-us/archive/msdnmagazine/2016/november/hololensintroduction-to-the-hololens

COURSE OUTCOMES:
1. **Apply** the describe how VR systems work and list the applications of VR.
2. **Understand** the system of human vision and its implication on perception and rendering.
3. **Create** and deploy a VR application.
4. **Identify** the describe how AR systems work and list the applications of AR
5. **Construct** the acquire knowledge in VR and AR technologies in terms of used devices, building of the virtual environment and modalities of interaction and modeling.

<table>
<tr><td colspan="15">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">CO'S</td><td colspan="14">Contribution to Program Outcomes</td></tr>
<tr><td>PO-1</td><td>PO-2</td><td>PO-3</td><td>PO-4</td><td>PO-5</td><td>PO-6</td><td>PO-7</td><td>PO-8</td><td>PO-9</td><td>PO-10</td><td>PO-11</td><td>PO-12</td><td>PSO-1</td><td>PSO-2</td><td>PSO-3</td></tr>
<tr><td>CO1</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>1</td><td>1</td><td></td></tr>
<tr><td>CO2</td><td>1</td><td>2</td><td>2</td><td></td><td>3</td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td></td></tr>
<tr><td>CO3</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td>3</td><td></td><td></td><td>2</td><td></td><td>1</td><td>4</td><td>1</td><td>1</td><td></td></tr>
<tr><td>CO4</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td>2</td><td>2</td></tr>
<tr><td>CO5</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td></tr>
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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0536	**Data Mining**	L	T	P
Credits: 3	[Professional Elective - III] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	3	-	-

Prerequisites: NIL

Course Objectives:
1. Uunderstands stages in building a Data Warehouse
2. Makes Identify the need and importance of preprocessing techniques
3. Implement similarity and dissimilarity techniques
4. Analyze and evaluate performance of algorithms for Association Rules
5. Analyze Classification and Clustering algorithms.

MODULE I: Introduction and Mining Issues & Data [09 Periods]
Introduction – Data, Why Data Mining? What Is Data Mining? What Kinds of Data Can Be mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted?
Mining Issues and Data - Major Issues in Data Mining, Types of Data, Data Quality

MODULE II: Data, Data Preprocessing [9 Periods]
A: Data Pre-processing: Data Warehousing, Data Cleaning, Data Integration, Data Reduction, Data Transformation, Aggregation, Sampling,
B: Techniques: Dimensionality Reduction, Feature Subset Selection, Feature Creation, Data Discretization and Binarization, Variable transformation.

MODULE III: Data Similarity and Dissimilarity Classification [10 Periods]
A: Measuring Data Similarity and Dissimilarity - Similarity and Dissimilarity between simple attributes, Dissimilarities and similarities between data objects, Examples of Proximity measures, Issues in Proximity Calculation, Selection of right proximity measure.
B: Classification - Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree.

MODULE IV: Classifier and Association Analysis [10 Periods]
Classifiers - Alterative Techniques**,** Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks**Association Analysis -** Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm.

MODULE V: Cluster Analysis and DBSCAN [10 Periods]
Cluster Analysis - Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm
DBSCAN - Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses.

TEXT BOOKS:
1. Vikram Pudi & P.Radha Krishna, "**Data Mining**",4th Edition, Oxford Higher Education .

2. Jiawei Han, Michel Kamber,"**Data Mining concepts and Techniques**", 3/e, Elsevier.

REFERENCES:
1. Hongbo Du, "**Data Mining Techniques and Applications: An Introduction**",Cengage Learning.
2. Vikram Pudi and P. Radha Krishna, "**Data Mining**", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr ,"**Data Mining and Analysis-fundamental Concepts and Algorithms**", Oxford
4. Alex Berson, Stephen Smith ,"**Data Warehousing Data Mining & OLAP**" , TMH.

E-RESOURCES:

1. http://www-users.cs.umn.edu/~kumar/dmbook/index.php
2. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf
3. http://www.ijctee.org/files/Issuethree/IJCTEE_1111_20.pdf
4. https://gunjesh.wordpress.com/

COURSE OUTCOMES:

At the end of the course, students will be able to
1. **Acquire** knowledge in building a Data Warehouse
2. **Understand** the need and importance of preprocessing techniques
3. **Implement** Similarity and dissimilarity techniques
4. **Analyze** and evaluate performance of algorithms for Association Rules.
5. **Deploy** Classification and Clustering algorithms

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

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: B0537	**Natural Language Processing**	**L**	**T**	**P**
Credits: 3	**[Professional Elective - IV]** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**3**	**-**	**-**

Course Objectives:

1. Gain a foundational understanding in natural language processing methods and strategies
2. Learn how to evaluate the strengths and weaknesses of various NLP technologies and frameworks as they gain practical experience in the NLP toolkits available.
3. learn how to employ literary-historical NLP-based analytic techniques like stylometry, topic modeling, synsetting also and named entity recognition in their personal research.
4. Enlighten concepts of Predicate – Argument Structure
5. Evaluate various discourse Processing of Cohesion Reference Resolution

Module I: Finding the Structure of Words: **[10 Periods]**

Words and Their Components, Issues and Challenges, Morphological Models
 Finding the Structure of Documents:

Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

Module II: Syntax Analysis: **[09 Periods]**

Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

Module III: Semantic Parsing: **[10 Periods]**

Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

Module IV: Predicate-Argument Structure   **[09 Periods]**

Predicate-Argument Structure, Meaning Representation Systems, Software.

ModuleV: Discourse Processing: **[10 Periods]**

Cohension, Reference Resolution, Discourse Cohension and Structure
Language Modeling:

Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

E-RESOURCES:

1. https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/revised.pdf
2. https://hpi.de/fileadmin/user_upload/fachgebiete/plattner/teaching/Natural LanguageProcessing/NLP2016/NLP01_IntroNLP.pdf
3. http://www.sciencedirect.com/science/article/pii/S1532046401910299
4. http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.34.1r036
5. http://nptel.ac.in/courses/106101007/
6. http://nptel.ac.in/courses/106105158/

Course Outcomes

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms
5. Able to design different language modeling Techniques.

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

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

Prerequisites: Computer Networks

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.
- 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
- Discuss the fundamental ideas of public-key cryptography
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted email message.
- Discuss Web security and Firewalls.

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 cipher operation, 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.

TEXT BOOKS:
1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: AtulKahate, 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: ForouzanMukhopadhyay, 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

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

<table>
<tr><td colspan="17" align="center">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12" align="center">Programme Outcomes(POs)</td><td colspan="3" align="center">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
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<tr><td>CO4</td><td></td><td>3</td><td></td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>3</td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td></tr>
</table>

OBJECTIVES:

• To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.

• To provide a good understanding of software design and a set of software technologies and APIs.

• To do a detailed examination and demonstration of Agile development and testing techniques.

• To understand the benefits and pitfalls of working in an Agile team.

• To understand Agile development and testing.

UNIT I   Agile Methodology   [10 Periods]

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II   Agile Processes   [9 Periods]

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III   Agility and Knowledge Management   [10 Periods]

Agile Information Systems – Agile Decision Making – Earl's Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV   Agility and Requirements Engineering   [10 Periods]

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V   Agility and Quality Assurance   **[9 Periods]**

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

OUTCOMES: Upon completion of the course, the students will be able to:

• Realize the importance of interacting with business stakeholders in determining the requirements for a software system
• Perform iterative software development processes: how to plan them, how to execute them.
• Point out the impact of social aspects on software development success.
• Develop techniques and tools for improving team collaboration and software quality.
• Perform Software process improvement as an ongoing task for development teams.

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, ―Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
   2. Hazza and Dubinsky, ―Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

REFERENCES:

1. Craig Larman, ―Agile and Iterative Development: A Manager_s Guide, Addison-Wesley, 2004.
2. Kevin C. Desouza, ―Agile Information Systems: Conceptualization, Construction, and Management‖, Butterworth-Heinemann, 2007.

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

CO- PO-PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak
Programme Outcomes(POs) | PSOs

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B6920	**Adhoc and Sensor Networks**	**L**	**T**	**P**
Credits: 3	[Professional Elective - IV] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	3	-	-

Prerequisites:
 1. A course on "Computer Networks"
 2. A course on "Mobile Computing"

Course Objectives:
- To understand the concepts of sensor networks
- Understand the different routing protocols
- To understand the MAC and transport protocols for ad hoc networks
- To understand the security of sensor networks
- To understand the applications of adhoc and sensor networks

MODULE-I: [10 Periods]
Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.
Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms-Proactive: DSDV; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM, Quorum-based; Forwarding Strategies: Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

MODULE-II: [10 Periods]
Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

MODULE-III: [10 Periods]
Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

MODULE-IV: [9 Periods]
Basics of Wireless, Sensors and Lower Layer Issues
Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

MODULE-V: [9 Periods]
Upper Layer Issues of WSN Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

Course Outcomes:
- Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks.

- Apply the knowledge to identify appropriate physical and MAC layer protocols.
- Ability to solve the issues in real-time application development based on ASN.
- Ability to conduct further research in the domain of ASN.
- Be familiar with the OS used in Wireless Sensor Networks and build basic modules.

TEXT BOOKS:
1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal,

World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech. VI Semester	
Code: B0541	**Image Processing**	L	T	P
Credits: 3	[Professional Elective - IV] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	3	-	-

Course Objectives:
1. To become familiar with digital image fundamentals.
2. To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
3. To learn concepts of degradation function and restoration techniques.
4. To study the image segmentation and representation techniques.
5. To become familiar with image compression and recognition methods

MODULE-I   [9 **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   [10 **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   **[8 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.

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

REFERENCES 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 Wilely, 3rd Edition, 2004.

E-RESOURCES:
1. http://www.nptel.iitm.ac.in/courses/IIT-Kanpure.Communication
2. DIP Image Databases
3. http://www.imagescience.org/

COURSE OUTCOMES:
1. **Demonstrate** the knowledge of the basic concepts of two-dimensional signal acquisition,sampling, and quantization.
2. **Apply** the knowledge of filtering techniques.
3. **Construct** the knowledge of 2D transformation techniques.
4. **Demonstrate** the knowledge of image enhancement, segmentation, restoration and compression techniques.
5. **Understand** the basics of segmentation, features extraction, compression and recognition methods for color models.

<table>
<tr><td colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
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<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
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<tr><td>CO4</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>4</td><td>5</td><td>3</td><td></td><td></td><td>2</td><td>2</td></tr>
<tr><td>CO5</td><td>4</td><td>5</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>4</td><td>1</td><td></td><td>1</td></tr>
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2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B0H03	**English Communication and Presentation Skills Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 1		-	-	2

Pre-requisites: NIL

Course Objectives:
The learners need to be aware of the characteristics of technical communication in their workplaces; as a result, they are exposed to different channels of technical communication. Hence the acquired skills make the learners effective communicators using persuasive language. Besides the above said, one of the major objectives is to maintain objectivity in writing documents and to produce professional quality documents using different components of the language.

Methodology: Facilitator's role: Since classroom learning augments thinking process, helping them to develop written, spoken and non verbal communication, the facilitator / Faculty would briefly discuss the topics with the students and later on guide them while the students involved in activities, writing work and while making presentations. The facilitator is required to design a lot of practical/industry oriented project works for the students
*Students are required to participate, perform, write and submit the work in the form of written documents or Power Point Presentations to hone their spoken written and non verbal communication skills. Students are to take up field work and submit the project work.

MODULE I: Oral Presentation
Mechanics of Presentations – Methodology of Presentation, Importance of Non-verbal communication during presentations– Nuances of Presentation.
*This particular MODULE is for internal evaluation purpose(s).

MODULE II: E - Correspondence and Email etiquette
Common web mail services, yahoo, gmailetc, fields to pay attention- To:, Cc:, Bcc:, Reply All, Subject, Salutation, Body, Signature, Font, Caps Lock , Highlight, The 'KISS' strategy (Keep It Simple and Short,)Points to remember while signing off, Introduction to Technical Vocabulary.
• This MODULE is purely for internal assessment/evaluation

MODULE III: Group Discussion
Initiators- Contributor-Informer-Team Leader-Motivator-Creative Contributor , Importance of , Non verbal communication -eye contact, voice characters, posture, gestures, do's and don'ts, Role play and Simulation- Learners assuming the roles of characters and participating in Group discussion, analysis, or prediction with strictly defined goals.

MODULE IV: Interview Skills & Office Etiquette
Preparing for the interview, types of interviews, interview session, importance of non verbal communication during the interview, do's and don'ts of interview, follow up and thanking letter. FAQ's. Formal Conversation, office attire- do's and don'ts, greetings and meetings, speaking to seniors and handshakes, offering and taking visiting cards.

MODULE V: Job Hunt Process

SWOT analysis, correspondence and browsing the internet to search for a suitable job(s), job application-cover letter drafting, drafting a winning resume', types of resume's -electronic, video and printed resume's

- Instruction: Students are required to prepare their video resume which will be assessed by the faculty member.

REFERENCES:

1. Chrissie: **Handbook of Practical Communication Skills**: Jaico Publishing house, 1999.
2. Daniels, Aubrey: **Bringing Out the Best in People**: Tata McGraw-Hill: New York, 2003.
3. Wright, Goulstone, Mark: **Just Listen: Discover the Secret to getting through to absolutely anything** : American Management Association, 2010.
4. Leslie. T. Giblin: **Skill with people** Publication details not known
5. Lewis, Norman: **Word Power Made Easy**: Goyal Publications: New Delhi, 2009.
6. Murthy, A.G, Krishna,:**Ten Much** : Tata McGraw-Hill :New Delhi, 2010.

E-RESOURCES:

1. http://www.mindtools.com/pages/article/newTMC_05.htm
2. http://www.kent.ac.uk/careers/intervw.htm
3. http://www.wikihow.com/Write-a-Report

Course Outcomes:

At the end of the course, students will be able to
1. Give Oral Presentations Confidently.
2. Draft appropriate Resume in accordance with the context.
3. Participate and present their view and ideas logically and confidently.
4. Understand the importance of communication in various settings.
5. Utilize the technology for career advancement.

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

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B0543	**Compiler Design Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: NIL

Course Objectives:
1. To understand the various phases in the design of a compiler.
2. To understand the design of top-down and bottom-up parsers.
3. To understand syntax directed translation schemes.

Software Requirements: Turbo C / C++

List of Programs:

1. Write a LEX Program to scan reserved word & Identifiers of C Language. The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments.
2. Write a C program to recognize strings under 'a*', 'a*b+', 'abb'
3. Write a C program to test whether a given identifier is valid or not
4. Write a Program to implement Recursive Descent Parser for language.
5. Write a Program to Design a Predictive Parser for the Language Accepted by the given Grammar.
6. Write a Program for Implementation of Shift Reduce parsing
7. Write a program to calculate first function for the given grammar.
8. Write a program to implement Simple LR Parser for the given language
9. Write a program to Implement SLR(1) Parsing algorithm for the given language
10. Write a program to Design LALR bottom-up parser for the given language
11. Write a program to Design CLR bottom-up parser for the given language
12. Write a C program to generate three address codes.

TEXTBOOKS:
1. Andrew N. Appel, "**Modern Compiler Implementation in C**", Cambridge University Press.
2. A.V. Aho .J.D.Ullman ,"**Principles of compiler design**" ,Pearson Education.
3. D.M Dhamdhere, "**Systems programming and operating systems**" ,2nd edition,tata McGraw hill publishing comp pvtLtd.

REFERENCES:
1. Dick Grune, Henry E. Bal, Cariel T. H. Jacobs," **Modern Compiler Design**", Wiley dreamtech.
2. Cooper & Linda," **Engineering a Compiler**", Elsevier.
3. Louden," **Compiler Construction**", Thomson.

Course Outcomes:

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

1. Ability to design, develop, and implement a compiler for any language.
2. Able to use lex and yacc tools for developing a scanner and a parser.
3. Able to design and implement LL and LR parsers.

	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	
CO4	3	2						2				2		2	
CO5	3	2										2		2	

2021-22 Onwards (MR-21))	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech. VI Semester		
Code: B0544	**Data Mining Lab** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**L**	**T**	**P**	
Credits: 2		-	1	2	

PERQUISITE: NIL

OBJECTIVE:

1. Makes Identify the need and importance of preprocessing techniques
2. Analyze and evaluate performance of algorithms for Association Rules
3. Analyze Classification and Clustering algorithms.

Software Requirements: WEKA TOOL

List of Programs:

1. Demonstration of preprocessing on dataset student.arff.
2. Implementation of preprocessing on dataset labor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori Algorithm.
4. Implement Association rule process on datasettest.arff using apriori algorithm.
5. Apply classification rule process on dataset student.arff using j48 algorithm.
6. Perform classification rule process on dataset employee.arff using j48 algorithm.
7. Use classification rule process on dataset employee.arff using id3 algorithm.
8. Deploy classification rule process on dataset employee.arff using naïve bayes Algorithm.
9. Implement clustering rule process on dataset iris.arff using simple k-means.
10. Make use of clustering rule process on dataset student.arff using simple k-means.
11. Design a decision tree by pruning the nodes on your own. Convert the decision trees into "if- then-else rules". The decision tree must consists of 2-3 levels and convert it into a set of rules.
12. Generate Association rules for the following transactional database using Apriori algorithm.

TID	ListofItems
T100	I1,I2,I5
T200	I2,I4
T300	I2,I3
T400	I1,I2,I4
T500	I1,I3
T600	I2,I3
T700	I1,I3
T800	I1,I2,I3,I5

TEXTBOOKS:

1. Pang-Ning Tan & Michael Steinbach, "**Introduction to Data Mining**", VipinKumar, Pearson.
2. Jiawei Han, Michel Kamber ,"**Data Mining concepts and Techniques**", 3/e,Elsevier.

REFERENCES:

1. Hongbo Du,"Data Mining Techniques and Applications:An Introduction",Cengage Learning.
2. Vikram Pudi and P.RadhaKrishna,"Data Mining",Oxford.
3. Mohammed J.Zaki,Wagner Meira,Jr,"Data Mining and Analysis-Fundamental Concepts and Algorithms",Oxford
4. Alex Berson,Stephen Smith,"Data Warehousing Data Mining & OLAP",TMH.

Course Outcomes:

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

1. Analyze the classification rules on various databases.
2. Deploy association rules for any kind of databases.
3. Develop clustering rules for applications.

COs	CO-PO,PSO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak														
	Program 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
CO2	1	2	2	2	2								2		2
CO3	1	2	3	2	1								1		2

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: B00M4	**Quantitative Aptitude and Verbal Reasoning – II**	**L**	**T**	**P**
Credits: -	(Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	**2**	**-**	**-**

Prerequisites: Databases, programming fundamentals.

Course Objectives:
This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs, discuss about concepts of big data, make use of Hadoop concepts for designing applications, develop applications using Hadoop I/O and analyze big data using programming tools such as Pig and Hive.

MODULE I: Big data overview, data analytics, and R Language   [09 Periods]
Big Data Overview: Data Structures, Analyst Perspective on Data Repositories, State of the Practice in Analytics, Bl Versus Data Science, Current Analytical Architecture, Drivers of Big Data, Emerging Big Data Ecosystem and a New Approach to Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics. Data Analytics Lifecycle, Model Building and Basic Data Analytic Methods Using R Data Analytics Lifecycle Overview, Key Roles for a Successful Analytics Project, Background and Overview of Data Analytics Lifecycle - Discovery, Data Preparation,   Learning the Business Domain , Model Planning , Model building, Communicate Results, Operationalize and case study example Global Innovation Network and Analysis (GINA)
R Introduction: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation, Hypothesis Testing, Difference of Means, Rank-Sum Test, Errors, Sample Size data

MODULE II: Working with Big Data   [09 Periods]
Hadoop - Google File System, Hadoop Distributed File System (HDFS)– Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker).
Configuring of Hadoop Cluster - Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

MODULE III: Hadoop API and Map Reduce Programs   [09 Periods]
A: Hadoop API - Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New)
B: MapReduce Programs with classes -   Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

MODULE IV: Hadoop I/O and Implementation   [09 Periods]
Hadoop I/O - The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections.
Implementation - Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators.

MODULE V: PIG and HIVE HADOOP TOOL   [12 Periods]
PIG - HADOOP TOOL -   Hadoop Programming Made Easier - Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig

Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

HIVE – HADOOP TOOL - Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

TEXTBOOKS:
1. Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data EMC Education Services, Wiley Publishers, 2015.
2. Cay Horstmann, Wiley John Wiley & Sons, "**Big Java**", 4th Edition, INC
3. Tom White, "**Hadoop: The Definitive Guide**" 3rd Edition, O'reilly

REFERENCES:
1. Alex Holmes, "**Hadoop in Practice**", MANNING Publ.
2. Srinath Perera, ThilinaGunarathne, "**Hadoop MapReduce**" Cookbook.

E-RESOURCES:
1. http://newton.uam.mx/xgeorge/uea/Lab_Prog_O_O/materiales_auxiliares/Big_Java_4th_Ed.pdf
2. http://www.isical.ac.in/~acmsc/WBDA2015/slides/hg/Oreilly.Hadoop.The.Definitive.Guide.3rd.Edition.Jan.2012.pdf-
3. https://static.googleusercontent.com/media/research.google.com/en//archive/mapreduce-osdi04.pdf
4. http://www.comp.nus.edu.sg/~ooibc/mapreduce-survey.pdf
5. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/18
6. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/40

Course Outcomes:
At the end of the course, students will be able to
1. **Develop** simple applications using R language
2. **Analyze** file systems such as GFS and HDFS.
3. **Design** applications by applying Map reduce concepts.
4. **Build** up programs by making use of I/O.
5. **Explore** and inspect the big data using programming tools like Pig and Hive.

<table>
<tr><th colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="3">PSOs</th></tr>
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<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>1</td><td></td><td>1</td><td>3</td><td>2</td><td>1</td><td>3</td><td>3</td><td>2</td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>CO4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>3</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>CO5</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>3</td><td>3</td><td>2</td><td>2</td></tr>
</table>

prerequisites: NIL

Course Objectives:

This course provides the students a broad introduction to python programming, machine learning, discuss about various learning algorithms like decision tree learning, Bayesian learning, computational learning, instance based learning, combined inductive and analytical learning methods, analyze genetic algorithms and various learning set of rules.

Module I: Python programming -Machine Learning (ML)   [10 Periods]
Introduction to Python:

Python, expression, variables, assignment statements, functions, built in function, strings, modules, lists, making choice(Boolean, if, storing conditional statements), repetition(loops, while, counted loops, user input loops, control loops , style notes), File processing(one record per line, records with multiple fields, positional data, multiline records, looking ahead, writing files), sets and dictionaries(sets, dictionaries, inverting a dictionary), Algorithms with suitable example. Construction of functions, methods, Graphical user interfaces, databases and applications.

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in ML

Concept Learning - Introduction, Concept Learning task, Concept learning as search, Find-S: Finding a maximally specific hypothesis, Version spaces and candidate elimination algorithm, Remarks on version spaces and Candidate elimination, Inductive bias.

Module II: Decision Tree Learning and ANN   [09 Periods]
Decision Tree learning - Introduction, Decision Tree representation, Appropriate Problems, Decision Tree learning algorithm, Hypothesis Space Search, Inductive bias, Issues.

Artificial Neural Networks - Introduction, Neural network representation, Problems for Neural Network Learning, Perceptions, Multilayer networks and Back Propagation algorithm, Remarks on back propagation algorithm, Evaluation Hypotheses, Motivation, Estimation hypothesis accuracy, Sampling theory, General approach for deriving confidence intervals, Difference in error of two hypotheses,

Module III: Bayesian learning and Instance based Learning   [10 Periods]
A: Bayesian learning - Introduction and concept learning, Maximum Likelihood and Least Squared Error Hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle.

B: Instance-based Learning - K -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Lazy and Eager Learning, Genetic Algorithm: Motivation, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Module IV: Rules and Analytical Learning   [09 Periods]
Learning Sets of Rules - Introduction, Sequential Covering Algorithms, Learning Rule Sets: Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

Module V: Learning Techniques   **[10 Periods]**

Combining Inductive and Analytical Learning - Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to initialize Hypothesis, Using Prior Knowledge to alter Search Objective, Using Prior Knowledge to Augment Search Operators.

Reinforcement Learning - Introduction, Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:
1. Jennifer Campbell paulGries Jason Montojo Greg Wilson, "Practical Programming" An introduction to Computer Science Using Python
2. Tom M. Mitchell, "**Machine Learning**", MGH, 1st Edition, 2013.
3. Stephen Marsland, "**Machine Learning: An Algorithmic Perspective**", Chapman and Hall / CRC, 2nd Edition, 2014.

REFERENCES:
1. Neural Networks, William WHsieh, "**Machine Learning Methods in the Environmental Sciences**"
2. Richard O. Duda, Peter E. Hart and David G. Stork, "**Pattern Classification**", John Wiley & Sons Inc., 2001
3. Chris Bishop, "**Neural Networks for Pattern Recognition**", Oxford University Press, 1995

E-RESOURCES:
1. http://www.zuj.edu.jo/download/machine-learning-tom-mitchell-pdf/
2. https://goo.gl/FKioSh
3. http://www.ntu.edu.sg/home/egbhuang/pdf/ieee-is-elm.pdf
4. www.fxpal.com/publications/a-genetic-algorithm-for-video-segmentation-and-summarization.pdf
5. http://nptel.ac.in/courses/106106139/
6. http://nptel.ac.in/courses/106105152/

Course Outcomes:
At the end of the course, students will be able to
1. **Formulate** machine learning problems corresponding to different applications.
2. **Understand** a range of machine learning algorithms like decision trees, and ANN.
3. **Apply** Machine Learning algorithms, Bayesian and Instance based Learning techniques.
4. **Use** of machine learning algorithms to solve problems using rules, and analytical learning techniques
5. **Illustrate** the Combining Inductive and Analytical Learning and applications of Reinforcement Learning

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<tr><td>CO2</td><td>1</td><td>2</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td>2</td><td>1</td></tr>
<tr><td>CO3</td><td>1</td><td>1</td><td>2</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td><td>2</td></tr>
<tr><td>CO4</td><td>1</td><td>1</td><td>1</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td></td><td>1</td><td>2</td></tr>
<tr><td>CO5</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>1</td><td>2</td></tr>
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Prerequisites: NIL
Course Objectives:

- This course makes the students to understand the concept of cyber security and issues and challenges associated with it, the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
- The course includes the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of social media platforms, the basic concepts related to E-commerce and digital payments, the basic security aspects related to computer and mobiles.

MODULE-I: Introduction to Cyber Security   [9 Periods]

Hacking, Types of hacking, Myths about hacking, Types of hackers, Motives for Hacking, Ethical hacking, Concept of cyber security, Issues and challenges of cyber security, Cyberterrorism, Cyber forensics, The INDIAN cyberspace, Regulation of cyberspace, National cyber security policy, Communication technology, Internet, World wide web, Advantages of internet, Internet infrastructure for data transfer and governance, Internet society, Recent cyber-attacks and Data breaches in India.

MODULE-II: Cyber Crime and Cyber Law   [10 Periods]

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

MODULE-III: Social Media Overview and Security   [10 Periods]

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

MODULE-IV: E-Commerce and Digital Payments   [10 Periods]

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled Payment Systems (AePS), Digital payments related

common frauds and preventive measures, RBI guidelines on digital payments and customer protection in unauthorized banking transactions, Relevant provisions of Payment Settlement Act,2007.

MODULE-V: Digital Devices Security, Tools and Technologies for Cyber Security

[9 Periods]

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

TEXT BOOKS

1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011).

REFERENCE BOOKS

1. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry
   A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November,2001)
2. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.

COURSE OUTCOMES:

At the end of the course, students will be able to:
1. **Explore** various concepts of cyber security and issues.
2. **Investigate** more on various challenges associated with cyber security.
3. **Analyze** reporting procedure of inappropriate content.
4. **Review** underlying legal aspects and best practices for the use of social media platforms.
5. **Examine** various basic concepts related to E-commerce and digital payments.

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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	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	

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2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech. VII Semester		
Code: B0545	**Block chain Technologies** [**Professional Elective - V**] **(Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)**		**L**	**T**	**P**
Credits: 3			3	-	-

Prerequisites: Nil

Course Objectives:
- Understand how block chain systems (mainly Bit coin and Ethereum) work
- Understand how to securely interact with them,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from block chain technology into their own projects.
- Ethereum Blockchain Implementation.

Module I: **[9 Periods]**
Introduction, Scenarios, Challenges Articulated, Blockchain, Blockchain Characteristics, Opportunities Using Blockchain, History of Blockchain.
Evolution of Blockchain: Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Blockchain Evolution, Consortia, Forks, Public Blockchain Environments, Type of Players in Blockchain Ecosystem, Players in Market.

Module II: **[10 Periods]**
Blockchain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on blockchain, data storage on blockchain, wallets, coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.

Module III: **[10 Periods]**
Architecting Blockchain solutions: Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference Architecture, Types of Blockchain Applications.
Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Blockchain Solutions, Architecture Considerations, Architecture with Blockchain Platforms, Approach for Designing Blockchain Applications.

MODULE IV: **[10 Periods]**
Ethereum Blockchain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, MyEther Wallet, Ethereum Networks/Environments, Infura, Etherscan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, OpenZeppelin Contracts

MODULE V: [**9 Periods**]

Hyperledger Blockchain Implementation, Introduction, Use Case – Car Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chaincode Functions Using Client Application.

Advanced Concepts in Blockchain: Introduction, Inter Planetary File System (IPFS), Zero-Knowledge Proofs, Oracles, Self-Sovereign Identity, Blockchain with IoT and AI/ML Quantum Computing and Blockchain, Initial Coin Offering, Blockchain Cloud Offerings, Blockchain and its Future Potential.

Text Books:
1) Ambadas, Arshad SarfarzAriff, Sham "Blockchain for Enterprise Application Developers", Wiley
2) Andreas M. Antonpoulos, "Mastering Bitcoin: Programming the Open Blockchain" , O'Reilly

Reference Books:
1) Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2) Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly

E-RESOURCES
1) https://github.com/blockchainedindia/resources
2) https://onlinecourses.nptel.ac.in/noc22_cs44/preview

Course Outcomes:
At the end of the course, students will be able to:
- Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
- Identify the risks involved in building Block chain applications.
- Review of legal implications using smart contracts.
- Choose the present landscape of Blockchain implementations and Understand Crypto currency markets
- Examine how to profit from trading crypto currencies.

<table>
<tr><th colspan="16">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th></tr>
<tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="3">PSOs</th></tr>
<tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO6</th><th>PO7</th><th>PO8</th><th>PO9</th><th>PO10</th><th>PO11</th><th>PO12</th><th>PSO1</th><th>PSO2</th><th>PSO3</th></tr>
<tr><td>CO1</td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td>2</td></tr>
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<tr><td>CO3</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td><td>3</td><td>2</td></tr>
<tr><td>CO4</td><td>2</td><td>1</td><td>1</td><td>1</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>1</td><td>1</td><td>2</td></tr>
<tr><td>CO5</td><td>2</td><td></td><td>1</td><td>1</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>3</td><td>3</td><td>2</td></tr>
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2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VII Semester		
Code: B0546	**Business Analytics**	L	T	P
Credits: 3	**[Professional Elective - V]** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	3	-	-

Prerequisites: NIL

Course Objective:

- Understand the role of business analytics within an organization.
- Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- To become familiar with processes needed to develop, report, and analyze business data
- Use decision-making tools/Operations research techniques
- Mange business process using analytical and management tools.
- Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc

MODULE-I: [9 Periods]

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

MODULE II: [9 Periods]

Descriptive Statistical Measures: Population and samples, Measures of location, Measures of Dispersion, Measures of variability, measures of Association. Probability distribution and Data Modelling – Discrete Probability distribution, Continuous Probability distribution, Random sampling from Probability Distribution, Data Modelling and Distribution fitting

MODULE III: [12 Periods]

A: Predictive Analytics: Karl Pearson Correlation Techniques - Multiple Correlation-Spearman's Rank correlation-Simple and Multiple regression Regressions by the method of least squares
B:Building good regression models: Regression with categorical independent variables-Linear Discriminate Analysis-One way and Two Way ANOVA

MODULE IV: [9 Periods]

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization..

MODULE V: [10 Periods]

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent Trends in Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

TEXT BOOKS:
1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

REFERENCES:
1. James Evans, Business Analytics, 2e, Pearson, 2017.
2. Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams Essential of Business Analytics, Cengage Learning.
3. Thomas Eri, Wajid Khattack & Paul Buhler : Big Data Fundamentals, Concepts, drivers and Techniques by Prentice Hall of India, New Delhi, 2015
4. Akil Maheswari: Big Data, Upskill ahead by Tata McGraw Hill, New Delhi, 2016
5. Seema Acharya & Subhashini Chellappan: Big Data and Analytics, Wiley Publications, New Delhi, 2015.

E Resources:
1. https://onlinecourses.nptel.ac.in/noc18_mg09/preview
2. http://nptel.ac.in/courses/110104086/13
3. https://onlinecourses.nptel.ac.in/noc18-mg11/preview
4. http://nptel.ac.in/courses/110106050/

Course Outcomes:

At the end of the course, the student will be able to:
- Students will demonstrate knowledge of business analytics
- know the various descriptive statistical measures and their application
- Understand the tools of predictive analytics and their application for business analysis.
- Understanding the basic concepts of data mining and its importance in business analytics.
- Students will demonstrate the ability to translate data into clear, actionable insights.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs)												PSOs		
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1												1	1	
1	2	2	4		3					2		1	1	
2	3	2		4		1	4				1	1	1	
3	2	2						4	5	3			2	2
4	5	1									4	1		1

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Course Objectives:
1. Compare programming languages and describe the main principles of imperative, functional, object oriented and logic oriented programming languages
2. Recite the high points of programming language history; and
3. Read the central formalisms used in the description of programming languages. 4. Assess programming languages critically and in a scientific manner
4. Analyze the principles of an imperative, functional, object oriented or logic oriented programming language

MODULE I: **[10 Periods]**
Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories. **Programming Paradigms**: Imperative, Object Oriented, functional Programming, Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments.

MODULE II: **[10 Periods]**
Syntax and Semantics: General Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotational semantics and axiomatic semantics for common programming language features.

MODULE III: **[10 Periods]**
Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization. **Expressions and Statements:** Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands

MODULE IV: **[10 Periods]**
Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines. Abstract Data types: Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95 Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads.

MODULE V: **[10 Periods]**
Exception handling: Exceptions, exception Propagation, Exception handler in Ada, C++ and Java. Logic **Programming Language:** Introduction and overview of logic programming,

basic elements of prolog, application of logic programming. Functional Programming Languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

Course Outcomes:
Upon completion of the course, the students are expected to:
1. Master using syntax-related concepts including context-free grammars, parse trees, Recursive descent parsing, printing, and interpretation.
2. Master analyzing semantic issues associated with function implementations, including Variable binding, scoping rules, parameter passing, and exception handling.
3. Master implementation techniques for interpreted functional languages.
4. Master using object oriented languages and be familiar with
    a) Design issues of object-oriented and functional languages.
    b) Language abstraction constructs of classes, interfaces, packages, and Procedures.
    c) Be familiar with implementation of object-oriented languages.

TEXT BOOKS:
1. Concepts of Programming Languages Robert .W. Sebesta 6/e, Pearson Education
2. Programming Languages –Louden, Second Edition, Thomson.

REFERENCE BOOKS:
1. Programming languages –Ghezzi, 3/e, John Wiley
2. Programming Languages Design and Implementation – Pratt and Zelkowitz,   Fourth Edition PHI/Pearson Education
3. Programming languages –Watt, Wiley Dreamtech
4. LISP Patric Henry Winston and Paul Horn Pearson Education.
5. Programming in PROLOG Clocksin, Springer

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
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	2			2						2			1	1	
CO2	1	2	2		3			1					1	1	
CO3	2	2	2			3			2		1	4	1	1	
CO4	2	2	2							2				2	2
CO5	1	2	1				2						1		

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VII Semester		
Code: B6917	Internet of Things	L	T	P
Credits: 3	[Professional Elective - V] (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	3	-	-

Prerequisites: Basic knowledge of computer architecture, programming and communication protocols

Course Objectives:
- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc)
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming)
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
- Data Acquiring, Organizing and Analytics IOT

MODULE I - The Internet of Things (IOT)   **[10 Periods]**
The Internet of Things: An Overview of Internet of Things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles for Connected Devices.

MODULE II -   **[09 Periods]**
Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability.

MODULE III –   **[10 Periods]**
Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

MODULE IV –   **[10 Periods]**
Data link layer of IoT, Wireless Communication Technologies, Wired Communication Technologies, Manet Networks: Network Layer of IoT, lowPAN adaptation layer for devices with limited resources, Dynamic routing protocols for wireless adhoc networks Communication protocols for IoT, Service oriented protocol(COAP), Communication protocols based on the exchange of messages(MQTT), Service discovery protocols.

MODULE V –   **[10 Periods]**
Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/ Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

Text Books:
1) Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education.
2) The Internet of Things: Key applications and Protocols ‖ Wiley Publications 2nd Edition
3) Internet of Things: A Hands-On Approach by Arsheep Bahga, Vijay Madisetti

Reference Books:
1) An Introduction to Internet of Things, Connecting devices, Edge Gateway and Cloud with Applications, Rahul Dubey, Cengage, 2019.
2) IoT Fundamentals, Networking Technologies, Protocols and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetette, rob Barton, Jerome Henry, CISCO, Pearson, 2018.
3) Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley.

E-RESOURCES:
1) https://onlinecourses.nptel.ac.in/noc22_cs96/preview
2) https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?dchild=1&keywords=sudip+misra&qid=1627359928&sr=8-1
3) https://www.amazon.in/dp/1032146753/ref=sr_1_3?dchild=1&keywords=sudip+misra&qid=1627359971&sr=8-3
4) https://www.naukri.com/learning/industrial-internet-of-things-iiot-course-courl4051
5) https://geekflare.com/internet-of-things-iot-learning-resources/

Course Outcomes:
At the end of the course, students will be able to
- Describe the usage of the term 'the internet of things' in different contexts
- Discover the various network protocols used in IoTand familiar with the key wireless technologies used in IoT systems, such as Wi-Fi, 6LoWPAN, Bluetooth and ZigBee
- Define the role of big data, cloud computing and data analytics in a typical IoT system Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software
- Build and test a complete working IoT system
- Data Acquiring, Organizing and Analytics of IoT applications.

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

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B. Tech. VII Semester	
Code: B0548	**Software Testing Methodologies** **[Professional Elective - V]** (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

- To study fundamental concepts in software testing and discuss various software testing issues and solutions in software unit, integration, regression and system testing
- To learn how to plan a test project, design test cases and data, conduct testing, manage software problems and defects, generate a test report
- To expose the advanced software testing concepts such as object-oriented software testing methods, web-based and component-based software testing
- To understand software test automation problems and solutions
- To learn how to write software test documents and communicate with engineers in various forms

MODULE I - The Internet of Things (IOT)   **[10 Periods]**

Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation.

MODULE II -   **[09 Periods]**

Dynamic Testing-Black Box testing techniques**:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing.

White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing.

MODULE III –   **[10 Periods]**

Static Testing: Inspections, Structured Walkthroughs, Technical Reviews.

Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing.

Regression testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing techniques.

MODULE IV –   **[10 Periods]**

Efficient Test Suite Management: growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite Software Quality Management: Software Quality metrics, SQA models.

Debugging: process, techniques, correcting bugs.

MODULE V –   **[10 Periods]**

Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and JUnit . Test Automation using Selenium tool.

Testing Object Oriented Software: basics, Object oriented testing Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems.

Text Books:
1) Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2) Software Testing, Yogesh Singh, CAMBRIDGE

Reference Books:
1) Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
2) Software testing techniques – Baris Beizer, Dreamtech, second edition.
3) Software Testing, Principles, techniques and Tools, M G Limaye, TMH
4) Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

E-RESOURCES:
1. https://www.tutorialspoint.com/software_testing_dictionary/test_tools.htm

Course Outcomes:

At the end of the course, students will be able to
- Identify and understand various software testing problems, apply software testing knowledge and engineering methods and solve these problems by designing and selecting software test models, criteria, strategies, and methods
- Design and conduct a software test process for a software project
- Analyze the needs of software test automation
- Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects
- Basic understanding and knowledge of contemporary issues in software testing, such as component-based, web based and object oriented software testing problems
- Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web based applications

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

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech VII Sem		
Code:	**Open Elective-II**	**L**	**T**	**P**
Credits: 3		3	-	-

2021-22 Onwards (MR-21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: B0549	**Big Data Analytics Lab**	**L**	**T**	**P**
Credits: 2		**-**	**1**	**2**

Prerequisites: NIL

Course Objectives:
The course should enable the students to:
1. Optimize business decisions and create competitive advantage with Big data analytics
2. Practice java concepts required for developing map reduce programs.
4. Impart the architectural concepts of Hadoop and introducing map reduce paradigm.
5. Practice programming tools PIG and HIVE in Hadoop eco system.
6. Implement best practices for Hadoop development.

Software Requirement: JDK, Hadoop and R Studio

List of Programs

1. INSTALL VMWARE Installation of VMWare to setup the Hadoop environment and its ecosystems.
2. HADOOP MODES a. Perform setting up and Installing Hadoop in its three operating modes. i. Standalone. ii. Pseudo distributed. iii. Fully distributed. b. Use web based tools to monitor your Hadoop setup.
3. USING LINUX OPERATING SYSTEM Implementing the basic commands of LINUX Operating System – File/Directory creation, deletion, update operations.
4. FILE MANAGEMENT IN HADOOP 6 Implement the following file management tasks in Hadoop: i. Adding files and directories ii. Retrieving files iii. Deleting files Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.
5. MAPREDUCE PROGRAM 1 Run a basic word count Map Reduce program to understand Map Reduce Paradigm.
6. MAPREDUCE PROGRAM 2 Write a Map Reduce program that mines weather data. Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented
7. MAPREDUCE PROGRAM 3 Implement matrix multiplication with Hadoop Map Reduce.
8. PIG LATIN LANGUAGE – PIG Installation of PIG.
9. PIG COMMANDS Write Pig Latin scripts sort, group, join, project, and filter your data.
10. PIG LATIN MODES, PROGRAMS a. Run the Pig Latin Scripts to find Word Count
    b. Run the Pig Latin Scripts to find a max temp for each and every year.
11. HIVE Installation of HIVE.
12. HIVE OPERATIONS Use Hive to create, alter, and drop databases, tables, views, functions, and indexes. Reference Books: Jay Liebowitz, ―Big Data And Business Analytics Laboratory, CRC Press.

References:
1. Jay Liebowitz, ―Big Data And Business Analytics Laboratory, CRC Press

Course Outcomes:
1. Understand the installation of VMWare
2. Understand and apply the Perform setting up and Installing Hadoop in its three operating modes.
3. Implementing the basic commands of LINUX Operating System
4. Implement the file management tasks in Hadoop.
5. Understand Map Reduce Paradigm.
6. Apply Map Reduce program that mines weather data.
7. Implement matrix multiplication with Hadoop MapReduce
8. Apply Map Reduce program that makes the dataset to be compressed.
9. Understand the installation of PIG.
10. Understand Pig Latin scripts sort, group, join, project, and filter your data.
11. Implement the Pig Latin scripts in two different modes
12. Understand the installation of HIVE
13. Apply Hive to create, alter, and drop databases, tables, views, functions, and indexes.

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				2	3		2					1			1
CO3			1					3				3	1		

Prerequisites: Computer Programming, Python

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

Course Outcomes: After the completion of the course the student can able to:
- understand complexity of Machine Learning algorithms and their limitations;
- understand modern notions in data analysis-oriented computing;
- be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
- Be capable of performing experiments in Machine Learning using real-world data

Software Requirement: Python

List of Programs

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

   medium skiing design single twenties no -> highRisk
   high golf trading married forties yes -> lowRisk
   low speedway transport married thirties yes -> medRisk
   medium football banking single thirties yes -> lowRisk
   high flying media married fifties yes -> highRisk
   low football security single twenties no -> medRisk
   medium golf media single thirties yes -> medRisk
   medium golf transport married forties yes -> lowRisk

high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?
6.   Implement linear regression using python.
7.   Implement the multivariate linear regression.
8.   Implement simple logistic regression and multivariate logistics regression.
9.   Implement Naïve Bayes theorem to classify the English text
10. Implement an algorithm to demonstrate the significance of genetic algorithm
11. Implement the finite words classification system using Back-propagation algorithm
12. Implement anomaly detection and recommendation.

REFERENCES:
1. Willi Richert, Luis Pedro Coelho, ―Building Machine Learning with Python‖, Packt Publishing, 2013.

Course Outcomes:
At the end of the course, students will be able to:
1.   Understand the implementation procedures for the machine learning algorithms.
2.   Design Java/Python programs for various Learning algorithms.
3.   Apply appropriate data sets to the Machine Learning algorithms.
4.   Identify and apply Machine Learning algorithms to solve real world problems.

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

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech VII Sem		
Code: B00P1	**Internship / Mini Project**	L	T	P
Credits: 2		-	-	4

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: B6705	**Advanced Python Programming**	L	T	P
Credits: 3	(Professional Elective – VI)	3	-	-

Course Objectives:
1. Learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration
2. Understand the basic types of data and basic statistics
3. Identify the importance of data reduction and data visualization techniques

MODULE I: [09 Periods]

Introduction: Definition of Data Science- Big Data and Data Science hype – and getting past the hype – Datafication – Current landscape of perspectives – Statistical Inference – Populations and samples -Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, R Environment Setup, Programming with R, Basic Data Types.

MODULE II: [10 Periods]

Data Types & Statistical Description Types of Data: Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Inter quartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

MODULE III: [10 Periods]

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting, Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class. Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames. Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

MODULE IV: [10 Periods]

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements. Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.

MODULE V: [10 Periods]

Data Reduction: Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation. Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization

Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Course Outcomes: After completion of the course, the student should be able to

1. Understand basic terms what Statistical Inference means.
2. Identify probability distributions commonly used as foundations for statistical modelling. Fit a model to data
3. describe the data using various statistical measures
4. utilize R elements for data handling
5. perform data reduction and apply visualization techniques.

TEXT BOOKS:
2. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
3. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed.
4. The Morgan Kaufmann Series in Data Management Systems.
5. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:
1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
3. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
4. Paul Teetor, "R Cookbook", O'Reilly, 2011

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

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: B0550	**DEEP LEARNING**	L	T	P
Credits: 3	[Professional Elective - VI]	3	-	-

Prerequisites: Machine Learning
Course Objectives:
This course aims to present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.

MODULE I: INTRODUCTION   [09 periods]
Feed forward Neural networks, Gradient descent and the back propagation algorithm. Unit saturation, aka the vanishing gradient problem, and ways to mitigate it. RelU Heuristics for avoiding bad local minima. Heuristics for faster training. Nestors accelerated gradient descent. Regularization. Dropout.

MODULE II: Convolution Neural Networks   [09 Periods]
Architectures, convolution / pooling layers, Recurrent Neural Networks LSTM, GRU, Encoder Decoder architectures

MODULE III: Deep Unsupervised Learning   [10 Periods]
Autoencoders (standard, sparse, denoising, and contractive, etc), Variational Autoencoders, Adversarial Generative Networks, Autoencoder and DBM Attention and memory models, Dynamic memory networks (2 lectures)

MODULE IV: Applications of Deep Learning to Computer Vision   [10 Periods]
Image segmentation, object detection, automatic image captioning, Image, generation with Generative adversarial networks, video to text with LSTM, models. Attention models for computer vision tasks. Applications of Deep Learning to NLP: Introduction to NLP and Vector Space Model of Semantics Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), Glove, Evaluations and Applications in word similarity.

MODULE V: Analogy reasoning   [10 Periods]
Named Entity Recognition, Opinion Mining using Recurrent Neural Networks Parsing and Sentiment Analysis using Recursive Neural Networks Sentence Classification using convolutional Neural Networks Dialogue Generation with LSTMs Applications of Dynamic Memory Networks in NLP Recent Research in NLP using Deep Learning.

TEXTBOOKS:
1. Ian Goodfellow, YoshuaBengio, Aaron Courville. Deep Learning.

REFERENCES:
1. Duda, R.O., Hart, P.E., and Stork, D.G. Pattern Classi□cation. Wiley-Interscience. 2nd Edition. 2001.
2. Theodoridis, S. and Koutroumbas, K. Pattern Recognition. Edition 4. Academic Press, 2008.
3. Russell, S. and Norvig, N. Arti□cial Intelligence: A Modern Approach. Prentice Hall Series in Artificial Intelligence. 2003.
4. Bishop, C. M. Neural Networks for Pattern Recognition. Oxford University Press. 1995.

5. Hastie, T., Tibshirani, R. and Friedman, J. The Elements of Statistical Learning. Springer. 2001.
6. Koller, D. and Friedman, N. Probabilistic Graphical Models. MIT Press. 2009.

Course Outcomes:
At the end of the course, students will be able to
1. **Examine** the significant features of neural networks.
2. **Explore** the architecture of various neural networks.
3. **Analyze** the strategy for unsupervised learning.
4. **Elaborate** the various deep learning applications concerned with computer vision.
5. **Investigate** various reasoning methods using deep learning techniques.

<table>
<tr><td colspan="17">CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">Programme Outcomes(POs)</td><td colspan="3">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td><td>PSO3</td></tr>
<tr><td>CO1</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td>2</td><td>1</td></tr>
<tr><td>CO2</td><td>1</td><td>2</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td>2</td><td></td></tr>
<tr><td>CO3</td><td>1</td><td>3</td><td>2</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td>2</td><td>1</td></tr>
<tr><td>CO4</td><td>1</td><td>3</td><td>3</td><td>3</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td><td>2</td><td>1</td></tr>
<tr><td>CO5</td><td>1</td><td>3</td><td>3</td><td>3</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td><td>3</td><td>1</td></tr>
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2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech. VIII Semester		
Code: B0551	Social Networking [Professional Elective - VI]		L	T	P
Credits: 3			3	-	-

COURSE OBJECTIVES

- Formalize different types of entities and relationships as nodes and edges and represent this information as relational data
- Plan and execute network analytical computations
- Use advanced network analysis software to generate visualizations and perform empirical investigations of network data
- Interpret and synthesize the meaning of the results with respect to a question, goal, or task
- Collect network data in different ways and from different sources while adhering to legal standards and ethics standards

MODULE I: [9 Periods]

Social Network Analysis: Preliminaries and definitions, Erdos Number Project, Centrality measures, Balance and Homophily.

MODULE II: [10 Periods]

Random graph models: Random graphs and alternative models, Models of network growth, Navigation in social Networks, Cohesive subgroups, Multidimensional Scaling, Structural equivalence, roles and positions.

MODULE III: [9 Periods]

Network topology and diffusion, Contagion in Networks, Complex contagion, Percolation and information, Navigation in Networks Revisited.

MODULE IV: [10 Periods]

Small world experiments, small world models, origins of small world, Heavy tails, Small Diameter, Clustering of connectivity, The ErdosRenyi Model, Clustering Models.

MODULE V: [10 Periods]

Network structure -Important vertices and page rank algorithm, towards rational dynamics in networks, basics of game theory, Coloring and consensus, biased voting, network formation games, network structure and equilibrium, behavioral experiments, Spatial and agent-based models.

COURSE OUTCOMES

After completing the course student should:

- Know basic notation and terminology used in network science
- Be able to visualize, summarize and compare networks

- Illustrate basic principles behind network analysis algorithms
- Develop practical skills of network analysis in R programming language
- Be capable of analyzing real work networks

TEXT BOOKS

1. S. Wasserman and K. Faust. "Social Network Analysis: Methods and Applications", Cambridge University Press.
2. D. Easley and J. Kleinberg, "Networks, Crowds and Markets: Reasoning about a highly connected world", Cambridge University Press, 1st edition,2010

REFERENCE BOOKS

1. Maarten van Steen. "Graph Theory and Complex Networks. An Introduction", 2010.
2. Reza Zafarani, Mohammed Ali Abbasi, Huan Liu. "Social Media Mining: An Introduction". Cambridge University Press 2014.
3. Maksim Tsvetovat and Alexander Kouznetsov. "Social Network Analysis for Startups". O'Reilly Media, 2011.

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

COURSE OBJECTIVES

To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing; become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans; be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation; appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user; be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality, mobile and wearable computing, and ubiquitous computing; and understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems. Finally, working in small groups on a product design from start to finish will provide you 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   **[10 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   **[10 PERIODS]**

HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

MODULE – V   **[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 Design Focus: Getting the size right.

COURSE OUTCOMES

- Ability to apply HCI and principles to interaction design.
- Ability to design certain tools for blind or PH people.

TEXT BOOKS

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Modules 1, 2, 3
2. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education Modules 4,5

REFERENCE BOOKS

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen , Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith – Atakan, Cengage Learning.

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

Prerequisites: Software Engineering

Course Objectives:
This course provides the students to learn, describe and determine the purpose, importance of Software Quality Assurance (SQA) Framework and its Standards, state the metrics, measurements and methodology in quality assurance, study the Standards, metrics, methodologies, establishing policies, SDLC process, techniques and software testing tools like automated testing tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, J Meter testing, assessing, project management in Client / Server and web applications by providing security.

Module I: SQA Framework and Quality Standards   [10 Periods]
SQA Framework and Standards: What is Quality in SQA, Components, SQA Plan, Steps to develop and implement a SQA Plan.
Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma and 6 Sigma.

Module II: Metrics and Methodologies   [10 Periods]
SQA Metrics and Measurement Software Quality Metrics: Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs
Software Quality Metrics methodology: Establish Quality Requirements, Identify Software quality metrics, Implement software quality metrics, Analyze software metrics results, Validate Software Quality Metrics, Software Quality Indicators, Fundamentals in Measurement theory.

Module III: Software Testing Methodologies   [9 Periods]
A: Software Testing Strategy and Environment
Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing.
B: Software Testing Methodology
Verification and validation, functional and structural testing, work bench concept, eight considerations in developing testing methodologies, testing tactics checklist.

Module IV: Techniques and Tools   [10 Periods]
Software Testing Techniques: Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing.
Software Testing Tools: Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, J Meter, J MODULE and Cactus.

MODULE V: Testing Process and Applications   [9 Periods]
Testing Process: Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing,

Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness.

Testing Specialized Systems and Applications: Testing Client/Server and Web applications, testing off the Shelf Components, Testing Security, Testing a data Warehouse.

TEXT BOOKS
1. William E. Perry, "**Effective Methods for Software Testing**", Wiley India, 2nd Edition, 2006.
2. Mordechai Ben-Menachem Garry S. Mar Liss, "**Software Quality**", Thomson Learning Publication, 1997.
3. K.V.K.K. Prasad, "**Software Testing Tools**", Dream Tech Publishers, Third Edition 2009.

REFERENCE BOOKS
1. Bories Beizer, "**Software Testing Techniques**", 2nd Edition, Dream Tech Press.
2. G.Gord on Schulmeyer, James I. Mc Manus, "**Hand book of Software Quality Assurance**", International Thomson Computer Press, 2nd Edition.

E-RESOURCES
1. https://hientl.files.wordpress.com/2011/12/effective-methods-for-software-testing2.pdf
2. http://www.softwaretestinggenius.com/download/EMFST.pdf
3. https://www.adturtle.biz/LP_TA/index.cfm?T=436379
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=32
5. http://dl.acm.org/citation.cfm?id=2597724
6. http://nptel.ac.in/courses/106101061/18
7. http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-5ybmrhKB j79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA

Course Outcomes:
At the end of the course, students will be able to:
1. **Define** state-of-the-art, and apply their findings to framework for software testing and quality assurance.
2. **Analyze** different approaches to software testing and quality assurance, metrics measurement, and select optimal solutions for different situations and projects.
3. **Demonstrate** software testing & quality assurance and apply that knowledge in SDLC, functional, structural testing, other testing methods their future research & its practice.
4. **Evaluate** different testing tools and techniques
5. **Justify** the testing process and its applications in quality assurance for client/server, web applications with security.

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

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech VIII Sem		
Code:	**Open Elective-III**	**L**	**T**	**P**
Credits: 3		3	-	-

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech VIII Sem		
Code: B00P3	**Seminar**	L	T	P
Credits: 1		-	-	2

2021-22 Onwards (MR21)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)		B.Tech VIII Sem		
Code: B00P2	**Major Project**		L	T	P
Credits: 12			-	-	24