

# **COURSE STRUCTURE AND DETAILED SYLLABUS**

**For**

**B.Tech-Four Year Degree Programme**

**(MR22 Regulations)**

**Effective from the Academic Year 2022-23 onwards**



**Department of AIML**

**Malla Reddy Engineering College**

(UGC Autonomous Institution, Approved by AICTE, & Affiliated to JNTUH,  
Accredited by NAAC with 'A++' Grade (Cycle- III), Maisammaguda (H),  
Medchal-Malkajgiri District, Secunderabad, Telangana –500100, [www.mrec.ac.in](http://www.mrec.ac.in))



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## **Department of AIML**

The B.Tech degree of Jawaharlal Nehru Technological University Hyderabad, Hyderabad shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

### **INSTITUTE VISION**

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

### **INSTITUTE MISSION**

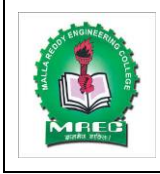
- To impart knowledge of advanced technologies using state-of-the-art infrastructural facilities.
- To inculcate innovation and best practices in education, training and research.
- To meet changing socio-economic needs in an ethical ambience.

### **DEPARTMENT VISION**

To impart excellence in education for students in the field of Artificial Intelligence and human-machine partnership in the technological-embedded world and create competent professionals who serve the greater cause of society.

### **DEPARTMENT MISSION**

1. To provide a student-centric learning environment to create competent professionals with knowledge in artificial intelligence, machine learning techniques, deep-learning and computer vision.
2. To facilitate the students to develop the necessary skills to sustain in today's globalized technological society, in pursuit of excellence by keeping high personal and professional values and ethics.
3. To nurture their skills in research and innovation that contributes to the development of society.



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## **Department of AIML**

### **Program Educational Objectives**

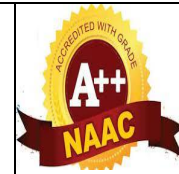
1. To prepare students to build intelligent machines, software, or applications combination of machine learning, analytics with cutting-edge technologies.
2. Promote research, design, product development and services in the field of AIML through strong technical, communication and entrepreneurial skills
3. To improve students' ability within a team and apply appropriate practices within a professional, legal and ethical framework for societal needs, and accomplish sustainable progress through lifelong learning and research.

### **Program Specific Outcomes**

1. An ability to apply core and advanced AI technologies to extract information and provide knowledge to intelligent decision-making systems.
2. An ability to develop a principle approach to the machine learning tools that can address complex cognitive tasks for the betterment of society.
3. Inculcate effective communication and ethics for lifelong learning with social awareness



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## Department of AIML

### PROGRAMME OUTCOMES (POs)

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



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## Department of AIML

### Course Structure and Syllabus

(MR22 Regulations-Effective from A.Y: 2022–23 Onwards)

I Year I Semester							
S. No	Category	Course Code	Name of the Subject	Contact Hours/Week			Credits
				L	T	P	
1.	BSC	C0B01	Linear Algebra and Numerical Methods	3	1	-	4
2.	BSC	C0B17	Engineering Chemistry	3	1	-	4
3.	ESC	C0501	Programming for Problem Solving	3	-	-	3
4.	ESC	C0301	Engineering Graphics	2	-	2	3
5.	BSC	C0B09	Semiconductor Physics	3	1	-	4
6.	ESC	C0502	Programming for Problem Solving Lab	-	1	2	1.5
7.	BSC	C0B11	Applied Physics Lab	-	-	2	1
8.	BSC	C0B18	Engineering Chemistry Lab	-	-	2	1
<b>Total</b>				<b>14</b>	<b>4</b>	<b>8</b>	<b>21.5</b>
<b>Total Contact Hours</b>				<b>26</b>			

I Year II Semester							
S. No	Category	Course Code	Name of the Subject	Contact Hours/Week			Credits
				L	T	P	
1.	HSMC	C0H01	English	3	-	-	3
2.	ESC	C0201	Basic Electrical and Electronics Engineering	3	-	-	3
3.	BSC	C0B02	Probability and Statistics	3	-	-	3
4.	ESC	C0504	Python Programming	3	1	-	4
5.	ESC	C0506	Python Programming Lab	-	1	2	2
6.	HSMC	C0H02	English Language and Communication Skills Lab	-	-	3	1
7.	ESC	C0202	Basic Electrical and Electronics Engineering Lab	-	-	2	1
8.	ESC	C1201	Engineering and IT Workshop	-	-	2	1.5
<b>Total</b>				<b>12</b>	<b>2</b>	<b>9</b>	<b>18.5</b>
<b>Total Contact Hours</b>				<b>23</b>			



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II Year I Semester							
S.No	Course Category	Course Code	Name of the Course	Contact Hours /Week			Credits
				L	T	P	
1	PCC	C0507	Discrete Mathematics	3	-	-	3
2	PCC	C0509	Computer Organization and Architecture	3	-	-	3
3	PCC	C0510	Data Structures	3	-	-	3
4	PCC	C7301	Introduction to Artificial Intelligence	3	-	-	3
5	PCC	C0511	Object Oriented Programming through Java	3	-	-	3
6	PCC	C0512	Data Structures Lab	-	-	3	1.5
7	PCC	C0513	Object Oriented Programming through Java Lab	-	-	3	1.5
8	PCC	C0522	Node JS/ React JS/ Django	-	1	2	2
9	MC	C00M1	Gender Sensitization	-	-	2	-
<b>Total</b>				<b>14</b>	<b>1</b>	<b>12</b>	<b>20</b>
<b>Total Contact Hours</b>				<b>27</b>			

II Year II Semester							
S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week			Credits
				L	T	P	
1	BSC	C0B07	Applied Statistics and Optimization Techniques	4	-	-	4
2	PCC	C0515	Database Management Systems	3	-	-	3
3	PCC	C0516	Operating Systems	3	-	-	3
4	PCC	C7302	Machine Learning-I	3	-	-	3
5	PCC	C0517	Design & Analysis of Algorithms	2	-	-	2
6	PCC	C0519	Database Management Systems Lab	-	-	2	1
		C1204	Design & Analysis of Algorithms Lab	-	-	2	1
7	PCC	C73P1	Real Time Research Project / Field Based Research Project	-	-	4	2
8	PCC	C7304	PROLOG / LISP / PYSWIP	-	-	2	1
9	PCC	C00M2	Environmental Science	2	-	-	-
<b>Total</b>				<b>16</b>	<b>1</b>	<b>10</b>	<b>20</b>
<b>Total Contact Hours</b>				<b>27</b>			



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III Year I Semester							
S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week			Credits
				L	T	P	
1	HSMC	C0H08	Business Economics & Financial Analysis	3	-	-	3
2	PCC	C6201	Computer Networks	3	-	-	3
3	PCC	C1205	Software Engineering	3	-	-	3
4	PCC	C7305	Machine Learning-II	3	-	-	3
<b>Professional Elective – I</b>							
5	PEC-I	C7306	Graph Theory	3	-	-	3
		C1208	Information Retrieval				
		C7307	Web Programming				
		C0527	Image Processing				
		C0525	Computer Graphics				
6	PCC	C7308	Machine Learning-II Lab	-	-	2	1
7	PCC	C1207	Software Engineering & Computer Networks Lab	-	1	2	2
8	HSMC	C0H03	Advanced English Communication Skills Lab	-	-	2	1
9	PCC	C0530	UI Design-Flutter	-	-	2	1
10	MC	C00M3	Quantitative Aptitude and Verbal Reasoning-I	2	-	-	-
11	MC	C00M5	Constitution of India	2	-	-	-
<b>Total</b>				<b>19</b>	<b>-</b>	<b>8</b>	<b>20</b>
<b>Total Contact Hours</b>				<b>27</b>			



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III Year II Semester							
S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week			Credits
				L	T	P	
1	PCC	C1208	Automata Theory and Compiler Design	3	-	-	3
2	PCC	C6711	Data Analytics	3	-	-	3
Professional Elective – II							
4	PEC-II	C1220	Augmented Reality & Virtual Reality	3	-	-	3
		C1210	Pattern Recognition				
		C7309	Computer Vision and Robotics				
		C7310	Data Warehousing and Business Intelligence				
		C7311	Robotic Process Automation				
Professional Elective - III							
5	PEC-III	C0532	Full Stack Development	3	-	-	3
		C1211	Data Mining				
		C0533	Scripting Languages				
		C0534	Mobile Application Development				
		C6917	Internet of Things				
6			<b>Open Elective-I</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
7	PCC-III Lab	C0538	Full Stack Development Lab	-	-	2	1
		C1213	Data Mining Lab				
		C0539	Scripting Languages Lab				
		C0540	Mobile Application Development Lab				
		C6918	Internet of Things Lab				
8	PCC	C7313	Principles of Data Analytics Lab	-	<b>1</b>	2	2
9	PROJ	C00P1	Industrial Oriented Mini Project/ Internship / Skill Development Course (DevOps)	-	-	4	2
10	MC	C00M4	Quantitative Aptitude & Verbal Reasoning-II	2	-	-	-
11	MC	C00M6	Intellectual Property Rights	2	-	-	-
<b>Total</b>				<b>19</b>	<b>0</b>	<b>10</b>	<b>20</b>
<b>Total Contact Hours</b>				<b>29</b>			





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IV Year I Semester							
S.No	Course Category	Course Code	Name of the Course	Contact Hours/Week			Credits
				L	T	P	
1	HSMC	C0H09	Organizational Behavior	3	-	-	3
2	PCC	C6610	Deep Learning	3	-	-	3
3	PCC	C0544	Cloud Computing	3	-	-	3
Professional Elective-IV							
4	PEC-IV	C1215	Information Security	3	-	-	3
		C7314	Expert Systems				
		C7315	Semantic Web				
		C7316	Game Theory				
		C7317	Nature Inspired Computing				
Professional Elective-V							
5	PEC-V	C7318	Social Network Analysis	3	-	-	3
		C7319	Federated Machine Learning				
		C0535	Software Testing Methodologies				
		C7320	Web Security				
		C0545	Ad-hoc & Sensor Networks				
6	PCC		Deep Learning Lab	-	-	2	1
7	PCC	C0560	Cloud Computing Lab	-	-	2	1
8	PROJ	C0P02	Project Stage-I	-	-	6	3
<b>Total</b>				<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>
<b>Total Contact Hours</b>				<b>25</b>			



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IV Year II Semester							
S.No	Course Category	Course Code	Name of the Course	Contact Hours /Week			Credits
				L	T	P	
<b>Professional Elective-VI</b>							
1	PEC-VI	C7320	Speech and Video Processing	3	-	-	3
			Mobile Computing				
		C7321	Randomized Algorithms				
		C7322	Cognitive Computing				
		C7323	Conversational AI				
2	OEC-II		<b>Open Elective-II</b>	3	-	-	3
3	OEC-III		<b>Open Elective-III</b>	3	-	-	3
4	PROJ	COP03	Project Stage-II including Seminar	-	-	22	9+2
<b>Total</b>				<b>9</b>	<b>0</b>	<b>22</b>	<b>20</b>
<b>Total Contact Hours</b>				<b>31</b>			



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### Department of AIML

#### LIST OF OPEN ELECTIVES

S.No	Course Code	Name of the Course	Credit
1	C7324	Fundamentals of AI	3
2	C7325	Machine Learning Basics	3
3	C7326	Introduction to Natural Language Processing	3
4	C7327	AI Applications	3
5	C7328	Chat bots	3
6	C7329	Genetic Algorithms & Fuzzy Logic	3

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: C0B01</b>	<b>Linear Algebra and Numerical Methods</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>	<b>Common For CSE, IT, CSE-AIML, DS, CS, IOT, and AIML</b>	<b>3</b>	<b>1</b>	<b>-</b>

**Prerequisites:** NIL

**Course Objectives:**

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

**Module-I: Matrix Algebra** **[12 PERIODS]**

**VECTOR SPACE, BASIS, LINEAR DEPENDENCE AND INDEPENDENCE (ONLY DEFINITIONS)**

**Matrices:** Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; solving system of Homogeneous and Non-Homogeneous linear equations, LU – Decomposition Method.

**Module II: Eigen Values and Eigen Vectors** **[12 Periods]**

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

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

**Module III: Algebraic & Transcendental equations** **[12 Periods]**

**(A)** Solution of Algebraic and Transcendental Equations: Introduction-Errors, types of errors. Bisection Method, Method of False Position, Newton-Raphson Method.

**(B)** The Iteration Method, Ramanujan's method to find smallest root of Equation. Jacobi's Iteration method for solving system of linear equations. Gauss seidel Iteration method for solving system of linear equations.

**Module IV: Interpolation** **[12 Periods]**

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences-Central differences - Symbolic relations and separation of symbols. Differences of a polynomial-Newton's formulae for interpolation; Central difference interpolation Formulae – Gauss Central Difference Formulae ; Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

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

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

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

**Text Books**

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

**References:**

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, 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](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](https://www.youtube.com/watch?v=9y_HcckJ96o) (Quadratic forms)
4. [https://www.youtube.com/watch?v=3j0c\\_FhOt5U](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\\_2iUCG87BLK18eISe4fHKdE2\\_j2B\\_T&index=5](https://www.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy_2iUCG87BLK18eISe4fHKdE2_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=0K6oIBTdcSs> (Regula Falsi and Newton Raphson Method)
6. <https://www.youtube.com/watch?v=KSFnfUYcxoI> (Interpolation)
7. <https://www.youtube.com/watch?v=QugqSa3Gl-w&t=2254s>(Numerical Solution of ODE)
8. [https://www.youtube.com/watch?v=NihKCpJx2\\_0&list=PLbMVogVj5nJRILpJJO7KrZa8Ttj4\\_ZAgl](https://www.youtube.com/watch?v=NihKCpJx2_0&list=PLbMVogVj5nJRILpJJO7KrZa8Ttj4_ZAgl) (Numerical Solution of ODE)
9. <https://www.youtube.com/watch?v=hizXlwJO1Ck> (Numerical Integration)

### Course Outcomes:

CO	Statement	Blooms Taxonomy Level
CO1	The student will be able to find rank of a matrix and analyze solutions of system of linear equations.	
CO2	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	
CO3	The student will be able to find the root of a given equation by various methods	
CO4	The student will be able to estimate the value for the given data using interpolation	
CO5	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 (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOS		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	3				2			1			
CO2	2	2	2	3	2				2			1			
CO3	2	2	2	3	2				2			1			

<b>CO4</b>	3	2	2	3	3				2			2			
<b>CO5</b>	2	2	2	3	3				2			2			

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech I Semester</b>		
<b>Code:C0B17</b>	<b>Engineering Chemistry (Common for ALL)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>1</b>	<b>-</b>

**Course objectives:**

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

**Module I: Water and its treatment**

**[10 Periods]**

Introduction to water, hardness of water, causes of hardness, expression of hardness, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale & Sludge, Priming and foaming, caustic embrittlement and boiler corrosion;

Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment - Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization. Desalination by Reverse osmosis and its significance.

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

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

**Module III: Electrochemistry and Corrosion [17 Periods]**

**A. Electrochemistry:**

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

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

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







<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: C0501</b>	<b>Programming for Problem Solving</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>	<b>Common for CE, EEE, ME, ECE, CSE, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, AIML, IT and Mi.E</b>	<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** NIL

**Course Objectives:**

- Understand the basic terminology, write, compile and debug programs in computer programming
- Implement different control statements for solving problems.
- Understand the concept of structured program and arrays.
- Implement the idea of strings and pointers.
- Analyse the usage of structures and different file operations.

**MODULE I: Fundamentals and Introduction to ‘C’ Language [10 Periods]**

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

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

**MODULEII: Conditional Statements and Repetition Statements [09 Periods]**

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

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

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

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

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

**MODULE IV: Strings and Pointers [09 Periods]**

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

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

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

**Structures** – Declaration, definition and initialization of structures, accessing structure elements, nested structures, arrays of structures, structures and functions, pointers to structures, self-

referential structures, unions, difference between structures and union, typedef, bit fields, enumerated types, C programming examples.

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

C program examples.

**Textbooks:**

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

**References**

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

**E–Resources**

1. [http://oxford.universitypress.ac.in/eBooks/ Programming in C.](http://oxford.universitypress.ac.in/eBooks/Programming%20in%20C)
2. <https://www.journals.elsevier.com/science-of-computer-programming>
3. <http://www.ejournalofsciences.org>
4. [http://onlinecourses.nptel.ac.in/iitk\\_cs-101](http://onlinecourses.nptel.ac.in/iitk_cs-101)
5. <http://onlinevideolecture.com/ebooks/?subject=C-Programming>

**Course Outcomes:**

COs	Course Outcome	Bloom’s Taxonomy Level
CO1	Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language).	
CO2	Apply different types of control structures to code and test a given logic in C programming language	
CO3	Decompose a problem into functions and to develop modular reusable code and Use arrays to formulate algorithms and programs for Searching and sorting problems.	
CO4	Develop programs that make use of concepts such as strings, pointer	
CO5	Analyze 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	2										1	3	2	2
CO2	3	2	1									1	3	2	1
CO3	3	3	1									1	3	2	1
CO4	3	1										2	3	2	1
CO5	3	3	1									2	3	2	1

2022-23 Onwards (MR22)	<b>Malla Reddy Engineering College (Autonomous)</b>			<b>B.Tech. I Semester</b>		
<b>Code: C0301</b>	<b>Engineering Graphics</b>			<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>	<b>(Common for All)</b>			<b>2</b>	<b>-</b>	<b>2</b>

**PREREQUISITES: NIL**

**Course Objectives:**

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

**MODULE I:**

Introduction to Engineering Drawing, Principles of Engineering Graphics and their significance, Lettering.

Geometrical Constructions: Regular polygons only. Conic Sections: Ellipse, Parabola, Hyperbola– General method only Cycloidal Curves and Involute, tangents & normal for the curves.

Scales: Plane Scale, Diagonal scale, Vernier Scale.

**MODULE II:**

Orthographic Projections: Principles of Orthographic Projections – Conventions – First and Third Angle projections.

Projection of Points: Projection of points including all four quadrants.

Projection of Lines: Projection of Lines - parallel, perpendicular, inclined to reference planes and Traces.

**MODULE III:**

Projection of Planes: Axis inclined to both the reference plane.

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

**MODULE IV:**

Section of Solids: Sectioning of single solid with the cutting plane inclined to one plane and perpendicular to the other - true shape of section.

Development of Surfaces: Development of lateral surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

**MODULE V:**

Isometric Projections: Principles of Isometric Projection – Isometric Scale, Isometric Views– Conventions –Plane Figures, Simple Solids.

Transformation of Projections: Conversion of Isometric Views to Orthographic Views and vice versa–simple objects.

**TEXT BOOKS**

1. K.L.Narayana, S. Bheemanjaneyulu “Engineering Drawing with Auto CAD-2016” New Age 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”, New Age 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-\(EG-MECI102\)](http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics-nit-jalandhar-(EG-MECI102))

**Course Outcomes:**

COs	Course Outcome	Bloom's Taxonomy Level
CO1		
CO2		
CO3		
CO4		
CO5		

**CO- PO, PSO Mapping**

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

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code:C0B09</b>	<b>Semiconductor Physics</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>	<b>Common for Sem-I:B. Tech-AIML, CSE-AIML, CSE-CS, CSE-IoT and CSE-DS &amp; Sem-II: CSE and IT</b>	<b>3</b>	<b>1</b>	<b>-</b>

**Prerequisites:** Fundamentals of Physics

**Course Objectives:**

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

**Module-I:Quantum Mechanics**

**[8 Periods]**

Introduction, Plank's theory of black body radiation, deduction of Wien's displacement law and Ralygien's law; Louis de Broglie's concept of matter waves; Davisson and Germer experiment; G.P. Thomson Experiment; Heisenberg's uncertainty principle and its application (electron

cannot exist inside the nucleus); Schrodinger's time-independent wave equation, Physical significance and properties of wave function; Particle in a one-dimensional infinite potential well.

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

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

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

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

**B:** Direct and indirect bandgap semiconductors; Carrier generation and Recombination; Drift and

Diffusion mechanisms; Equation of Continuity; P-N Junction diode, Energy band diagram, V-I

Characteristics; Construction and Working of Photodiode, LED & Solar cell and their applications.

**Module – IV** [12  
**Periods]**

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

**Optical Fibers:**

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

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

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

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

**Text Books:**

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

**Reference Books:**

1. P K Palanisamy, "Engineering Physics", SciTech Publication, 4<sup>th</sup> Edition, 2014.





CO5	2	2	1												
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<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: C0502</b>	<b>Programming for Problem Solving Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1.5</b>	(Common for CE, EEE, ME, ECE, CSE, CSE-CS, CSE-AIML, CSE-DS, CSE -IOT, AIML, IT and Mi.E)	-	-	<b>2</b>

**Prerequisites: NIL**

**Course Objectives:**

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

**Software Requirements: C**

**List of Programs:**

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



CO1	3	2										1	3	2	
CO2	3	2	1									1	3	3	1
CO3	2	3	1									1	3	2	1

2022-23 Onwards (MR22)	Malla Reddy Engineering College (Autonomous)			B.Tech. I Semester		
Code: C0B11	Applied Physics Lab			L	T	P
Credits: 1	(Common for AIML, CSE-AIML, CSE-CS, CSE-IoT, CSE-DS ,CSE and IT)			-	-	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:**

**Planck's constant**

To determine Planck's constant using Photo electric effect.

**1 Energy band –gap of a semiconductor**

To determine the energy band gap of a semiconductor.

**2 V-I and P-I characteristics of light emitting diode**

Plot V-I and P-I characteristics of light emitting diode.

**3 Laser diode**

To study the Characteristics of Laser diode.

**4 Solar Cell**

To study the V-I Characteristics of solar cell.

**5 LCR Circuit**

To determination of resonant frequency, bandwidth and quality factor of RLC circuit.

**6 Numerical Aperture of an Optical fiber**

To determine the Numerical aperture of the given fiber.

**7 Bending Loss of a Fiber**

To determine the bending loss of the given fiber.

**8 Light Dependent Resistance (LDR)**

To determine the characteristics of a LDR.

**9 Stewart and Gee's experiment**

Determination of Magnetic field along the axis of current carrying circular coil.

**10 B-H Curve**

To study the magnetization of ferromagnetic material in presence of magnetic field.

**11 Sonometer**

To verify the frequency of AC Supply.

**13. Construction of fundamental logic gates using discrete components and verification of truth tables**



<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: C0B18</b>	<b>Engineering Chemistry Lab (Common for ALL)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

**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<sup>H</sup>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<sup>+2</sup>ion in KMnO<sub>4</sub> 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.



CO5	2	1	2												
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<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code:C0H01</b>	<b>English</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>	<b>Common for CE, EEE, ME, ECE, CSE, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIML, IT and Mi.E</b>	<b>3</b>	<b>-</b>	<b>-</b>

**Course Objectives:**

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

**Module – I**

**Speech** : “Go Kiss the World” by Subroto Bagchi

**Poem** : “Leisure” by W. H. Davies

**Vocabulary** : Formation of Words, Roots, Prefixes, Suffixes

**Grammar** : Articles and Prepositions

**Reading** : Skimming and Scanning

**Writing** : Introduction to Writing Skills, Characteristics of Effective Writing

**Module – II**

**Short story** : “Gift of Magi” by O’ Henry



**Poem** : “No Man is an Island” by John Donne  
**Vocabulary** : One Word Substitutions; Synonyms and Antonyms  
**Grammar** : Degrees of Comparison, Active and Passive Voice  
**Reading** : Intensive Reading and Extensive Reading  
**Writing** : Paragraph Writing- Cohesive devices; Jumbled Sentences; Punctuation

### MODULE – III

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

### MODULE – IV

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

### MODULE – V

**Essay** : “Toasted English” by R. K. Narayan  
**Poem** : “If” by Rudyard Kipling  
**Grammar** : Direct and Indirect Speech, Misplaced Modifiers  
**Vocabulary** : Redundancies and Clichés  
**Reading** : Reading for Specific Purposes, Reading Comprehension practice  
**Writing** : Paraphrasing & Summarizing,

### Prescribed Textbook:

#### Reference Books:

1. Azar, Betty and Stacy A. Hagen. *Understanding and Using English Grammar*. 4<sup>th</sup> 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. Eastwood, John. *Oxford Guide to English Grammar*. 4<sup>th</sup> edition, Oxford University Press, 1994.
4. Field, Marion. *Improve Your Written English*. 5<sup>th</sup> Edition. How to Books, UK, 2009.
5. Leech, Geoffrey and Svartvik, J. *A Communicative Grammar of English*. 3<sup>rd</sup> edition, Routledge, 2013.

#### Related Websites:

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

**Course Outcomes:**

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

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

2022-23 Onwards (MR22)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code: C0201	Basic Electrical And Electronics Engineering (Common for all branches)	L	T	P
Credits: 3		3	-	-

**Prerequisites: Nil**

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

**MODULE I: DC Circuits**

**[9 Periods]**

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

**MODULE II: AC Circuits**

**9 Periods**

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

RLC combinations (series and parallel).

**MODULE III: Introduction to Electrical Machines**

**10 Periods**

**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.

**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,  $\pi$ - section Filters.

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

**10 Periods**

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

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

**Text Books**

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, “ **Basic Electrical and Electronics Engineering**”, S.Chand and Company Limited, New Delhi, 1<sup>st</sup> 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”, 3 rd editions, 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, 2<sup>nd</sup> 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:**

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

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code:C0B02</b>	<b>Probability and Statistics</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>	<b>Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and AIML</b>	<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** NIL

**Course Objectives:**

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

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

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

**MODULE II: Random variables****[14 Periods]**

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

**MODULE III: Sampling Distributions:****[14 Periods]**

**(A)** Definitions of population-sampling-statistic, parameter. Types of sampling, expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, point estimation and interval estimation

**(B) Testing of Hypothesis:** Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, and Level of significance. One sided test, two-sided test.

**Large sample tests:**

- (i) Test of significance for single mean
- (i) Test of significance for difference of means
- (ii) Test of significance for single proportion
- (iii) Test of significance for difference of proportions
- (iv) Test of significance for standard deviations

**MODULE IV: Small Sample Tests****[12 Periods]**

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

**MODULE V: Correlation, Regression:****[10 Periods]**

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

**Text Books**

1. Walpole, Probability & Statistics, for Engineers & Scientists, 8th Edition, Pearson Education.
2. Paul A Mayer Introductory Probability and Statistical Applications, John Wiley Publications.
3. 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](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:

CO	Statement	Blooms Taxonomy Level
CO1	The students will understand and appreciate the role of P&S in data analytics and big data analysis.	
CO2	Students would be able to find the Probability in certain realistic situation	
CO3	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.	
CO4	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.	
CO5	Students will understand how to forecast the future observations.	

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: C0504</b>	<b>Python Programming</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>	<b>Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML</b>	<b>3</b>	<b>1</b>	<b>-</b>

**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, Web 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/101EfoBUcccVISQHW>
3. “Basics of Python for Data Science”, <https://olympus.greatlearning.in/courses/11265>
4. “Beginners Guide / Programmers - Python Wiki”, <https://wiki.python.org/moin/BeginnersGuide/Programmers>
5. “Introduction to Python”, <https://www.datacamp.com/courses/intro-to-python-for-data-science>

**Course Outcomes**

1.

CO	Statement	Blooms Taxonomy Level
CO1	Learn syntax and semantics along with the basic data structures of Python	
CO2	Apply different operation on Files by using modules and implement exceptions in Python	
CO3	Identify the use regular expressions and multithreaded programming in Python	
CO4	Implement Object Oriented Programming concepts to build programs in Python.	
CO5	Identify different GUI Components to Design web applications in Python	



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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>						<b>B.Tech. II Semester</b>		
<b>Code: C0506</b>	<b>Python Programming Lab</b>						<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>	<b>Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and AIML</b>						<b>-</b>	<b>1</b>	<b>2</b>

**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 equivalent 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)  $\leq$  (sum of their radii) then (they are colliding)  
b) Find mean, median, mode for the given set of numbers in a list.
- 7 a) Write a function `nearly_equal` to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.  
b) Write a function `dups` to find all duplicates in the list.  
c) Write a function `unique` to find all the unique elements of a list.
- 8 a) Write a function `cumulative_product` to compute cumulative product of a list of numbers.  
b) Write a function `reverse` to reverse a list. Without using the reverse function.
- 9 Create a Regular Expression and implement the following  
a) Recognize the following strings: “bat,” “bit,” “but,” “hat,” “hit,” or “hut.”  
b) Match any pair of words separated by a single space, i.e., first and last names.  
c) Match any word and single letter separated by a comma and single space, as in last name, first initial.
- 10 Write a python program to implement multithreading scenarios.
- 11 Write a python program to simulate the banking operations using Class.
- 12 Write a python program to demonstrate the Queue / Stack operations using Class.

### Text Books

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

### Reference Books

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

### Course Outcomes

CO	Statement	Blooms Taxonomy Level
CO1	Apply core Python scripting elements such as variables and flow control structures	
CO2	Implement data structures like lists, tuple, dictionary and sequence in Python.	

CO3	Build Python programs by using OOPs concepts and apply different file operations.	
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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										2	3	2	1
CO2	3	2	1									1	3	2	1
CO3	3	2	1									2	3	2	1

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>			<b>B.Tech. II Semester</b>		
<b>Code: C0H02</b>	<b>English Language and Communication Skills Lab</b>			<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>	(Common for CE, EEE, ME, ECE, CSE, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIML, IT and Mi.E)			-	-	2

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

#### Course Objectives:

The course aims to develop students' intelligibility in their pronunciation of English—speech Sounds, word accent, intonation and rhythm. It also helps to improve the fluency in spoken English and make them aware of nuances of major skills, namely, listening and speaking skills.

It also trains students to understand nuances of both verbal and non-verbal communication during all activities. The course enables the learners to develop their confidence levels so as to participate in discussions, debates and public speaking.

#### Listening Skills:

##### Objectives:

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

\*Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

## **Speaking Skills:**

### **Objectives:**

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

### **Syllabus: English Language and Communication Skills Lab has two parts:**

#### **a. Computer Assisted Language Learning (CALL) Lab**

#### **b. Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the English Language Communication Skills Lab

#### **Module - I:**

**CALL Lab:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants

**ICS Lab:** Ice-Breaking activity and JAM session; Listening: listening for sounds in context, for ideas; Speaking: ideation and translation of ideas into sentences.

#### **Module - II:**

**CALL Lab:** Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

**ICS Lab:** Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette; Listening: listening for specific purposes, for details; Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

#### **Module - III:**

**CALL Lab:** Word accent and Listening Comprehension-reading aloud meaningfully.

**ICS Lab:** Descriptions- Narrations- Giving Directions and guidelines; Listening: listening for intelligible English; Speaking: formal and informal conversations, register.

#### **Module - IV:**

**CALL Lab:** Intonation and Common errors in Pronunciation- reading aloud (evaluating through recording).

**ICS Lab:** Extempore- Public Speaking, Oral Presentation Skills; Listening: note taking and listening for speaker's tone/attitude; Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

#### **Module - V:**

**CALL Lab:** Reduction of Mother Tongue Interference and Conversation Practice

**ICS Lab:** Information Transfer, Debate

Minimum requirement of infrastructural facilities for EL Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

#### **System Requirement (Hardware component):**

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

- a) P – IV Processor                      b) Speed – 2.8 GHZ                      c) RAM – 512 MB Minimum  
d) Hard Disk – 80 GB                      e) Headphones of High quality

**2. Interactive Communication Skills (ICS) Lab:** The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the textbook which are loaded on the systems):

**Prescribed Lab Manual:**

Rani, Sudha. English Language Communication Skills Laboratory. 5th edition, Pearson Publication, 2014.

**Reference Books:**

1. Roach, Peter. English Phonetics and Phonology. 4<sup>th</sup> edition, Cambridge University Press, 2009.
2. Hughes, John and Mallett, Andrew. *Successful Presentations DVD and Student's Book Pack*. Oxford University Press, 2013.
3. Hancock, Mark. *English Pronunciation in Use* (Intermediate). 2<sup>nd</sup> 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*. 11<sup>th</sup> 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](http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf)

**Course Outcomes:**

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

CO5	Speak with clarity and confidence; thereby enhance employability skills of the students.	
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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	PSO1	PSO2	PSO3
C01		1				1		1	2	2		1			
C02										1		1			
C03							1		1	2		2			
C04								1	1	2		2			
C05										2		2			

2022-23 Onwards (MR22)	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. II Semester</b>		
Code: C0202	<b>Basic Electrical And Electronics Engineering Lab (Common for all branches)</b>	<b>L</b>	<b>T</b>	<b>P</b>
Credits: 1		-	-	2

**Course Objectives:**

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

**List of Experiments:**

1. Verification of Kirchhoff's Laws.
2. Verification of Maximum Power Transfer Theorem.
3. Determination of Phase Angle for RC series circuit.
4. Brake Test on DC-Shunt Motor. Determination of Performance curves

5. Load Tests on Single Phase Transformer
6. Brake Test on Three Phase Induction Motors. Determination of Performance curves
7. V-I Characteristics of PN Junction Diode
8. V-I Characteristics of Zener Diode
9. Half Wave Rectifier and Full Wave rectifier.
10. Input and Output characteristics of BJT with CE configuration
11. Input and Output characteristics of BJT with CB configuration
12. Input and Output Characteristics of JFET.

**Course Outcomes:**

<b>CO</b>	<b>Statement</b>	<b>Blooms Taxonomy Level</b>
CO1	Experimentally verify the basic circuit theorems, KCL and KVL	
CO2	Measure power, power factor and phase angle in RC circuits experimentally	
CO3	Acquire hands on experience of conducting various tests on dc shunt motor, single phase transformers and three phase induction motors	

	and obtaining their performance indices using standard analytical as well as graphical methods	
CO4	Draw the characteristics of different semiconductor devices like PN junction Diode, Zener Diode, BJT and JFET by conducting suitable experiments	
CO5	Experimentally verify the working of half and full wave rectifier by using PN Junction diodes.	

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

<b>2022-22 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>						<b>B.Tech. II Semester</b>		
<b>Code: C1201</b>	<b>Engineering and IT Workshop</b>						<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>	Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and AIML						-	-	2

**Pre requisites:** NIL

**Course Objectives:**

- To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.



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

### **Engineering Workshop:**

#### **Problem 1: Trades for Exercises**

##### **At least two exercises from each trade**

1. House-wiring
2. Soldering

#### **Problem 2: Trades for Demonstration & Exposure**

1. Carpentry
2. Wood working lathe

### **PC Hardware:**

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

#### **Problem 3:**

Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. 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: 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:**

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

using open office tools and LaTeX

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

2022-23 Onwards (MR22)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code:C0507	Discrete Mathematics	L	T	P
Credits: 3		3	-	-

**Prerequisites: NIL**

**Course Objectives:**

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]**

**Functions**-Inverse Function, Composition of functions, recursive Functions - Lattice and its Properties.

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

**MODULE IV: Counting Techniques and Theorems [09 Periods]**

**Counting Techniques**-Basis of counting, Combinations and Permutations with repetitions, Constrained repetitions

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

**MODULE V: Generating functions and Recurrence Relation [09 Periods]**

**Generating Functions**-Generating Functions, Function of Sequences, Calculating Coefficient of generating function.

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

**Text Books:**

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/yVCWqd6u7wgye1qwH9xY7xPG734QA9tMJN2ncqS12ZbN7pUSSIWcxSgPOZJEokyWJlxQLYsrFyeITA70W9C8Pg>
4. <http://nptel.ac.in/courses/106106094/>

**Course Outcomes:**

CO	Statement	Blooms Taxonomy Level
CO1	<b>Apply</b> the concepts of connectives and normal forms in real time applications.	
CO2	<b>Summarize</b> predicate logic, relations and their operations.	
CO3	<b>Describe</b> functions, algebraic systems, groups and Boolean algebra.	
CO4	<b>Illustrate</b> practical applications of basic counting principles, permutations, combinations, and the pigeonhole methodology.	
CO5	<b>Analyze</b> 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		

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: C0509</b>	<b>Computer Organization and Architecture</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** No Prerequisites

**Objectives:**

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

**Module-I**

**[10 Periods]**

**Sequential Circuits Fundamentals:** Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

**Registers and Counters:** Shift Registers–Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

**Module-II**

**[10 Periods]**

**Digital Computers:** Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

**Register Transfer Language and Micro Operations:** Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

**Basic Computer Organization and Design:** Instruction Codes, Computer Registers Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input – Output and Interrupt.

**Module–III**

**[9 Periods]**

**Micro Programmed Control:** Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

**Central Processing Unit:** General Register Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control.

**Module–IV**

**[10 Periods]**

**Data Representation:** Data types, Complements, Fixed Point Representation, Floating Point Representation.

**Computer Arithmetic:** Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations. Decimal Arithmetic Unit, Decimal Arithmetic Operations.

**MODULE–V**

**[9 Periods]**

**Input-Output Organization:** Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access.

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associate Memory, Cache Memory.

**Textbook:**

1. Computer System Architecture, M. Moris Mano, 3rd Edition, Pearson/PHI.

**References:**

1. Computer Organization, Car Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer Organization and Architecture, William Stallings 6th Edition, Pearson/PHI.
3. Structured Computer Organization, Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

**E-Resources:**

1. <https://books.google.co.in/books?isbn=8131700704>
2. [http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgYe1qwH9xY7Eh9eBOsT1ELoYpKlg\\_xngrkluevXOJLs1TbxS8q2icgUs3hL4\\_KAi5So5FgXcVg](http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgYe1qwH9xY7Eh9eBOsT1ELoYpKlg_xngrkluevXOJLs1TbxS8q2icgUs3hL4_KAi5So5FgXcVg)
3. [http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgYe1qwH9xY7xAYUzYSIXI4zudlsolr-e7wQNrNXLxbgGFxbkoyx1iN3YbHuFrzI2jc\\_70rWMEwQ](http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgYe1qwH9xY7xAYUzYSIXI4zudlsolr-e7wQNrNXLxbgGFxbkoyx1iN3YbHuFrzI2jc_70rWMEwQ)
4. <http://nptel.ac.in/courses/106106092/>

**Course Outcomes:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the theory and architecture of central processing unit.	
CO2	Analyze some of the design issues in terms of speed, technology, cost, performance.	

CO3	Design a simple CPU with applying the theory concepts.	
CO4	Use appropriate tools to design verify and test the CPU architecture.	
CO5	Learn the concepts of parallel processing, pipelining and inter processor communication.	

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>					<b>B.Tech. III Semester</b>		
<b>Code: C0510</b>	<b>Data Structures</b>					<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>						<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** A course on “Programming for Problem Solving “

**Course Objectives:**

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

**Module-I:**

**[10 Periods]**



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

**Module-II:**

**[09 Periods]**

**Dictionaries:** linear list representation, skip list representation, operations - insertion, deletion and searching.

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

**Module-III:**

**[10 Periods]**

**Search Trees:** Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Definition and example of Red –Black, Splay Trees.

**Module-IV:**

**[10 Periods]**

**Graphs:** Graph Implementation Methods. Graph Traversal Methods.

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

**Module-V:**

**[09Periods]**

**Pattern Matching and Tries:** Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

**Text Books:**

1. Jean Paul Tremblay, Paul G Sorenson, “An Introduction to Data Structures with Applications”, Tata McGraw Hills, 2<sup>nd</sup> Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures: A Pseudo code approach with C”, Thomson (India), 2<sup>nd</sup> Edition, 2004.

**References:**

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, “Fundamentals of Data Structure in C”, University Press (India), 2<sup>nd</sup> Edition, 2008.
2. A. K. Sharma, “Data structures using C”, Pearson, 2<sup>nd</sup> Edition, June, 2013.
3. R. Thareja, “Data Structures using C”, Oxford University Press, 2<sup>nd</sup> 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/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjIExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ>
5. <http://nptel.ac.in/courses/106102064/1>

**Course Outcomes:**

CO	Statement	Blooms Taxonomy
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		Level
CO1	<b>Implement</b> the linear data structures such as linked list, stacks and queues.	
CO2	<b>Understand</b> the Dictionaries and Hash table representation.	
CO3	<b>Analyze</b> the various non linear data structures with its operations	
CO4	<b>Develop</b> the programs by using Graph Traversal and heap sort	
CO5	<b>Apply</b> data structure concepts for the implementation of pattern matching and tries.	

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

2022-23 Onwards (MR22)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: C7301	Introduction to Artificial Intelligence	L	T	P
Credits: 2		2	-	-

**Prerequisite:** Knowledge on Data Structures.

**Course Objectives:**

- To learn the distinction between optimal reasoning Vs. human like reasoning.
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.

**Module-I** **[8 Periods]**

Introduction to AI - Intelligent Agents, Problem-Solving Agents, Searching for Solutions - Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

**Module-II** **[10 Periods]**

Games - Optimal Decisions in Games, Alpha–Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, Logic-Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

**Module-III** **[10 Periods]**

First-Order Logic-Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic.  
Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution.  
Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

**Module-IV** **[9 Periods]**

Planning-Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning.

**Module-V** **[9 Periods]**

Probabilistic Reasoning: Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First- Order Probability.

**Text Book:**

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

**Reference Books:**

1. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH)

2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

**Course Outcomes:**

CO	Statement	Blooms Taxonomy Level
CO1		
CO2		
CO3		
CO4		
CO5		

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: C0511</b>	<b>Object Oriented Programming</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Computer Programming

**Course Objectives:**

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

**MODULE-I:**

**[10 Periods]**

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

**Module II:**

**[10 Periods]**

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

**MODULE III:**

**[09 Periods]**

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

**Exception handling and Multithreading--** Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String

handling, Exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

#### **MODULE IV:**

**[10 Periods**

**Event Handling:** Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices,

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

#### **MODULE V:**

**[09 Periods]**

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

#### **TEXT BOOKS:**

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

#### **REFERENCES:**

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

#### **E-RESOURCES:**

1. [http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVIXBW-RPf64\\_TFk2i4LJhgQFPQ WAEt-Zobbm3twyubjRA1YOe9WVwkN2qGcxBwdHaPdi\\_mMQ](http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVIXBW-RPf64_TFk2i4LJhgQFPQ WAEt-Zobbm3twyubjRA1YOe9WVwkN2qGcxBwdHaPdi_mMQ)

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

**Course Outcomes:**

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

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: C0512</b>	<b>Data Structures Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1.5</b>		<b>-</b>	<b>-</b>	<b>3</b>

**Prerequisites:** A Course on “Programming for problem solving”

**Objectives:**

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

**Software Requirements:** C

**List of Programs:**

- 1 Write a program that uses functions to perform the following operations on singly linked list.:  
i)Creation ii) Insertion iii) Deletion iv) Traversal
- 2 Write a program that uses functions to perform the following operations on doubly linked list.:  
i)Creation ii) Insertion iii) Deletion iv) Traversal
- 3 Write a program that uses functions to perform the following operations on circular linked list.:  
i)Creation ii) Insertion iii) Deletion iv) Traversal
- 4 Write a program that implement stack (its operations) using  
i) Arrays ii) Pointers
- 5 Write a program that implement Linear Queue (its operations) using  
i) Arrays ii) Pointers



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

### Text Books

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

### References

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

### Course Outcomes:

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

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code:C0513</b>	<b>Object Oriented Programming through Java Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1.5</b>		<b>-</b>	<b>-</b>	<b>3</b>

**Prerequisites:** NIL

**Software Requirements:** JDK

**Course Objectives:**

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

**Note:**

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of the Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

**List of Programs:**

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3. A) Develop an applet in Java that displays a simple message.  
B) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
6. Write a Java program for the following:  
Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.
7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in the selected color. Initially, there is no message shown.
8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas.  
Write a java program to display the table using Labels in Grid Layout.
10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
12. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.
13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

**Text Books:**

1. Herbert Schildt, “**Java The complete reference**”, TMH, 8<sup>th</sup> edition, 2011.



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: C0522</b>	<b>NODE JS/ REACT JS/ DJANGO</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

**Prerequisites:** Object Oriented Programming through Java, HTML Basics

**Course Objectives:**

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

**Exercises:**

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.



<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code:C00M1</b>	<b>Gender Sensitization (An Activity-based Course)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: NIL</b>		-	-	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.” “Share the 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 on Gender*” written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharupublished 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](http://blogs.visj.com/India%20real%20time/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 [http://harooreollins.co.in/BookDetailasp? FlookCndet,3732](http://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](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.nordiclbourjournal.org/emner/likestilling> (GENDER AND BIOLOGY)

**Course Outcomes:**

CO	Statement	Blooms Taxonomy Level

CO1	Students will have developed a better understanding of important issues related to gender in contemporary India	
CO2	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.	
CO3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.	

**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		

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech IV Semester</b>		
<b>Code: C0B07</b>	<b>Applied Statistics and Optimization Techniques</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Module-I: Analysis of Variance & Analysis of Co-variance**

[12 Periods]

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

**Module-II: Design of Experiments**

[12 Periods]

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: Transportation and Assignment**

[13 Periods]

**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 (max-min) method of optimal strategies, mixed strategies – Value of the game- two-person zero sum game, method of dominance, graphical method

**Module V: Queuing Theory**

[10 Periods]

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

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

**Proposed Text Books:**

1. Monte Gomery, “Applied Statistics and Probability for Engineers”, 6<sup>th</sup> Edition, Wiley Publications.
2. J K Sharma, “Operations research Theory and applications” Macmillan publishers india limited, 4<sup>th</sup> edition.
3. Paul A Maeyer Introductory Probability and Statistical Applications, John Wiley Publications.

**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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: C0515</b>	<b>Database Management Systems</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

### 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, alteration. 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 1, 6th edition, 2011.
2. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7<sup>th</sup> 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+retrieval?SGWID=0-153-12-114576-0>
5. <http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093>
6. <http://www.nptelvideos.in/2012/11/database-management-system.html>

**Course Outcomes:**

CO	Statement	Blooms Taxonomy Level
CO1	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	

CO2	Apply the method to convert the ER model to a database schema based on the conceptual relational model	
CO3	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	
CO4	Appreciate the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.	
CO5	Familiarity with database storage structures and access techniques	

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: C0516</b>	<b>Operating Systems</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** NIL

**Course Objectives:**

1. **Determine** the interfaces between OS and other components of a computer system.
2. **Illustrate** the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling. **Analyse** the main problems related to concurrency and the different synchronization mechanisms.
3. **Describe** the different approaches for deadlock detection, avoidance, recovery and dead lock handling techniques.
4. **Describe** different approaches of memory management and **Apply** different page replacement algorithms to resolve page faults.
5. **Describe** the structure and organization of file system, **analyse** the data storage in secondary storage and **understand** the protection issues in computer systems.

**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]



**Deadlocks:** System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention.

**Detection and Recovery:** Deadlock avoidance, Deadlock detection, Recovery from Deadlocks.

#### **Module-IV: Memory Management**

**[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: File Management**

**[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**” 7<sup>th</sup> Edition, John Wiley.
2. Stallings, “**Operating Systems Internal and Design Principles**”, 5th 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 conceptbased approach**”, 2<sup>nd</sup> Edition, TMH

#### **E-Resources:**

1. [https://www.tutorialspoint.com/operating\\_system/operating\\_system\\_tutorial.pdf](https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf)
2. <https://archive.org/details/2005OperatingSystemConcepts7thEditionAbrahamSilberschatz>
3. [https://ndl.iitkgp.ac.in/document/BN1jh1UjGAJr\\_Zl4CiGeVCT3CaRCi4AlvzVWgkNQLQcFt\\_lb03ZmqLHrc1tBe3aA6pjyl3jlrBqPLRxX2VQUvQ](https://ndl.iitkgp.ac.in/document/BN1jh1UjGAJr_Zl4CiGeVCT3CaRCi4AlvzVWgkNQLQcFt_lb03ZmqLHrc1tBe3aA6pjyl3jlrBqPLRxX2VQUvQ)
4. <http://nptel.ac.in/courses/106108101/>

#### **Course outcomes:**

<b>CO</b>	<b>Statement</b>	<b>Blooms Taxonomy Level</b>
CO1	<b>Distinguish</b> between the different types of operating system environments.	
CO2	<b>Apply</b> the concepts of process scheduling. <b>Develop</b> solutions to process synchronization problems.	

CO3	<b>Identify</b> Deadlocks, prevention of deadlocks, avoid deadlocks	
CO4	<b>Analyze</b> various memory management techniques	
CO5	<b>Identify</b> various issues of Operating Systems file systems	

<b>CO- PO, PSO Mapping</b> (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		

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: C0517</b>	<b>Design and Analysis of Algorithms</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Data Structures

**Course Objectives:**

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

5. To Learn and understanding of NP Hard and NP complete problems

**Module-I: Basics of Algorithm Design**

**[09 Periods]**

**Introduction:** Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations, Amortized analysis.

**Disjoint Sets:** Disjoint set operations, union and find algorithms, spanning trees, connected components and bi connected components.

**Module-II: Algorithm Methods**

**[10 Periods]**

**Divide and Conquer** - General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication

**Greedy method** General method, applications-Job sequencing with deadlines, general knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

**Module-III: Dynamic Programming and Optimization Techniques**

**[10 Periods]**

**Dynamic Programming** - General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem

**Optimization Techniques** - All pairs shortest path problem, travelling sales person problem, Reliability design.

**Module-IV: Backtracking and Branch and Bound**

**[10 Periods]**

**Backtracking**-General method, n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles

**Branch and Bound** - General method, applications: Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

**Module-V: NP-Hard and NP-Complete problems**

**[09 Periods]**

**NP-Hard and NP-Completeness:** Basic concepts, NP - Hard and NP Complete classes, Cook's theorem, Deterministic and Non-Deterministic algorithms, NP-hard graph problems and scheduling problem

**Text Books:**

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

**References:**

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

**E-Resources:**

1. <https://comsciars.files.wordpress.com/2015/12/horowitz-and-sahani-fundamentals-of-computer-algorithms-2nd-edition.pdf>
2. [http://en.cnki.com.cn/Article\\_en/CJFDTOTAL-JFYZ200208019.htm](http://en.cnki.com.cn/Article_en/CJFDTOTAL-JFYZ200208019.htm)
3. <http://nptel.ac.in/courses/106101060/>

**Course Outcomes:**

CO	Statement	Blooms Taxonomy
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		Level
CO1	<b>Analyze</b> performance of algorithms using asymptotic notations, performance analysis, disjoint sets, spanning trees and connected components	
CO2	<b>Describe and analyze</b> 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	
CO3	<b>Synthesize</b> 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	
CO4	<b>Apply</b> 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	
CO5	<b>Apply</b> algorithm design techniques to solve certain NP-complete problems.	

<b>CO- PO, PSO Mapping</b> (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	

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: C7304</b>	<b>Introduction to Machine Learning B.Tech-AIML</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>2</b>	<b>-</b>	<b>-</b>

**Course Objectives:**

The students will try to learn:

- The underlying mathematical principles from probability, linear algebra and optimization.

- The knowledge of using machine learning to make predictions in a scientific computing environment.
- The underlying mathematical relationships within and across machine learning algorithms and the paradigms of supervised and un-supervised learning.
- The advanced topics such as robotics, machine learning, deep learning, pattern recognition, computer vision, cognitive computing, human-computer interaction etc.

**Module–I: Introduction**

**[09 Periods]**

Machine Learning Foundations: Introduction to machine learning, learning problems and scenarios, need for machine learning, types of learning, standard learning tasks, the Statistical Learning Framework, Probably Approximately Correct (PAC) learning, Evaluation Metrics.

**Module–II: Supervised Learning Algorithms**

**[09 Periods]**

Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification, Decision Trees: ID3, Classification and Regression Trees (CART), Regression: Linear Regression, Multiple Linear Regression, Logistic Regression.

**Module–III: Ensemble and Probabilistic Learning**

**[10 Periods]**

Ensemble Learning Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: Random Forest Trees, Boosting: Adaboost, Stacking Bayesian Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks, Mining Frequent Patterns

**Module–IV: Unsupervised Learning**

**[09 Periods]**

Introduction to clustering, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, K-Mode Clustering, Self-Organizing Map, Expectation Maximization, Gaussian Mixture Models, Principal Component Analysis (PCA), Locally Linear Embedding (LLE), Factor Analysis

**Module–V: Advanced Supervised Learning**

**[09 Periods]**

**Support Vector Machines:** Linear and Non Linear, Kernel Functions, K-Nearest Neighbors.

**Neural Networks:** Introduction, Perceptron, Multilayer Perceptron,

**Text Books:**

1. Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, PHI, 3rd Edition, 2014.
2. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, “Foundations of Machine Learning”, MIT Press, 2 nd Edition, 2018.

**Reference Books:**

1. Tom M. Mitchell, “Machine Learning”, McGraw Hill, Indian Edition, 2017.
2. Sahi Shalev-Shwartz, Shai Ben-David, “Understanding Machine Learning: From Theory to Algorithms”, Cambridge University Press, 2014.

2. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2010.
3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, 2nd Edition, 2009.
4. Avrim Blum, John Hopcroft, Ravindran Kannan, "Foundations of Data Science", Cambridge University Press, 2020.
5. Gareth James, Daniela Witten, Trevor Hastie and Rob Tibshirani, "An Introduction to Statistical Learning: with applications in R", Springer Texts in Statistics, 2017.

**E-Resources:**

1. <http://www.zuj.edu.jo/download/machine-learning-tom-mitchell-pdf/>
2. <http://index-of.es/Python/Core.Python.Programming.2nd.Edition.Wesley.Chun.2006.pdf>
3. <http://index-of.es/Python/Core.Python.Applications.Programming.3rd.Edition.pdf>
4. [https://www.davekuhlman.org/python\\_book\\_01.pdf](https://www.davekuhlman.org/python_book_01.pdf)
5. <http://nptel.ac.in/courses/106106139/>
6. <http://nptel.ac.in/courses/106105152/>

**Course Outcomes:**

CO	Statement	Blooms Taxonomy Level
CO1	Design a learning system and know about the learning tasks.	
CO2	Apply decision tree learning in classification tasks.	
CO3	Develop neural networks algorithms in machine learning.	
CO4	Illustrate Bayesian learning and instance-based learning.	
CO5	Examine the concepts of reinforcement learning and deep learning concepts	

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

2022-23 Onwards (MR22)	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>
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<b>Code: C0519</b>	<b>Database Management Systems Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		-	-	<b>2</b>

**Co-requisites:** “Database Management Systems”

**Course Objectives:**

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

**Course Outcomes:**

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

**List of Experiments:**

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

**Text Books:**

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

**Reference Books:**

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





<b>2022-22 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: C0523</b>	<b>Design And Analysis of Algorithms Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

### 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 .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 Problem using Backtracking.
12. Implement sum of subsets problem.

#### Text Books:

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

#### References:

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

**Analysis of Algorithms A strategic approach", Mc GrawHill.**

**Course Outcomes:**

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

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

<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:C7305</b>	<b>Real Time Research Project / Field Based Research Project</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

2022-23 Onwards (MR22)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: C7306	PROLOG/LISP/PYSWIP	L	T	P
Credits: 1		-	-	2

### List of Programs:

1. Write simple fact for following:

- A. Ram likes mango.
- B. Seema is a girl.
- C. Bill likes Cindy.
- D. Rose is red.
- E. John owns gold

2. Write predicates one converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.

3. Write a program to solve the Monkey Banana problem

4. WAP in turbo prolog for medical diagnosis and show the advantages and disadvantages of green and red cuts.

5. Write a program to solve the 4-Queen problem.

6. Write a program to solve traveling salesman problems.

7. Write a program to solve water jug problems using Prolog.

8. Write simple Prolog functions such as the following. Take into account lists which are too short.

-- remove the N<sup>th</sup> item from the list. -- insert as the Nth item.

9. Assume the prolog predicate `gt(A, B)` is true when A is greater than B. Use this predicate to define the predicate `addLeaf(Tree, X, NewTree)` which is true if `NewTree` is the Tree produced by adding the item X in a leaf node. Tree and `NewTree` are binary search trees. The empty tree is represented by the atom `nil`.

10. Write a Prolog predicate, `countLists(Alist, Ne, NI)`, using accumulators, that is true when NI is the number of items that are listed at the top level of Alist and Ne is the number of empty lists. Suggestion: First try to count the lists, or empty lists, then modify by adding the other counter.

11. Define a predicate `memCount(AList,Blist,Count)` that is true if Alist occurs Count times within

Blist. Define without using an accumulator. Use "not" as defined in `utilities.pro`, to make similar cases are unique, or else you may get more than one count as an answer.

Examples:

`memCount(a,[b,a],N).`



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: C00M2</b>	<b>Environmental Science</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: NIL</b>		<b>2</b>	<b>-</b>	<b>-</b>

**Pre-Requisites:** NIL

**Objectives**

1. Creating the awareness about environmental problems among students.
2. Imparting basic knowledge about the environment and its allied problems.
3. Developing an attitude of concern for the environment.
4. Motivating students to participate in environment protection and environment improvement.

**Outcomes**

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

1. Identify and analyze environmental problems as well as the risks associated with these problems
2. Understand what it is to be a steward in the environment
3. Studying how to live their lives in a more sustainable manner

**Module–I: Multidisciplinary Nature of Environmental Studies:**

Definition, Scope and Importance, Need for Public Awareness.

**Natural Resources:** Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams– benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

**Module–II: Ecosystems**

**Concept of an Ecosystem:** Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. – Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

### **Module–III: Biodiversity and its Conservation**

**Introduction - Definition:** genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-spots of biodiversity -Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### **Module–IV: Environmental Pollution and Control**

**Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.

**Water pollution:** Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil.

**Noise Pollution:** Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

### **Module–V: Social Issues and the Environment**

**From Unsustainable to Sustainable Development-** Urban problems related to energy -Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its problems and concerns. Case Studies -

#### **Environmental Ethics:**

**Issues and Possible Solutions:** Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies-Wasteland reclamation.–Consumerism and waste products. - Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water(Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

**Human Population and the Environment:** Population growth, variation among nations. Population explosion-Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies.

#### **Text Books:**

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

#### **References:**

1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

#### **Course Outcomes:**

<b>CO</b>	<b>Statement</b>	<b>Blooms Taxonomy Level</b>
CO1		

CO2		
CO3		
CO4		
CO5		

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

2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)			B.Tech. V Semester		
Code: C0H08	Business Economics & Financial Analysis			L	T	P
Credits: 3				3	-	-

**Prerequisites:** None

**Course Objective:**

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

**Module-I: Introduction to Business and Economics:**

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

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

**Module-II: Demand and Supply Analysis:**

**Elasticity of Demand:** Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of



Demand in decision making,

**Demand Forecasting:** Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

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

**Module–III: Production, Cost, Market Structures & Pricing:**

**Production Analysis:** Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

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

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

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

**Module–IV: Financial Accounting:**

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

**Module–V: Financial Analysis through Ratios:**

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

**Text Books:**

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

**Reference Books:**

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	The students will understand the various Forms of Business and the impact of economic variables on the Business.	Understand

CO2	The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.	
CO3	The Students can study the firm's financial position by analysing the Financial Statements of a Company.	
CO4		
CO5		

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C6201</b>	<b>Computer Networks</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

#### Prerequisites

1. A course on "Programming for problem solving"
2. A course on "Data Structures"

#### Course Objectives

- The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

#### Module-I:

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable,

fiber optics, Wireless Transmission. Data link layer: Design issues, framing, Error detection and correction.

**Module–II: Elementary data link protocols:**

Simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols. Medium Access sublayer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

**Module–III: Network Layer:**

Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

**Module–IV:Transport Layer:**

Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

**Module–V:**

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

**Text Book:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Gain the knowledge of the basic computer network technology	
CO2	Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model	
CO3	Obtain the skills of subnetting and routing mechanisms	

CO4	Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.	
CO5		

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C1207</b>	<b>Software Engineering</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** None

**Course Objectives**

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

### **Module–I: Introduction to Software Engineering:**

The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). Process models: The waterfall model, Spiral model and Agile methodology

### **Module–II: Software Requirements:**

Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

### **Module–III: 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: Testing Strategies:**

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

### **Module–V: Risk management:**

Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

### **Text Books:**

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

### **Reference Books:**

1. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.

3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

**COURSE OUTCOMES:**

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

CO-PO,PSOMapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak															
CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	2	1	-	-	-	-	-	-	-	1		1	-
CO 2	3	3	2	1	-	-	-	-	-	-	-	1		1	-
CO 3	3	2	2	1	-	-	-	-	-	-	-	1		2	-
CO 4	2	2	2	1	-	-	-	-	-	-	-	1		1	1
CO 5	2	1	1	-	-	-	-	-	-	-	-	1		1	1

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C7305</b>	<b>Machine Learning-II</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Pre-requisites:** Linear Algebra and Probability Theory

**COURSE OBJECTIVES:**

The objectives of this course are:

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

**MODULE I:**

**Introduction:** Introduction, Classic and Adaptive machines, learning types, deep learning, bio-inspired adaptive systems, Machine Learning and big data

**Elements of Machine Learning:** Data formats, Learnability, Statistical learning concepts, Class balancing, Elements of Information theory.

**MODULE II:**

**Feature Selection and Feature Engineering:** Data sets, creating training and test sets, managing categorical data, missing features, data scaling and normalization, Withering, Feature selection and filtering, PCA, Visualization of high-dimensional datasets;

**MODULE III:**

**Regression Algorithms:** Linear models for regression, Regression types; Linear Classification Algorithms: Linear classification, logistic regression, grid search, classification metrics, ROC curve.

**Naïve Bayes and Discriminant Analysis:** Bayes theorem, Naïve Bayes classifiers, Discriminant analysis; Support Vector Machines: Linear SVM, Kernel-based classification

**MODULE IV:**

**Decision Trees and Ensemble Learning:** Binary Decision trees, Introduction to Ensemble Learning- Random Forests, AdaBoost, Gradient Tree Boosting, Voting classifier

**MODULE V:**

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

**Introduction to Neural Networks:** Introduction to deep learning, MLPs with Keras, deep learning model layers, introduction to Tensorflow

**TEXT BOOKS:**

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

**REFERENCES**

1. Abhishek Vijavargia “Machine Learning using Python”, BPB Publications, 1st Edition, 2018
2. Reema Thareja “Python Programming”, Oxford Press, 2017
3. Yuxi Liu, “Python Machine Learning by Example”, 2nd Edition, PACT, 2017

**E-RESOURCES**

1. <https://www.guru99.com/machine-learning-tutorial.htm>
2. [https://www.tutorialspoint.com/machine\\_learning\\_with\\_python/index.htm](https://www.tutorialspoint.com/machine_learning_with_python/index.htm)
3. <https://www.geeksforgeeks.org/machine-learning/>
4. <http://nptel.ac.in/courses/106106139/>
5. <http://nptel.ac.in/courses/106105152/>

**COURSE OUTCOMES:**

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

CO-PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
CO	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	2	2	1	-	-	-	-	-	-	1	1	2	-
CO 2	3	3	2	2	2	-	-	-	-	-	-	-	1	2	1
CO 3	3	3	2	1	1	-	-	-	-	-	-	-	1	1	-
CO 4	3	3	2	2	1	-	-	-	-	-	-	-	2	1	1



CO 5	2	2	1	1	-	-	-	-	-	-	-	-	-	2	1
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<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C7306</b>	<b>Graph Theory [Professional Elective -I]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** None

**Course Objectives:**

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

**Module-I:**

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

**Module-II:**

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

**Module-III:**

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

**Module-IV:**

**Independent sets coverings and matchings-** Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall's Theorem, Konig's Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

**Module-V:**

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

**Text Books:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO <sub>1</sub>	Understand some important classes of graph theoretic problems	Understand
CO <sub>2</sub>	Prove central theorems about trees, matching, connectivity, coloring and planar graphs	Apply
CO <sub>3</sub>	Describe and apply some basic algorithms for graphs;	Understand
CO <sub>4</sub>	Use graph theory as a modeling tool.	Apply
CO <sub>5</sub>	Compare various algorithms	Analyze

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C1208</b>	<b>Information Retrieval [Professional Elective -I]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** 1. Data Structures

**Course Objectives:**

- To learn the concepts and algorithms in Information Retrieval Systems
- To understand the data/file structures those are necessary to design, and implement information retrieval (IR) systems.

**Module–I: Introduction to Information Retrieval Systems:**

Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

**Module–II: Cataloging and Indexing:**

History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

**Module–III: Automatic Indexing:**



<b>CO4</b>			2				2						2		1
<b>CO5</b>				2					2						

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C7307</b>	<b>Web Programming [Professional Elective -I]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** None

**Course Objectives:**

- Understand the technologies used in Web Programming.
- Know the importance of object-oriented aspects of Scripting.
- Understand creating database connectivity using JDBC.
- Learn the concepts of web-based application using sockets.

**Module–I: Client side Programming**

**HTML-** Basic Tags- List, Tables, Images, Forms, Frames, CSS

**JAVA Script –**

Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java ScriptObject, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built-in functions- Browser object model - Verifying forms.-HTML5- CSS3- HTML 5 canvas - Web site creation using tools.

**Module–II: JAVA**

Introduction to object-oriented programming-Features of Java – Data types, variables and arrays – Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/Output – Files – Utility Classes – String Handling.

**Module–III:JDBC**

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets – UDP sockets, Java Beans –RMI.

**Module–IV:APPLETS**

Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

**Module–V: XML AND WEB SERVICES**

Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services-UDDI- WSDL-Java web services – Web resources.

**Text Books:**

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

**Reference Books:**

1. John Pollock, Javascript - A Beginners Guide, 3rd Edition – Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Design web pages.	Create
CO2	Use technologies of Web Programming.	Apply
CO3	Apply object-oriented aspects to Scripting.	Apply
CO4	Create databases with connectivity using JDBC.	Create
CO5	Build web-based application using sockets.	Create

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C0527</b>	<b>Image Processing</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites**

1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of digital signal processing is desirable.

2. A course on “Computational Mathematics”

3. A course on “Computer Oriented Statistical Methods”

**Course Objectives**

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

**Module–I: 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:**

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

**Module–III:**

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

**Module–IV:**

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

**Module–V:**

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

**Text Book:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy
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		<b>Level</b>
CO1	Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.	Understand
CO2	Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.	Understand
CO3	Demonstrate the knowledge of filtering techniques.	Understand
CO4	Demonstrate the knowledge of 2D transformation techniques.	Understand
CO5	Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.	Understand

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>
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<b>Code: C0525</b>	<b>Computer Graphics</b> <b>[Professional Elective -I]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:**

1. Programming for problem solving and Data Structures

**Course Objectives:**

- Provide the basics of graphics systems including Points and lines, line drawing algorithms, 2D, 3D objective transformations

**Module-I:**

**Introduction:** Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random-scan systems, graphics monitors and work stations and input devices

**Output primitives:** Points and lines, line drawing algorithms (DDA and Bresenham's Algorithm) circlegenerating algorithms and ellipse - generating algorithms Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

**Module-II:**

**2-D geometric transformations:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems

**2-D viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, clipping operations, point clipping, Line clipping-Cohen Sutherland algorithms, Polygon clipping-Sutherland Hodgeman polygon clipping algorithm.

**Module-III:**

**3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces, Polygon rendering methods, color models and color applications.

**Module-IV:**

**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations.

**3-D viewing:** Viewing pipeline, viewing coordinates, projections, view volume and general projection transforms and clipping.

**Module-V:**

**Computer animation:** Design of animation sequence, general computer animation functions, raster animations, computer animation languages, key frame systems, motion specifications.

**Visible surface detection methods:** Classification, back-face detection, depth-buffer method, BSPtree method, area sub-division method and octree method.

**Text Books:**

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education

**Reference Books:**

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
4. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
5. Computer Graphics, Steven Harrington, TMH.



<b>2022-23 Onwards (MR22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C7308</b>	<b>Machine Learning-II Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

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

### List of Experiments

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

**TEXT BOOK:** 1. Machine Learning – Tom M. Mitchell, - MGH.

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

<b>CO</b>	<b>Statement</b>	<b>Blooms Taxonomy Level</b>
CO1	Understand modern notions in predictive data analysis	Understand
CO2	Select data, model selection, model complexity and identify the trends	Understand
CO3	Understand a range of machine learning algorithms along with their strengths and weaknesses	Understand

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C1210</b>	<b>Software Engineering &amp; Computer Networks Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>1</b>	<b>2</b>

### Course Objectives:

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

### SOFTWARE ENGINEERING:

#### LIST OF EXPERIMENTS:

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

- Development of problem statements.
- Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
- Preparation of Software Configuration Management and Risk Management related documents.
- Study and usage of any Design phase CASE tool
- Performing the Design by using any Design phase CASE tools.
- Develop test cases for unit testing and integration testing
- Develop test cases for various white box and black box testing techniques.
- Sample Projects:
  - Passport automation System
  - Book Bank
  - Online Exam Registration

### COMPUTER NETWORKS

#### LIST OF EXPERIMENTS:

- Implement the data link layer framing methods such as character, character-stuffing



<b>2022-23 Onwards (MR-22)</b>	<b>MALLA REDDY ENGINEERING COLLEGE</b> (Autonomous)	<b>B. Tech. VI Semester</b>		
<b>Code:C0H03</b>	<b>ADVANCED ENGLISH COMMUNICATION SKILLS LAB</b> (Common for All branches)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:1</b>		-	-	2

### 1. Introduction

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

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

1. Gathering ideas and information to organise ideas relevantly and coherently.
2. Making oral presentations.
3. Writing formal letters.
4. Transferring information from non-verbal to verbal texts and vice-versa.
5. Writing project/research reports/technical reports.
6. Participating in group discussions.
7. Engaging in debates.
8. Facing interviews.
9. Taking part in social and professional communication.

### 2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, with a focus on vocabulary
- To enable them to listen to English spoken at normal conversational speed by educated English speakers
- To respond appropriately in different socio-cultural and professional contexts
- To communicate their ideas relevantly and coherently in writing
- To prepare the students for placements.

### 3. SYLLABUS:

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

1. **Activities on Listening and Reading Comprehension:** Active Listening – Development of Listening Skills Through Audio clips - Benefits of Reading – Methods and Techniques of Reading  
– Basic Steps to Effective Reading – Common Obstacles – Discourse Markers or Linkers  
- Sub- skills of reading - Reading for facts, negative facts and Specific Details- Guessing Meanings from Context, Inferring Meaning - Critical Reading — Reading Comprehension – Exercises for Practice.
2. **Activities on Writing Skills:** Vocabulary for Competitive Examinations - Planning for Writing – Improving Writing Skills - Structure and presentation of different types of writing – Free Writing and Structured Writing - Letter Writing –Writing a Letter of

Application –Resume vs. Curriculum Vitae

– Writing a Résumé – Styles of Résumé - e-Correspondence – Emails – Blog Writing - (N)etiquette

– Report Writing – Importance of Reports – Types and Formats of Reports– Technical Report Writing– Exercises for Practice.

3. **Activities on Presentation Skills** - Starting a conversation – responding appropriately and relevantly – using the right language and body language – Role Play in different situations including Seeking Clarification, Making a Request, Asking for and Refusing Permission, Participating in a Small Talk – Oral presentations (individual and group) through JAM sessions- PPTs – Importance of Presentation Skills – Planning, Preparing, Rehearsing and Making a Presentation – Dealing with Glossophobia or Stage Fear – Understanding Nuances of Delivery - Presentations through Posters/Projects/Reports – Checklist for Making a Presentation and Rubrics of Evaluation

4. **Activities on Group Discussion (GD):** Types of GD and GD as a part of a Selection Procedure - Dynamics of Group Discussion- Myths of GD - Intervention, Summarizing - Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas – Do’s and Don’ts - GD Strategies  
– Exercises for Practice.

5. **Interview Skills:** Concept and Process - Interview Preparation Techniques - Types of Interview Questions – Pre-interview Planning, Opening Strategies, Answering Strategies - Interview Through Tele-conference & Video-conference - Mock Interviews.

4. **MINIMUM REQUIREMENT:**

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- One PC with latest configuration for the teacher
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. **Suggested Software:** The software consisting of the prescribed topics elaborated above should be procured and used.

- **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **Oxford Advanced Learner’s Dictionary**, 10<sup>th</sup> Edition
- CAMBRIDGE ADVANCED LEARNER’S DICTIONARY
- **DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech

6. **BOOKS RECOMMENDED:**

1. Rizvi, M. Ashraf (2018). *Effective Technical Communication*. (2<sup>nd</sup> ed.). McGraw Hill





<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C0550</b>	<b>UI Design-Flutter</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		-	-	2

**Prerequisites:** None

**Course Objectives:**

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

**List of Experiments:** Students need to implement the following experiments

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

**Text Book:**

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

**COURSE OUTCOMES:**

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

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C00M3</b>	<b>Intellectual Property Rights</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: -</b>		<b>2</b>	<b>-</b>	<b>-</b>

**Prerequisites:** None

**Course Objectives:**

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

**Module–I: Introduction to Intellectual property:**

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

**Module–II: Trade Marks:**

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

**Module–III: Law of copyrights:**

Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

**Module–IV: Trade Secrets:**

Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. Unfair competition: Misappropriation right of publicity, false advertising.

**Module–V: New development of intellectual property:**

new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

**Text Book:**

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

**Reference Book:**

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

**COURSE OUTCOMES:**

CO	Statement	Blooms
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<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: C00M4</b>	<b>Quantitative Aptitude &amp; Verbal Reasoning-I</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: -</b>		<b>2</b>	<b>-</b>	<b>-</b>

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C1214</b>	<b>Automata Theory and Compiler Design</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisite: Nil**

**Course Objectives:**

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

**Module–I: Introduction to Finite Automata:**

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

**Module–II: Regular Expressions:**

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

**Module–III: Push Down Automata:**

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

**Module–IV: Introduction:**

The structure of a compiler, Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, Syntax Analysis:



**Module–V: Syntax-Directed Translation:**

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

**Text Books:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

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

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

<b>CO3</b>		2	2	2	2							2	2	2	
<b>CO4</b>		2	2	2	2							2	2	2	
<b>CO5</b>		2	2	2	2							2	2	2	

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C6711</b>	<b>Data Analytics</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

### Prerequisites

1. A course on “Database Management Systems”.
2. Knowledge of probability and statistics.

### Course Objectives:

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

### Module–I: Data Management:

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

### Module–II: Data Analytics:

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

### Module–III:

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

### Module–IV: Object Segmentation:



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C1220</b>	<b>Augmented Reality &amp; Virtual Reality [Professional Elective – II]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisite: Nil**

**Course Objectives:**

- Provide a foundation to the fast growing field of AR and make the students aware of the various AR concepts.
- To give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

**Module–I: Introduction to Augmented Reality:**

Augmented Reality - Defining augmented reality, history of augmented reality, Examples, Related fields Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial Display Model, Visual Displays Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors

**Module–II: Computer Vision for Augmented Reality:**

Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Outdoor Tracking. Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on Real Surfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction

Software Architectures: AR Application Requirements, Software Engineering Requirements, Distributed Object Systems, Dataflow, Scene Graphs

**Module–III: Introduction to Virtual Reality:**

Defining Virtual Reality, History of VR, Human Physiology and Perception The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, The Human Eye, Cameras, Displays

**Module–IV: The Physiology of Human Vision:**

From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color Visual Rendering: Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

**Module–V: Motion in Real and Virtual Worlds:**

Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Interaction: Motor Programs and Remapping, Locomotion, Social Interaction R22 B.Tech. IT Syllabus JNTU Hyderabad Page 148 of 154 Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering

**Text Books:**

1. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India;First edition (12 October 2016),ISBN-10: 9332578494
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

**Reference Books:**

1. Allan Fowler-AR Game Developmentl, 1st Edition, A press Publications, 2018, ISBN 978-1484236178
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381
5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0 6. Gerard Jounghyun Kim, “Designing Virtual Systems: The Structured Approach”, 2005.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy
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		Level
CO1	Describe how AR systems work and list the applications of AR.	Understand
CO2	Understand the software architectures of AR.	Understand
CO3	Understand the Visual perception and rendering in VR	Understand
CO4	Understand the interaction, auditory perception and rendering in VR	Understand
CO5	Construct the acquire knowledge in VR and AR technologies in terms of used devices	Create

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

2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: C1208	Pattern Recognition [Professional Elective – II]	L	T	P
Credits: 3		3	-	-

**Prerequisites:**

- Programming for problem solving
- Computer Oriented Statistical Methods

**Course Objectives:**

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

**Module–I: Introduction:**

Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

**Module–II: Nearest Neighbor Based Classifier:**

Nearest Neighbor Algorithm, Variants of the NN Algorithm, use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

**Module–III: Hidden Markov Models:**

Markov Models for Classification, Hidden Markov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

**Module–IV: Support Vector Machines:**

Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

**Module–V: Clustering:**

Importance of clustering, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

**Text Book:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
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CO1	Understand the importance of pattern recognition and its representation	Understand
CO2	Analyze the variants of NN algorithm	Analyze
CO3	Understand the necessity of Hidden markov models, decision tree and SVM for classification	Understand
CO4	Understand different types of clustering algorithms	Understand
CO5	Application and classification of algorithms	Apply

<b>CO- PO Mapping</b> (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	
CO2		2	2			3					2				
CO3	2						1					1	1	1	
CO4		2	2								3			2	2
CO5			1										1		1

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C7309</b>	<b>Computer Vision and Robotics [Professional Elective – II]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>



**Pre-Requisites:**

Linear Algebra and Probability.

**Course Objectives:**

- To understand the Fundamental Concepts Related To sources, shadows and shading
- To understand the The Geometry of Multiple Views

**Module–I: CAMERAS:**

Pinhole Cameras Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

**Module–II: Linear Filters:**

Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates Edge Detection: Noise, Estimating Derivatives, Detecting Edges Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

**Module–III: The Geometry of Multiple Views: Two Views Stereopsis:**

Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras Segmentation by Clustering: Segmentation, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

**Module–IV: Segmentation by Fitting a Model:**

The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization

**Module–V: Introduction to Robotics:**

Social Implications of Robotics, Brief history of Robotics, Attributes of hierarchical paradigm, Closed world assumption and frame problem, Representative Architectures, Attributes of Reactive Paradigm, Subsumption Architecture, Potential fields and Perception R22 B.Tech. AI & ML Syllabus JNTU Hyderabad Page 95 of 147 Common sensing techniques for Reactive Robots: Logical sensors, Behavioural Sensor Fusion, Proprioceptive sensors, Proximity Sensors, Topological Planning and Metric Path Planning

**Text Books:**

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

2. Robin Murphy, Introduction to AI Robotics, MIT Press

**Reference Books:**

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.
2. The Robotics premier, Maja J Matari, MIT Press
3. Richard Szeliski “Computer Vision: Algorithms and Applications” Springer-Verlag London Limited 2011.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Implement fundamental image processing techniques required for computer vision	Apply
CO2	Implement boundary tracking techniques	Apply
CO3	Apply chain codes and other region descriptors, Hough Transform for line, circle, and ellipse detections.	Apply
CO4	Apply 3D vision techniques and Implement motion related techniques.	Apply
CO5	Develop applications using computer vision techniques.	Create

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C7310</b>	<b>Data Warehousing and Business Intelligence [Professional Elective – II]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisite: Nil**

**Course Objectives:**

- This course is concerned with extracting data from the information systems that deal with the day-to-day operations and transforming it into data that can be used by businesses to drive high-level decision making
- Students will learn how to design and create a data warehouse, and how to utilize the process of extracting, transforming, and loading (ETL) data into data warehouses.

**Module–I:**

Data Warehouse, Data Warehouse Modelling, OLAP operations, Data Cube Computation methods

**Module–II:** Business Intelligence Introduction – Definition, Leveraging Data and Knowledge for BI, BI Components, BI Dimensions, Information Hierarchy, Business Intelligence and Business Analytics. BI Life Cycle. Data for BI - Data Issues and Data Quality for BI.

**Module–III:**

BI Implementation - Key Drivers, Key Performance Indicators and Performance Metrics, BI Architecture/Framework, Best Practices, Business Decision Making, Styles of BI-vent-Driven alerts-A cyclic process of Intelligence Creation. The value of Business Intelligence-Value driven and Information use.

**Module–IV:**

Advanced BI – Big Data and BI, Social Networks, Mobile BI, emerging trends, Description of different BI-Tools (Pentaho, KNIME)

**Module–V:**

Business Intelligence and integration implementation-connecting in BI systems- Issues of legality Privacy and ethics- Social networking and BI.

**Text Books:**

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER, Elsevier, 4th Edition.
2. Rajiv Sabherwal “Business Intelligence” Wiley Publications, 2012.



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C7311</b>	<b>Robotic Process Automation [Professional Elective – II]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisite: Nil**

**Course Objectives:**

- Introduce robotic process automation, techniques of automation using UiPath RPA tool.

Course Outcomes:

- Understand the concepts of Robotic Process Automation.
- Apply the flow chart mechanism in various calculations.
- Applying UiPath tool for debugging process
- Design system managing techniques.
- Create application for process automation using UiPath tool.

**Module–I: Robotic Process Automation:**

Introduction, Scope and techniques of automation, Robotic process automation, Components of RPA, RPA platforms, About UiPath UiPath Stack Uipath Studio, Uipath Robot, Types of Robots, UiPath Orchestrator UiPath Studio Projects, User interface The User Interface: Task recorder, Advanced UI interactions: Input methods, Output methods

**Module–II:Sequence, Flowchart, and Control Flow:**

Sequencing the workflow, Activities, Control Flow, various types of loops and decision making  
Data Manipulation: Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, File operation with step-by-step example, CSV/Excel to data table and vice versa

**Module–III:Taking Control of the Controls:**

Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Handling events, revisit recorder, When to use OCR,

Types of OCR available, How to use OCR Plugins and Extensions: Terminal Plugin, SAP Automation, Citrix automation and Credential management

**Module–IV:Handling User Events and Assistant Bots:**

Assistant bots, Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Error reporting

**Module–V:Managing and Maintaining the Code:**

Project organization, nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files Deploying and Maintaining the Bot: Publishing using publish utility, using Orchestration Server to control bots, deploy bots, License Management, Publishing and Managing updates

**Text Book:**

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition

**Reference Book:**

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the concepts of Robotic Process Automation	Understand
CO2	Apply the flow chart mechanism in various calculations.	Apply
CO3	Applying UIPath tool for debugging process	Apply
CO4	Design system managing techniques	Create
CO5	Create application for process automation using UIPath tool.	Create

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C0532</b>	<b>Full Stack Development [Professional Elective – III]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Pre-Requisites:**

1. Object Oriented Programming
2. Web Technologies

**Course Objectives:**

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

**Module–I: Introduction to Full Stack Development:**

Understanding the Basic Web Development Framework- User, Browser, Webserver, Backend Services, Full Stack Components - Node.js, MongoDB, Express, React, Angular. Java Script Fundamentals, NodeJS- Understanding Node.js, Installing Node.js, Working with Node Packages, creating a Node.js Application, Understanding the Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks

**Module–II: Node.js:**

Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Accessing the File System from Node.js- Opening, Closing, Writing, Reading Files and other File System Tasks. Implementing HTTP Services in Node.js- Processing URLs,

Processing Query Strings and Form Parameters, Understanding Request, Response, and Server Objects, Implementing HTTP Clients and Servers in Node.js, Implementing HTTPS Servers and Clients. Using Additional Node.js Modules-Using the os Module, Using the util Module, Using the dns Module, Using the crypto Module.

**Module–III: MongoDB:**

Need of NoSQL, Understanding MongoDB, MongoDB Data Types, Planning Your Data Model, Building the MongoDB Environment, Administering User Accounts, Configuring Access Control, Administering Databases, Managing Collections, Adding the MongoDB Driver to Node.js, Connecting to MongoDB from Node.js, Understanding the Objects Used in the MongoDB Node.js Driver, Accessing and Manipulating Databases, Accessing and Manipulating Collections

**Module–IV: Express and Angular:**

Getting Started with Express, Configuring Routes, Using Requests Objects, Using Response Objects. Angular: importance of Angular, Understanding Angular, creating a Basic Angular Application, Angular Components, Expressions, Data Binding, Built-in Directives, Custom Directives, Implementing Angular Services in Web Applications. R22 B.Tech. IT Syllabus JNTU Hyderabad Page 96 of 154

**Module–V: React:**

Need of React, Simple React Structure, The Virtual DOM, React Components, Introducing React Components, Creating Components in React, Data and Data Flow in React, Rendering and Life Cycle Methods in React, Working with forms in React, integrating third party libraries, Routing in React.

**Text Books:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand Full stack components for developing web application.	Understand



CO2	Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.	Apply
CO3	Use MongoDB data base for storing and processing huge data and connects with NodeJS application.	Apply
CO4	Design faster and effective single page applications using Express and Angular.	Create
CO5	Create interactive user interfaces with react components.	Create

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C1215</b>	<b>Data Mining [Professional Elective – III]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Pre-Requisites:**

1. Database Management System
2. Probability and Statistics

**Course Objectives:**

- Students will become acquainted with both the strengths and limitations of various data mining techniques like Association, Classification, Cluster and Outlier analysis.

**Module–I: Introduction to Data Mining:**

What Data mining? Kinds of Data, Knowledge Discovery process, Data Mining Functionalities, Kinds of Patterns, Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity, Data Pre-processing: Major Tasks in Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

**Module–II: Association Analysis:**

Basic Concepts, Market Basket Analysis, Apriori Algorithm, FP-growth, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel Associations and Multidimensional Associations.

**Module–III: Classification:**

Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Metrics for Evaluating Classifier Performance, Ensemble Methods, Multilayer FeedForward Neural Network, Support Vector Machines, k-Nearest-Neighbor Classifiers.

**Module–IV: Cluster Analysis:**

Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, DensityBased Method-DBSCAN, Outlier Analysis: Types of Outliers, Challenges of Outlier Detection, and Overview of Outlier Detection Methods

**ModuleV: Advanced Concepts:**

Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining- Spatial Data Overview, Spatial Data Mining Primitives, Spatial Rules, Spatial Classification Algorithm, Spatial Clustering Algorithms, Temporal Mining- Modeling Temporal Events, Time Series, Pattern Detection, Sequences, Temporal Association Rules.

**Text Books:**

1. Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann/Elsevier, 2012.
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, 2nd Edition, Pearson Education, India, 2006.

**Reference Books:**

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson Education India, 2021.
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India, 2007.

**COURSE OUTCOMES:**

CO	Statement	Blooms
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		<b>Taxonomy Level</b>
CO1	Understand the need of data mining and pre-processing techniques	Understand
CO2	Perform market basket analysis using association rule mining.	Analyze
CO3	Utilize classification techniques for analysis and interpretation of data.	Analyze
CO4	Identify appropriate clustering and outlier detection techniques to handle complex data.	Apply
CO5	Understand the mining of data from web, text and time series data.	Understand

<b>CO- PO Mapping</b> (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
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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C0533</b>	<b>Scripting Languages [Professional Elective – III]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:**

1. A course on “Computer Programming and Data Structures”.

2. A course on “Object Oriented Programming Concepts”.

**Course Objectives:**

- This course introduces the script programming paradigm
- Introduces scripting languages such as Perl, Ruby and TCL.
- Learning TCL

**Module–I: Introduction:**

Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

**Module–II: Extending Ruby:**

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

**Module–III:**

Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

**Module–IV:**

Advanced perl Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

**Module–V: TCL**

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

**Text Books:**

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O’Reilly
3. “Programming Ruby” The Pramatic Progammmers guide by Dabve Thomas Second edition

**Reference Books:**

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O’Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Comprehend the differences between typical scripting languages and typical system and application programming languages.	
CO2	Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem	
CO3	Acquire programming skills in scripting language	
CO4		
CO5		

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

2022-23 Onwards	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester
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(MR-22)				
<b>Code: C0534</b>	<b>Mobile Application Development</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>	<b>[Professional Elective – III]</b>	<b>3</b>	<b>-</b>	<b>-</b>

### **Prerequisites**

1. Acquaintance with JAVA programming
2. A Course on DBMS

### **Course Objectives**

- To demonstrate their understanding of the fundamentals of Android operating systems
- To improve their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

### **Module–I: Introduction to Android Operating System:**

Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

### **Module–II: Android User Interface:**

Measurements – Device and pixel density independent measuring unit - s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components –Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

### **Module–III: Intents and Broadcasts:**

Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

### **Module–IV: Persistent Storage:**

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

### **Module–V:**



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C6917</b>	<b>Internet of Things [Professional Elective – III]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

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

**Course Objectives:**

1. Understand the basics of Embedded System, IoT and the development model.
2. Understand the architecture, Instruction set and work on ARM microcontroller using hands-on experience.
3. Ability to select appropriate hardware and microcontrollers based on need of application.
4. Understand the Internet of Things Standards, Frameworks and Techniques.
5. Apply the tools, techniques and skills acquired towards development of Projects.

**Module-I: Introduction to Embedded Systems and Internet of Things**

Architecture of Embedded Systems, Embedded Systems Development process, Architecture of Internet of Things, Applications of Embedded Systems and IoT, Design Methodology for IOT Products

**Module-II: Overview of Open-Source Hardware and Its relevance to IOT**

Introduction and Programming Arduino Development Board , Working with Sensor Integration, Interfacing Input / Output devices (Pot, LDR, LCD, etc), Introduction to Network Connectivity, Concepts of IP based communication, Client – Server model of communication, Introduction to Wi-Fi communication using ESP8266, ESP8266 in Station & Access Point Mode

**Module-III: Fundamentals of Python Programming & Raspberry PI**

Introduction to python programming, working with functions, classes, REST full Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3

**Module-IV: IOT and Cloud Computing Platforms for IOT Development (IBM Cloud)**

IOT Platform Architecture (IBM Internet of Things & Watson Platforms), API Endpoints for Platform Services, Devices Creation and Data Transmission, Introduction to NODE-RED and Application deployment

**Module-V: IOT Use-cases: Smart city Project & Industrial Use cases**

Introduction to Smart City Project & IOT Use cases, Development of Smart city Applications, Project Work -1 (Smart city Use case), Project Work-2 (Industrial Use case)



## Text Books

1. Internet of Things: A Hands-On Approach by by Arsheep Bahga, Vijay Madiseti
2. The Internet of Things: Key applications and Protocols” Wiley Publications 2<sup>nd</sup> Edition

## References

1. Embedded Systems: Real-Time Interfacing to Arm(r) Cortex -M Microcontrollers: Volume-1&2 by Jonathan W. Valvano
2. Designing the Internet of Thingsl by Adrian McEwen, Hakim Cassimally, Wiley Publications, 2012
4. Embedded Real Time Systems: Concepts, Design and Programming by Dr.K.V.K.K.Prasad, Dream Tech Publication, 2003.

## E-Resources

1. <http://www.itu.int/en/ITU-T/gsi/iot/Pages/default.aspx>
2. <http://electronicdesign.com/embedded/understanding-protocolsbehind-internet-things>
3. [http://eclipse.org/community/eclipse\\_newsletter/2014/february/article2.php](http://eclipse.org/community/eclipse_newsletter/2014/february/article2.php)
4. <http://iot.eclipse.org/protocols.html>
5. <http://www.slideshare.net/paolopat/internet-ofthingsprotocolswar>
6. <http://www.slideshare.net/RealTimeInnovations/io-34485340>
7. <https://thingsboard.io/docs/iot-video-tutorials/>
8. <https://thenewboston.com/videos.php?cat=98&video=20109>

## COURSE OUTCOMES:

CO	Statement	Blooms Taxonomy Level
CO1	Describe the fundamental concepts of IoT and its applications	Understand
CO2	Illustrate M2M concepts with protocols.	Apply
CO3	Develop applications using Python Scripting Language.	Create
CO4	Build real world applications by applying Raspberry PI.	Create
CO5	Examine web-based services	Analyze

CO- PO Mapping															
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3	3	3	3	3	3						3	3	3
CO2	3			2	3							2			3
CO3	3			3	3										3
CO4	3	3	3	3	3	3						3			3
CO5	3	3	3	3	3							3	3	3	3

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C0538</b>	<b>Full Stack Development Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

**Pre-Requisites:** 1. Object Oriented Programming 2. Web Technologies

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

#### **List of Experiments**

1. Create an application to setup node JS environment and display “Hello World”.
2. Create a Node JS application for user login system.
3. Write a Node JS program to perform read, write and other operations on a file.
4. Write a Node JS program to read form data from query string and generate response using NodeJS
5. Create a food delivery website where users can order food from a particular restaurant listed in the website for handling http requests and responses using NodeJS.

6. Implement a program with basic commands on databases and collections using MongoDB.
7. Implement CRUD operations on the given dataset using MongoDB.
8. Perform Count, Limit, Sort, and Skip operations on the given collections using MongoDB.
9. Develop an angular JS form to apply CSS and Events.
10. Develop a Job Registration form and validate it using angular JS.
11. Write an angular JS application to access JSON file data of an employee from a server using \$http service.
12. Develop a web application to manage student information using Express and Angular JS.
13. Write a program to create a simple calculator Application using React JS.
14. Write a program to create a voting application using React JS
15. Develop a leave management system for an organization where users can apply different types of leaves such as casual leave and medical leave. They also can view the available number of days using react application.
16. Build a music store application using react components and provide routing among the web pages.
17. Create a react application for an online store which consist of registration, login, product information pages and implement routing to navigate through these pages.

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

**REFERENCE BOOKS:** 1. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress,2019. 2. Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer’, 1st edition, Apress, 2018. 3. Brad Green& Seshadri. Angular JS. 1st Edition. O’Reilly Media, 2013. 4. Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications Using React and Redux, 2nd edition, Addison-Wesley Professional, 2018.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Design flexible and responsive Web applications using Node JS, React, Express and Angular	Create
CO2	Use various full stack modules to handle http requests and responses.	Apply
CO3	Develop real time applications using react components.	Create

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

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C1213</b>	<b>Data Mining Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		-	-	2

**Prerequisites: NIL**

**Course Objectives:**

This course provides the students to understand stages in building a Data Warehouse, identify the need and importance of preprocessing techniques, implement similarity and dissimilarity techniques, analyze and evaluate performance of algorithms for Association Rules, analyze Classification and Clustering algorithms.

**Software Requirements: WEKA TOOL**

**List of Programs:**

1. Demonstration of preprocessing on dataset student.aff.

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 dataset test.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	List of Items
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

**Text Books:**

1. Pang-Ning Tan & Michael Steinbach, “**Introduction to Data Mining**”, Vipin Kumar, 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. 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.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level

CO1	<b>Analyze</b> the classification rules on various databases.	Analyze
CO2	<b>Deploy</b> association rules for any kind of databases.	Apply
CO3	<b>Develop</b> clustering rules for applications.	Create

<b>CO- PO Mapping</b> (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
CO2	1	2	2	2	2								2		2
CO3	1	2	3	2	1								1		2

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C0539</b>	<b>Scripting Languages Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		-	-	2

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

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

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

#### LIST OF EXPERIMENTS

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

TEXT BOOKS: 1. The World of Scripting Languages, David Barron, Wiley Publications. 2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly 3. "Programming Ruby" The Pragmatic Programmers guide by Dabve Thomas Second edition

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<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C0540</b>	<b>Mobile Application Development Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

Prerequisites: --- NIL--- Course Objectives:  To learn how to develop Applications in an android environment.  To learn how to develop user interface applications.  To learn how to develop URL related applications.

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

#### LIST OF EXPERIMENTS:

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



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C6918</b>	<b>Internet of Things Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>-</b>	<b>2</b>

**COURSE OBJECTIVES:**

1. Fundamental concepts of IoT and its applications
  2. M2M concepts with protocols.
  3. Applications using Python Scripting Language.
  4. Real world applications by applying Raspberry Pi.
  5. Web-based services.
1. GETTING STARTED WITH ARDUINO PLATFORM, INTEGRATE INPUT & OUTPUT DEVICES  
In this experiment student will setup the environment for programming Arduino UNO development boards. Explore the command set and integrates the sensors like LDR, Potentiometer, LED's, LCD display, Pushbuttons and Servo Motor.
  2. EXPLORE THE SENSOR DATASHEET & INTEGRATE WITH ARDUINO UNO BOARD  
In this lab experiment student will understand how to read the datasheet of a sensor, its power requirement, connection diagram. The sensors (Temperature Sensor (LM35), Ultrasonic, Digital Temperature & Humidity sensor) will be integrated with Arduino UNO platform and programmed to capture the data.
  3. GETTING STARTED WITH ESP8266 (NODEMCU) DEVELOPMENT BOARD, EXPLORE CLIENT SERVER MODEL OF COMMUNICATION  
In this experiment the student will setup the environment for programming ESP8266 and configures it into station & access point mode. He will convert ESP8266 into a webserver, which receives data and commands from a client in the same network.
  4. GET HANDS-ON WITH RASPBERRY PI, BUILD AN IOT GATEWAY WITH RASPBERRY PI  
This lab is designed to program the raspberry pi GPIO pins, enabling network connection, installing webserver along with database on Rpi.

5. The raspberry pi will act as a gateway and receives the data from multiple ESP8266 devices in the network.
6. EXPLORE DIFFERENT COMMUNICATION TECHNOLOGIES & PROTOCOLS  
In this lab experiment we will explore the use of Bluetooth, Zigbee, GSM/GPRS and
7. RFID communication technologies along with latest communication protocols like MQTT and CoAP
8. CONFIGURE IBM WATSON IOT PLATFORM TO RECEIVE EVENTS & SEND COMMANDS  
In this lab student will understand the features of IBM Watson IoT platform, explore the API Endpoints, RESTful Webservices, etc.
9. Get hands-on exposure to Node-RED tool Integrate the ESP8266 to IBM Watson IoT platform and exchange the events & commands
10. BUILD END-TO-END IOT USE CASE WITH DEVICE-GATEWAY -CLOUD- APPLICATION MODEL  
In this experiments student will build a use case with end-to-end development. Following are some of the examples i. Smart Street Lighting and ii. System Smart Home Management System
11. Smart Water Management System  
Integrate the ESP8266 to IBM Watson IoT platform and exchange the events & commands
12. BUILD END-TO-END IOT USE CASE WITH DEVICE-GATEWAY -CLOUD- APPLICATION MODEL  
In these experiments students will build a use case with end-to-end development. Following are some of

the examples

- Smart Street Lighting System
- Smart Home Management System
- Smart Water Management System

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1		
CO2		
CO3		

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

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

2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: C7313	Principles of Data Analytics Lab	L	T	P
Credits: 1		-	-	2

**Prerequisites:** Big Data Concepts

**Getting Hadoop Up and Running in a cluster:**

1. Setting up Hadoop on standalone machine.
2. Wordcount Map Reduce program using standalone Hadoop.
3. Adding the combiner step to the Wordcount Map Reduce program.
4. Setting up HDFS.
5. Using HDFS monitoring UI
6. HDFS basic command-line file operations.
7. Setting Hadoop in a distributed cluster environment.
8. Running the WordCount program in a distributed cluster environment.
9. Using Map Reduce monitoring UI

**Hadoop Map Reduce Applications:**

1. Choosing appropriate Hadoop data types.
2. Implementing a custom Hadoop Writable data type.



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C00P1</b>	<b>Industrial Oriented Mini Project/ Internship / Skill Development Course (DevOps)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		-	-	4

**Prerequisites: NIL**

**Course Objectives:**

- Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aims to shorten the software development lifecycle to provide continuous delivery with high-quality.

**List of Experiments:**

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application for exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

**Text Books:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the need of DevOps tools	Understand
CO3	Apply different project management, integration and development tools	Apply
CO3	Use Selenium tool for automated testing of application	Apply

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



2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: C00M5	Constitution of India	L	T	P
Credits: -		2	-	-

**Prerequisites: NIL**

**Course Objectives:**

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

**Module-I:**

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

**Module-II:**

Philosophy of the Indian Constitution- Preamble Salient Features

**Module-III:**

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

**Module–IV:**

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

**Module–V:**

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

**Module–VI:**

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

**Suggested Reading:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.	
CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution	
CO4	Discuss the passage of the Hindu Code Bill of 1956.	

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: C00M6</b>	<b>Quantitative Aptitude &amp; Verbal Reasoning-II</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: -</b>		<b>2</b>	<b>-</b>	<b>-</b>

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C0H09</b>	<b>Organizational Behavior</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** NIL

**Course Objectives:**

- This course demonstrates individual, group behavior aspects: The dynamics of organizational climate, structure and its impact on Organizations.

**Module–I:**

Organizational Behaviour Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models.

**Module–II:**

Individual Behaviour Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification, Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

**Module–III:**

Group Behaviour Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

**Module–IV:**

Leadership and Power Meaning – Importance – Leadership styles – Theories of leadership – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

**Module–V:**

Dynamics of Organizational Behaviour Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness

**Text Books:**

1. Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organisational Behavior, McGraw Hill, 11th Edition, 2001.

**Reference Books:**

1. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9 th Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education, 2004.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Students understand their personality, perception and attitudes for overall development and further learn the importance of group behavior in the organizations.	
CO2		
CO3		
CO4		
CO5		

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

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C6610</b>	<b>Deep Learning</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: NIL**

**Course Objectives:**

- To understand deep Learning algorithms and their applications in real-world data

**Module–I: Machine Learning Basics**

Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning Deep Feedforward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

**Module–II: Regularization for Deep Learning**

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and UnderConstrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, MultiTask Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier, Optimization for Training Deep

Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates

**Module–III: Convolutional Networks**

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features

**Module–IV: Recurrent and Recursive Nets**

Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for LongTerm Dependencies, Explicit Memory

**Module–V: Practical Methodology:**

Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition  
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**Applications:**

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

**Text Book:**

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.

**Reference Books:**

1. The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3. Bishop. C.M., Pattern Recognition and Machine Learning, Springer, 2006.
4. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
5. Golub, G.,H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.
6. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand machine learning basics and neural networks	Understand
CO2	Understand optimal usage of data for training deep models	Understand
CO3	Apply CNN and RNN models for real-world data	Apply
CO4	Evaluate deep models	Evaluate
CO5	Develop deep models for real-world problems	Create

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

2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: C0544	Cloud Computing	L	T	P
Credits:3		3	-	-

**Pre-requisites:**

1. A course on “Computer Networks”.
2. A course on “Operating System”.

**Course Objectives:**

- This course provides an insight into cloud computing.
- Topics covered include- Cloud Computing Architecture, Deployment Models, Service Models, Technological Drivers for Cloud Computing, Networking for Cloud Computing and Security in Cloud Computing.

**Module–I:**

Computing Paradigms, Cloud Computing Fundamentals, Cloud Computing Architecture and Management

**Module–II:**





<b>CO1</b>	1			2											
<b>CO2</b>		1	2	2							1				
<b>CO3</b>		1		3							2				
<b>CO4</b>	1										2				
<b>CO5</b>	1		2								1				

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C1215</b>	<b>Information Security [Professional Elective-IV]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

### **Prerequisites**

1. A Course on “Computer Networks and a course on Mathematics

### **Course Objectives**

- To understand the fundamentals of Cryptography
- To understand various key distribution and management schemes
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To apply algorithms used for secure transactions in real world applications

### **Module–I:**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security Classical Encryption Techniques: DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

**Module–II:**

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. Message authentication and Hash Functions: Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

**Module–III:**

Digital Signatures: Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service. Email Security: Pretty Good Privacy (PGP) and S/MIME.

**Module–IV:**

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**Module–V:**

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

**Text Book:**

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

**Reference Books:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.

**COURSE OUTCOMES:**

CO	Statement	Bloom Taxonomy Level
CO1	Demonstrate the knowledge of cryptography, network security concepts and applications.	Apply
CO2	Ability to apply security principles in system design.	Apply
CO3	Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.	Analyze
CO4	Distinguish SSL, TLS and its applications.	Analyze
CO5	Formulate web security services and mechanisms.	Create

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>			<b>B.Tech. VII Semester</b>		
<b>Code: C7314</b>	<b>Expert Systems</b>			<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>	<b>[Professional Elective-IV]</b>			<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: NIL**

**Course Objectives:**

- Understand the basic techniques of artificial intelligence.
- Understand the Non-monotonic reasoning and statistical reasoning.

**Module-I:**

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO\* algorithm – game trees, Minmax algorithms, game playing – Alpha-beta pruning.

**Module-II:**

Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

**Module–III:**

Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

**Module–IV:**

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems.

**ModuleV:**

Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process. Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development.

**Text Books:**

1. Elain Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill, New Delhi
2. Waterman D.A., “A Guide to Expert Systems”, Addison Wesley Longman.

**Reference Books:**

1. Stuart Russel and other Peter Norvig, “Artificial Intelligence – A Modern Approach”, PrenticeHall,
2. Patrick Henry Winston, “Artificial Intelligence”, Addison Wesley,
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley,
5. Weiss S.M. and Kulikowski C.A., “A Practical Guide to Designing Expert Systems”, Rowman &Allanheld, New Jersey.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Apply the basic techniques of artificial intelligence	Apply
CO2	Discuss the architecture of an expert system and its tools.	Understand
CO3	Understand the importance of building an expert systems	Understand
CO4	Understand various problems with an expert systems	Understand
CO5	Building Expert system	Create

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

<b>C02</b>	2	3								3			3	2	
<b>C03</b>			3	3						2				3	
<b>C04</b>				2	3								2		
<b>C05</b>						2	3	3					3	3	

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C7315</b>	<b>Semantic Web [Professional Elective-IV]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: NIL**

**Course Objectives:**

- Introduce Semantic Web Vision and learn Web intelligence
- Understanding about XML, RDF, RDFS, OWL
- Querying Ontology and Ontology Reasoning
- To learn Semantic Web Applications, Services and Technology
- To learn Knowledge Representation for the Semantic Web

**Module–I: Introduction:**

Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

**Module–II: Web Services:**

Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

**Module–III: Resource Description Framework:**

Features, Capturing Knowledge with RDF. XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

**Module–IV: Taxonomies and Ontologies:**

Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

**Module–V: Semantic Web Application:**

Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base. Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle

**Text Books:**

1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.
2. Peter Mika, Social Networks and the Semantic Web, Springer

**Reference Books:**

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley Interscience
2. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.

**COURSE OUTCOMES:**

<b>CO</b>	<b>Statement</b>	<b>Blooms Taxonomy Level</b>
CO1	Understand the characteristics of the semantic web technology	Understand
CO2	Understand the concepts of Web Science, semantics of knowledge resource and ontology	Understand
CO3	Describe logic semantics and inference with OWL	Understand
CO4	Use ontology engineering approaches in semantic applications	Apply
CO5	Learn about web graph processing for various applications such as search engine, community detection	Understand

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

2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: C7316	Game Theory [Professional Elective-IV]	L	T	P
Credits:3		3	-	-

**Prerequisites: NIL**

### Course Objectives

The course will explain in depth the standard equilibrium concepts (such as Nash equilibrium, Subgame-Perfect Nash Equilibrium, and others) in Game Theory.

### Module-I:

Introduction- Game Theory, Games and Solutions, Game Theory and the Theory of Competitive Equilibrium, Rational Behavior, The Steady State and Deductive Interpretations, Bounded Rationality Terminology and Notation Nash Equilibrium- Strategic Games, Nash Equilibrium, Examples, Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information

### Module-II:

Mixed, Correlated, and Evolutionary Equilibrium -Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium Rationalizability and Iterated Elimination of Dominated Actions- Rationalizability



Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions

**Module–III:**

Knowledge and Equilibrium -A Model of Knowledge Common Knowledge, Can People Agree to Disagree? Knowledge and Solution Concepts, The Electronic Mail Game

**Module–IV:**

Extensive Games with Perfect Information -Extensive Games with Perfect Information, Subgame Perfect Equilibrium, Two Extensions of the Definition of a Game, The Interpretation of a Strategy, Two Notable Finite Horizon Games, Iterated Elimination of Weakly Dominated Strategies Bargaining Games -Bargaining and Game Theory, A Bargaining Game of Alternating Offers, Subgame Perfect Equilibrium, Variations and Extensions

**Module–V:**

Repeated Games - The Basic Idea Infinitely Repeated Games vs. Finitely Repeated Games, Infinitely Repeated Games: Definitions, Strategies as Machines, Trigger Strategies: Nash Folk Theorems, Punishing for a Limited Length of Time: A Perfect Folk Theorem for the Limit of Means Criterion, Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion, Rewarding Players Who Punish: A Perfect Folk Theorem for the Discounting Criterion, The Structure of Subgame Perfect Equilibria Under the Discounting Criterion, Finitely Repeated Game

**Text Books:**

1. A course in Game Theory, M. J. Osborne and A. Rubinstein, MIT Press.

**Reference Books:**

1. Game Theory, Roger Myerson, Harvard University Press.
2. Game Theory, D. Fudenberg and J. Tirole, MIT Press.
3. Theory of Games and Economic Behavior, J. von Neumann and O. Morgenstern, New York: John Wiley and Sons.
4. Games and Decisions, R.D. Luce and H. Raiffa, New York: John Wiley and Sons.
5. Game Theory, G. Owen, 2nd Edition, New York: Academic Press.

**COURSE OUTCOMES:**

<b>CO</b>	<b>Statement</b>	<b>Blooms Taxonomy Level</b>
CO1	Understand the basic concepts of game theory and solutions	Understand
CO2	Understand different types of equilibrium interpretations	Understand
CO3	Understand and analyze knowledge and solution concepts	Understand
CO4	Analyze extensive games with perfect information	Analyze
CO5	Distinguishing repeated and finitely repeated games	Analyze

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>			<b>B.Tech. VII Semester</b>		
<b>Code: C7317</b>	<b>Nature Inspired Computing</b>			<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>	<b>[Professional Elective-IV]</b>			<b>3</b>	<b>-</b>	<b>-</b>

**Course Objectives:** Knowledge on significance of intelligence, genetic algorithms Ant Colony algorithms.

**UNIT - I:** Models of Life and Intelligence - Fundamentals of bio-inspired models and bio-inspired computing. Evolutionary models and techniques, Swarm models and its self-organization, swarm and evolutionary algorithms. Optimisation problems – single and multi-objective optimisation, heuristic, meta-heuristic and hyper heuristic functions.

**UNIT - II:** Genetic algorithms - Mathematical foundation, Genetic problem solving, crossover and mutation. genetic algorithms and Markov process, applications of genetic algorithms.

**UNIT - III:** Ant Colony Algorithms - Ant colony basics, hybrid ant system, ACO in combinatorial optimisation, variations of ACO, case studies.

**UNIT - IV:** Particle Swarm algorithms - particles moves, particle swarm optimisation, variable length PSO, applications of PSO, case studies. Artificial Bee Colony algorithms - ABC

basics, ABC in optimisation, multi-dimensional bee colony algorithms, applications of bee algorithms, case studies.

**UNIT - V:** Selected nature inspired techniques - Hill climbing, simulated annealing, Gaussian adaptation, Cuckoo search, Firey algorithm, SDA algorithm, bat algorithm, case studies. Other nature inspired techniques - Social spider algorithm, Cultural algorithms, Harmony search algorithm, Intelligent water drops algorithm, Artificial immune system, Flower pollination algorithm, case studies.

**TEXT BOOKS:** 1. Albert Y.Zomaya - "Handbook of Nature-Inspired and Innovative Computing", Springer, 2006 2. Floreano, D. and C. Mattiussi - "Bio-Inspired Artificial Intelligence: Theories, methods and Technologies" IT Press, 2008.

**REFERENCE BOOKS:** 1. Leandro Nunes de Castro - " Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007. 2. Marco Dorigo, Thomas Stutzle -" Ant Colony Optimization", Prentice Hall of India, New Delhi, 2005. 3. Vinod Chandra S S, Anand H S - "Machine Learning: A Practitioner's Approach", Prentice Hall of India, New Delhi, 2020.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Familiar with Genetic algorithm and its applications	Understand
CO2	Compare different Ant Colony Optimization algorithmic models	Analyze
CO3	Compare different Artificial Bee Colony Optimization algorithmic models	Analyze
CO4	Illustrate Particle swam optimization algorithm with an example	Apply
CO5	Applying various algorithms	Apply

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

<b>CO4</b>				2								3			
<b>CO5</b>			3		3									3	3

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C7318</b>	<b>Social Network Analysis [Professional Elective-V]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:**

- Web Technologies
- Computer Networks
- Data Warehousing and Data Mining

**Course Objectives:**

- Understand the concepts of social media
- Learn the mechanisms for social network analysis
- Analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

**Module–I: Introduction: Social Media and Social Networks Social Media:**

New Technologies of Collaboration Social Network Analysis: Measuring, Mapping, and Modelling collections of Connections.

**Module–II:**

NodeXL, Layout, Visual Design, and Labelling, Calculating and Visualising Network Metrics, Preparing Data and Filtering, Clustering and Grouping.

**Module–III:CASE STUDIES:**

Email: The lifeblood of Modern Communication. Thread Networks: Mapping Message Boards and Email Lists Twitter: Conversation, Entertainment and Information

**Module–IV:CASE STUDIES:**

Visualizing and Interpreting Facebook Networks, WWW Hyperlink Networks

**Module–V:CASE STUDIES:**

You Tube: Contrasting Patterns of Content Interaction, and Prominence. Wiki Networks: Connections of Creativity and Collaboration

**Text Book:**

1. Hansen, Derek, Ben Sheiderman, Marc Smith, Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Morgan Kaufmann, 2011.

**Reference Books:**

1. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Sybex, 2009.
2. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and Using Metrics, 1st Edition, MGH, 2011.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Ability to construct social network maps easily	Create
CO2	Gain skills in tracking the content flow through the social media	Understand
CO3	Understand NodeXL use to perform social network analysis	Understand
CO4	Interpreting social networks	Apply
CO5	Building connections and collaborations of networks	Create

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

<b>CO1</b>			3		3								2		
<b>CO2</b>					3					2				2	
<b>CO3</b>	3	3			3										
<b>CO4</b>			2				2						2		1
<b>CO5</b>	1												3		

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>		<b>B.Tech. VII Semester</b>		
<b>Code: C7319</b>	<b>Federated Machine Learning [Professional Elective-V]</b>		<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>			<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:**

- The prerequisite knowledge for this course includes machine learning, basic computer systems and basic programming skills.

**Course Objectives:**

- Understand the key concepts and issues behind Federated Learning
- Get familiar with key theoretical results of Federated Learning

**Module–I Introduction:**

Motivation, Federated Learning as a Solution, The Definition of Federated Learning, Categories of Federated Learning, Current Development in Federated Learning, Research Issues in Federated Learning, Open-Source Projects, Standardization Efforts, The Federated AI Ecosystem Background: Privacy-Preserving Machine Learning, PPML and Secure ML, Threat and Security

Models, Privacy Threat Models, Adversary and Security Models, Privacy Preservation Techniques, Secure Multi-Party Computation, Homomorphic Encryption, Differential Privacy

**Module–II Distributed Machine Learning:**

Introduction to DML, The Definition of DML, DML Platforms, Scalability Motivated DML, Large-Scale Machine Learning, Scalability-Oriented DML Schemes, Privacy-Motivated DML, Privacy-Preserving Decision Trees, Privacy-Preserving Techniques, Privacy-Preserving DML Schemes, Privacy-Preserving Gradient Descent, Vanilla Federated Learning, Privacy-Preserving Methods

**Module–III Horizontal Federated Learning:**

The Definition of HFL, Architecture of HFL, The Client- Server Architecture, The Peer-to-Peer Architecture, Global Model Evaluation, The Federated Averaging Algorithm, Federated Optimization, The FedAvg Algorithm, The Secured FedAvg Algorithm, Improvement of the FedAvg Algorithm, Communication Efficiency, Client Selection Vertical Federated Learning: The Definition of VFL, Architecture of VFL, Algorithms of VFL, Secure Federated Linear Regression, Secure Federated Tree-Boosting

**Module–IV Federated Transfer Learning:**

Heterogeneous Federated Learning, Federated Transfer Learning, The FTL Framework, Additively Homomorphic Encryption, The FTL Training Process, The FTL Prediction Process, Security Analysis, Secret Sharing-Based FTL Incentive Mechanism Design for Federated Learning: Paying for Contributions, Profit- Sharing Games, Reverse Auctions, A Fairness-Aware Profit Sharing Framework, Modeling Contribution, Modeling Cost, Modeling Regret, Modeling Temporal Regret, The Policy Orchestrator, Computing Payoff Weightage

**Module–V Federated Learning for Vision, Language, and Recommendation:**

Federated Learning for Computer Vision, Federated CV, Federated Learning for NLP, Federated NLP, Federated Learning for Recommendation Systems, Recommendation Model, Federated Recommendation System R22 B.Tech. AI & ML Syllabus JNTU Hyderabad Page 135 of 147 Federated Reinforcement Learning: Introduction to Reinforcement Learning, Policy, Reward, Value Function, Model of the Environment, RL Background Example, Reinforcement Learning Algorithms, Distributed Reinforcement Learning, Asynchronous Distributed Reinforcement Learning, Synchronous Distributed Reinforcement Learning, Federated Reinforcement Learning, Background and Categorization

**Text Book:**

1. Federated Learning, Qiang Yang, Yang Liu, Yong Cheng, Yan Kang, Tianjian Chen, and Han Yu Synthesis Lectures on Artificial Intelligence and Machine Learning 2019.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy
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		Level
CO1	Understand the basics on privacy-preserving ML	Understand
CO2	Analyze the key concepts of Distributed ML and FL	Analyze
CO3	Understand the key concepts and applications of Horizontal FL and Vertical FL	Understand
CO4	Motivates the intensive mechanism design for FL	Apply
CO5	Analyze the concepts of federated reinforcement learning	Analyze

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

2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)			B.Tech. VII Semester		
Code: C0535	Software Testing Methodologies			L	T	P
Credits:3	[Professional Elective-V]			3	-	-

### Prerequisites

1. Software Engineering

### Course Objectives

- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- To develop skills in software test automation and management using the latest tools.

### Module–I Introduction:

Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs  
Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

### Module–II Transaction Flow Testing:



transaction flows, transaction flow testing techniques. Data Flow testing: Basics of data flow testing, strategies in data flow testing, application of data flow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

**Module–III Paths, Path products and Regular expressions:**

path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

**Module–IV**

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

**Module–V**

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like Jmeter/selenium/soapUI/Catalon).

**Text Books:**

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

**Reference Books:**

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand purpose of testing and path testing	Understand
CO2	Understand strategies in data flow testing and domain testing	Understand
CO3	Develop logic-based test strategies	Create
CO4	Understand graph matrices and its applications	Understand
CO5	Implement test cases using any testing automation tool	Apply

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

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>		<b>B.Tech. VII Semester</b>		
<b>Code: C7320</b>	<b>Web Security</b>		<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>	<b>[Professional Elective-V]</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:**

- Give an Overview of information security
- Give an overview of Access control of relational databases

**Module-I**

The Web Security, The Web Security Problem, Risk Analysis and Best Practices Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification

**Module–II**

The Web’s War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications

**Module–III Database Security:**

Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems

**Module–IV Security Re-engineering for Databases:**

Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and

**Module–V Future Trends Privacy in Database Publishing:**

A Bayesian Perspective, Privacy-enhanced Location Based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment

**Text Books:**

1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O’Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the Web architecture and applications	Understand
CO2	Understand client side and service side programming	Understand
CO3	Understand how common mistakes can be bypassed and exploit the application	Understand
CO4	Identify common application vulnerabilities	Analyze
CO5	Able to enforce security and privacy principles	Apply

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

<b>CO5</b>	3	3	3	3	2								2	2	
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<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C0545</b>	<b>Ad-hoc &amp; Sensor Networks [Professional Elective-V]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

#### **Prerequisites**

- Computer Networks
- Distributed Systems
- Mobile Computing

#### **Course Objectives**

- To understand the challenges of routing in ad-hoc and sensor networks
- To understand various broadcast, multicast and geocasting protocols in ad hoc and sensor networks
- To understand basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN

#### **Module-I**

Introduction to Ad Hoc Networks Characteristics of MANETs, Applications of MANETs and Challenges of MANETs. Routing in MANETs Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; Position- based routing algorithms Location Services-DREAM,

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

**Module-II**

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

**Module-III**

Geocasting Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

**Module-IV**

Basics of Wireless Sensors and Lower Layer Issues-Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

**Module-V**

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

**Text Books**

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kaufman)

**Reference Books:**

1. C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the concepts of sensor networks and applications	
CO2	Understand and compare the MAC and routing protocols for adhoc networks	
CO3	Understand the transport protocols of sensor networks	
CO4		
CO5		

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code:</b>	<b>Deep Learning Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:2</b>		<b>-</b>	<b>-</b>	<b>2</b>

**Course Objectives:**

1. To Build the Foundation of Deep Learning.
2. To Understand How to Build the Neural Network.
3. To enable students to develop successful machine learning concepts.

**LIST OF EXPERIMENTS:**

1. Setting up the Spyder IDE Environment and Executing a Python Program
2. Installing Keras, Tensorflow and Pytorch libraries and making use of them
3. Applying the Convolution Neural Network on computer vision problems
4. Image classification on MNIST dataset (CNN model with Fully connected layer)
5. Applying the Deep Learning Models in the field of Natural Language Processing
6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes
7. Applying the Autoencoder algorithms for encoding the real-world data
8. Applying Generative Adversial Networks for image generation and unsupervised tasks.

TEXT BOOKS:



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C0560</b>	<b>Cloud Computing Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:2</b>		-	-	2

**Prerequisites :Nil**

**Course Objectives:**

- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service oriented architectures, cloud programming and software environments, resource management.

**List of Experiments:**

1. Install Virtualbox/VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Create an Amazon EC2 instance and set up a web-server on the instance and associate an IP address with the instance.
4. Install Google App Engine. Create a hello world app and other simple web applications using python/java.





<b>C05</b>															
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<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: C0P02</b>	<b>Project Stage-I</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>-</b>	<b>-</b>	<b>6</b>

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: C7320</b>	<b>Speech and Video Processing [Professional Elective-VI]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites :Nill**

**Course Objectives:**

- To make students understand speech and video processing techniques

**Module–I Speech processing concepts**

The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and non linear filter banks, spectral estimation of speech using DFT. Linear Prediction analysis of speech.

**Module–II**

Speech recognition Feature extraction for speech, static and dynamic feature for speech recognition, MFCC, LPCC, Distance measures, vector quantization models, Gaussian Mixture model, HMM.

**Module–III**

Multi-Dimensional Signals and Systems Multi-Dimensional Signals, Multi-Dimensional Transforms, Multi-Dimensional Systems, MultiDimensional Sampling Theory, Sampling Structure Conversion Digital Images and Video: Human Visual System and Color, Digital Video

**Module–IV**

Motion Estimation Image Formation, Motion Models, 2D Apparent-Motion Estimation, Differential Methods, Matching Methods, Nonlinear Optimization Methods, Transform-Domain Methods, 3D Motion and Structure Estimation

**Module–V**

Video Segmentation and Tracking Image Segmentation, Change Detection, Motion Segmentation, Motion Tracking, Image and Video Matting, Performance Evaluation

**Text Books:**

1. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signal processing series
2. Digital Video processing, A Murat Tekalp, 2nd edition, Prentice Hall.

**Reference Books:**

1. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
2. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang, Pearson Education
3. “Speech and Audio Signal Processing”, B.Gold and N. Morgan, Wiley.
4. “Digital image sequence processing, Compression, and analysis”, Todd R. Reed, CRC Press
5. “Handbook of Image and Video processing”, Al Bovik, Academic press, second Edition.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Describe the mechanisms of human speech production systems and methods for speech feature extraction	Understand
CO2	Understand basic algorithms of speech analysis and speech recognition	Understand
CO3	Explain basic techniques in digital video processing, including imaging characteristics and sensors.	Understand
CO4	Apply motion estimation and object tracking algorithms on video.	Apply
CO5	Analyzing various segmentations	Analyze

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

<b>CO1</b>	3	2					3	2						2	2
<b>CO2</b>						2			3	2	2		3	2	
<b>CO3</b>								2			2				
<b>CO4</b>	3	2						2			2				
<b>CO5</b>						2	3	2	3	2	2				

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code:</b>	<b>Mobile Computing</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>	<b>[Professional Elective-VI]</b>	<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Computer Networks, Distributed Systems / Distributed Operating Systems

**Course Objectives:** To make the student understand the concept of mobile computing paradigm, its novel applications and limitations, the typical mobile networking infrastructure through a popular GSM protocol, the issues and solutions of various layers of mobile networks.

**UNIT - I** Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

**UNIT –II** (Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA,

Wireless LAN/(IEEE 802.11) Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

**UNIT - III** Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

**UNIT - IV** Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

**UNIT - V** Mobile Ad hoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery. Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android

**TEXT BOOKS:** 1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2

2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772

**REFERENCE BOOK:** 1. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal Mobile Computing: Technology, Applications and Service Creation, McGraw Hill Education.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the concept of mobile computing paradigm, its novel applications and limitations.	Understand
CO2	Analyze and develop new mobile applications	Analyze
CO3	Understand the protocols and platforms related to mobile environment	Understand
CO4	Classify data delivery mechanisms	Analyze
CO5	Understanding protocols	Understand

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: C7321</b>	<b>Randomized Algorithms [Professional Elective-VI]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites :Nil**

Course Objective:

- To introduce the power of randomization in the design of algorithms.

**Module–I Introduction,**

A Min – Cut algorithm, Las Vegas and Monte Carlo, Binary Planar Partitions, A Probabilistic Recurrence Game-Theoretic Techniques: Game Tree Evaluation, The Minimax Principle

**Module–II Moments and Deviations:**

Occupancy Problems, The Markov and Chebyshev Inequalities, Randomized Selection, Two Point sampling, The Coupon Collector’s problem. Markov Chains and Random Walks: A 2-SAT example, Markov Chains, Random Walks on Graphs, Graph Connectivity

**Module–III Algebraic Techniques:**

Fingerprinting and Freivald’s Technique, Verifying Polynomial Identities, Perfect Matching in Graphs, Verifying Equality of Strings, A Comparison of Fingerprinting Techniques, Pattern Matching

**Module–IV Data Structures:**

The Fundamental of Data-structures, Random Treaps, Skip Lists, Hash Tables Graph Algorithms: All Pairs Shortest Path, The Min- Cut Problem, Minimum Spanning Trees

**Module–V Geometric Algorithms:**

Randomized Incremental Construction, Convex Hulls in the Plane, Duality, HalfSpace Intersections, Dalaunay Triangulations, Trapezoidal Decompositions, Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings

**Text Books:**

1. Randomized Algorithms: Rajeev Motwani, Prabhakar Raghavan, Cambridge University Press
2. Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and
3. Data Analysis by Eli Upfal and Michael Mitzenmacher.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Appreciate the fundamentals of randomized algorithm design	Understand
CO2	Understand the fundamentals of Markov chains and the Monte Carlo method	Understand
CO3	Apply high probability analysis to selected randomized algorithms.	Apply
CO4	Understand the Fingerprint and Pattern Matching techniques	Understand
CO5	Construction of geometric algorithms	Create

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



<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: C7322</b>	<b>Cognitive Computing [Professional Elective-VI]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Probability theory

**Course Objectives:**

- To provide an understanding of the central challenges in realizing aspects of human cognition.
- To provide a basic exposition to the goals and methods of human cognition.
- To develop algorithms that use AI and machine learning along with human interaction and feedback to help humans make choices/decisions.
- To support human reasoning by evaluating data in context and presenting relevant findings along with the evidence that justifies the answers.

**Module–I Introduction to Cognitive Science:**

Understanding Cognition, IBM’s Watson, Design for Human Cognition, Augmented Intelligence, Cognition Modeling Paradigms: Declarative/ logic-based computational cognitive modeling, connectionist models of cognition, Bayesian models of cognition, a dynamical systems approach to cognition.

**Module–II**

Cognitive Models of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

**Module–III Cognitive Modeling:**

modeling the interaction of language, memory and learning, Modeling select aspects of cognition classical models of rationality, symbolic reasoning and decision making.

**Module–IV**

Formal models of inductive generalization, causality, categorization and similarity, the role of analogy in problem solving, Cognitive Development Child concept acquisition. Cognition and Artificial cognitive architectures such as ACT-R, SOAR, OpenCog, CopyCat, Memory Networks.

**Module–V**

DeepQA Architecture, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.

**Text Book:**

1. The Cambridge Handbook of Computational Psychology by Ron Sun (ed.), Cambridge University Press.

**Reference Books:**

1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing and Big Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, Venu Govindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Hollan.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand cognitive computing	Understand
CO2	Plan and use the primary tools associated with cognitive computing	Apply
CO3	Plan and execute a project that leverages cognitive computing	Understand
CO4	Understand and develop the business implications of cognitive computing	Understand
CO5	Differentiate structured and unstructured Information	Analyze

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

<b>CO4</b>	2		3				2					2	2		
<b>CO5</b>	2		3									2			2

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: C7323</b>	<b>Conversational AI [Professional Elective-VI]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites :Nil**

**Course Objectives:**

- To be familiar with the basic knowledge about conversational systems.
- To understand the different techniques of natural language processing
- Study the fundamental role of machine learning in building conversational systems.
- To know the various applications of conversational systems and its future development

**Module–I Introducing Dialogue Systems**

Introduction of Dialogue System, History of Dialogue Systems, Present-Day Dialogue Systems, Modeling Conversation Dialogue Systems, Designing and Developing Dialogue Systems

**Module–II Rule-Based Dialogue Systems:**

Architecture, Methods, and Tools Dialogue Systems Architecture, designing a Dialogue System, Tools for Developing Dialogue Systems, Rule-Based Techniques in Dialogue Systems Participating in the Alexa Prize

**Module–III**

Statistical Data-Driven Dialogue Systems Motivating the Statistical Data-Driven Approach, Dialogue Components in the Statistical Data-Driven Approach, Reinforcement Learning (RL),

Representing Dialogue as a Markov Decision Process, From MDPs to POMDPs, Dialogue State Tracking, Dialogue Policy, Problems and Issues with Reinforcement Learning in POMDPs

**Module–IV**

Evaluating Dialogue Systems Process of Evaluation, Evaluating Task-Oriented Dialogue Systems, Evaluating Open-Domain Dialogue Systems, Evaluation Frameworks- PARADISE, Quality of Experience (QoE), Interaction Quality, Best Way to Evaluate Dialogue Systems.

**Module–V**

End-to-End Neural Dialogue Systems Neural Network Approaches to Dialogue Modeling, A Neural Conversational Model, Introduction to the Technology of Neural Dialogue, Retrieval-Based Response Generation, Task-Oriented Neural Dialogue Systems, Open-Domain Neural Dialogue Systems, Some Issues and Current Solutions, Dialogue Systems: Datasets, Competitions, Tasks, and Challenges.

**Text Books:**

1. Michael McTear, “Conversational AI: Dialogue Systems, Conversational Agents, and Chatbots”, Second Edition, Moran and Claypool Publishers, 2020.

**Reference Book:**

1. CATHY PEARL, “DESIGNING VOICE USER INTERFACES: PRINCIPLES OF CONVERSATIONAL EXPERIENCES”, O’REILLY, 2016.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the basic technologies required for building a conversational system.	Understand
CO2	Learn the rule-based dialogue system	Understand
CO3	Involve AI in building conversational system and build advanced systems that are cognitively inclined towards human behaviour.	Apply
CO4	Develop a real time working conversational system for social domain that can intelligently process inputs and generate relevant replies.	Create
CO5	Analysis of neural dialogue systems	Analyze

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: C0P03</b>	<b>Project Stage-II including Seminar</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: C7324</b>	<b>Fundamentals of AI [OPEN ELECTIVE]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: NIL**

**Course Objective:**

- To learn the difference between optimal reasoning Vs human like reasoning
- To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques
- To understand the applications of AI namely, Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

**Module–I:**

**Foundations of AI:** Introduction to AI, History of AI, Strong and Weak AI, The State of the Art, Risks and Benefits of AI Philosophy,

**Ethics and Safety of AI:** The Limits of AI, Machine thinking capability, The Ethics of AI Intelligent Agents: Agents and Environments,

**Good Behavior:** The Concept of Rationality, The Nature of Environments, The Structure of Agents.

**Module–II:**

**Solving Problems by Searching:** Problem – Solving Agents

**Uninformed Search Strategies:** Best-First Search, Breadth-First Search, Uniform-Cost Search, Depth-First Search, Iterative Deepening Search and Bidirectional Search  
**Informed Search Strategies:** Greedy Best-First Search, A\* Search

**Module–III:**

**Logical Agents:** Knowledge-based agents, Propositional Logic, Propositional Theorem Proving

**First-Order Logic:** Syntax and Semantics of First-Order Logic

**Inference in First-Order Logic:** Propositional Vs. First-Order Inference, Unification and First-Order Inference, Forward Chaining, Backward Chaining

**Knowledge Representation:** Ontological Engineering, Categories and Objects, Events

**Module–IV:**

**Quantifying Uncertainty:** Basic Probability Notation, Inference Using Full-Joint Distributions, Independence, Bayes’ Rule and its Use, Naive Bayes Models

**Probabilistic Reasoning:** Representing Knowledge in an Uncertain Domain, The semantics of Bayesian Networks, Exact Inference in Bayesian Networks

**Module–V:**

**Learning from Examples:** Forms of Learning, Supervised Learning, Learning Decision Trees, Model Selection, Linear Regression and Classification, Ensemble Learning

**Natural Language Processing:** Language Models, Grammar, Parsing, Complications of Real Natural Language, Natural Language Tasks

**Robotics:** Robots, Robot Hardware, Kind of Problems solved, Application Domains

**Computer Vision:** Simple Image Features, Using Computer Vision

**Text Books:**

1. “Artificial Intelligence a Modern Approach”, Fourth Edition, Stuart J. Russell & Peter Norvig – Pearson.

**Reference Books:**

1. “Artificial Intelligence”, Elaine Rich, Kevin Knight & Shivashankar B Nair – McGraw Hill Education.
2. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
3. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
4. Artificial Intelligence, Shivani Goel, Pearson Education.
5. Artificial Intelligence and Expert systems – Patterson, Pearson Education

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Gain the knowledge of what is AI, risks and benefits of AI, limits of AI and the ethics involved in building an AI application.	Understand
CO2	Understand the nature of environments and the structure of agents.	Understand

CO3	Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.	Apply
CO4	Possess the skill for representing knowledge using the appropriate technique	Apply
CO5	Gain an understanding of the applications of AI	Understand

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

2022-23 Onwards (MR-22)	Malla Reddy Engineering College (Autonomous)			B.Tech. VI Semester		
Code: C7325	Machine Learning Basics			L	T	P
Credits: 3	[OPEN ELECTIVE]			3	-	-

**Prerequisites: NIL**

**Course Objectives:**

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

**Module-I:**

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

**Module-II:**

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation



**Module–III:**

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

**Module–IV:**

Support Vector Machines Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

**Module–V:**

Reinforcement Learning – Overview – Getting Lost Example Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Hidden Markov Models

**Text Books:**

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

**Reference Books:**

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

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Distinguish between, supervised, unsupervised and semi-supervised learning	Analyze
CO2	Understand algorithms for building classifiers applied on datasets of non-linearly separable classes	Understand
CO3	Understand the principles of evolutionary computing algorithms	Understand
CO4	Design an ensembler to increase the classification accuracy	Create
CO5	Application of reinforce learning	Apply

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

<b>CO2</b>					3			1						1	
<b>CO3</b>								2		1				1	
<b>CO4</b>	2		2							2			1	2	2
<b>CO5</b>			1				2						1		

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: C7325</b>	<b>Introduction to Natural Language Processing [OPEN ELECTIVE]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:**

- Data structures and compiler design

**Course Objectives:**

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

**Module–I: Finding the Structure of Words:**

Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

**Module–II: Syntax I:**

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

**Module–III: Syntax II:**

Models for Ambiguity Resolution in Parsing, Multilingual Issues Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

**Module–IV: Semantic Parsing II:**

Predicate-Argument Structure, Meaning Representation Systems

**Module–V: Language Modeling:**

Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

**Text Books:**

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication

**Reference Book:**

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson Publications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.	create
CO2	Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems	Understand
CO3	Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.	Apply
CO4	Able to design, implement, and analyze NLP algorithms; and design different language modeling Techniques.	Create
CO5	Application of language modeling	Apply

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: C7327</b>	<b>AI Applications [OPEN ELECTIVE]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Course Objectives:** To give deep knowledge of AI and how AI can be applied in various fields to make life easy.

**UNIT - I** Linguistic aspects of natural language processing, A.I. And Quantum Computing, Applications of Artificial Intelligence (AI) in business.

**UNIT - II** Emotion Recognition using human face and body language, AI based system to predict diseases early, Smart Investment analysis, AI in Sales and Customer Support.

**UNIT - III** Robotic Processes Automation for supply chain management.

**UNIT - IV** AI-Optimized Hardware, Digital Twin i.e. AI Modeling, Information Technology & Security using AI.

**UNIT - V** Recent Topics in AI/ML: AI/ML in Smart solutions, AI/ML in Social Problems handling, Block chain and AI.

**TEXT BOOKS:** 1. Sameer Dhanrajani, AI and Analytics, Accelerating Business Decisions, John Wiley & Sons. 2. Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Bernard Marr, Matt Ward, Wiley.

**REFERENCE BOOKS:** 1. Life 3.0: Being Human in the Age of Artificial Intelligence by Max Tegmark, 2018. 2. Homo Deus: A Brief History of Tomorrow by Yuval Noah Harari, 2017.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	To correlate AI and solutions to modern problems	Understand
CO2	To decide when to use which type of AI technique	Analyze
CO3	Understand Robotic Processes Automation	Understand
CO4	Analyze AI-Optimized Hardware	Analyze
CO5	Handle block chain and AI	Apply

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: C7328</b>	<b>Chat bots [OPEN ELECTIVE]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites :Nil**

**Course Objectives:**

- Knowledge on concepts of chatbots and understanding the developer environment bot framework.

**Module–I: Introduction to Chatbots:**

Definition of chatbots, Journey of Chatbots, Rise of Chatbots, Messaging Platforms

**Module–II:**

Setting Up the Developer Environment Botframework Local Installation, Installing NodeJS, Following the Development Pipeline, Storing Messages in Database.

**Module–III:**

Basics of Bot Building- Intents, Entities

**Module–IV:**

Advanced Bot Building Design Principles, Showing Product Results, Saving Messages, Building Your Own Intent Classifier

**Module–V:**

Business and Monetization Analytics, Chatbot Use Cases- Modes of Communication- Business-to-Business (B2B), Business-to-Consumer (B2C) Consumer-to-Consumer (C2C) Business-to-Employee (B2E), Employee-to-Employee (E2E), Chatbots by Industry Vertical

**Text Book:**

1. Rashid Khan, Anik Das, Build Better Chatbots: A Complete Guide to Getting Started with Chatbots, Apress

**Reference Books:**

1. Drexen Braxley, Chat GPT #1 Bible - 10 Books in 1: A Comprehensive Guide to AI: Elevate Your Daily Life, Increase Work Output, Secure Financial Gains, Foster Career Growth, and Cultivate Modern Talents Paperback
2. D. Nardo Publications, ChatGPT Made Simple How Anyone Can Harness AI To Streamline Their Work, Study & Everyday Tasks To Boost Productivity & Maintain Competitive Edge By Mastering Prompt Engineering
3. Robert E. Miller, Prompt Engineering Bible Join and Master the AI Revolutions Profit Online with GPT-4 & Plugins for Effortless Money Making!
4. Lucas Foster, Chat GPT Bible Developer and Coder Special Edition: Enhancing Coding Productivity with AI-Assisted Conversations.

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand basic concepts of chatbots	Understand
CO2	Analyze different entities in building bots	Analyze
CO3	Understand the concepts of advanced bot building	Understand
CO4	Discuss different types of chatbot use cases	Understand
CO5	Applying monetization Analytics	Apply

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

<b>2022-23 Onwards (MR-22)</b>	<b>Malla Reddy Engineering College (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: C7329</b>	Genetic Algorithms & Fuzzy Logic <b>[OPEN ELECTIVE]</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Course Objectives:** Knowledge on concepts of fundamentals of genetic algorithms, genetic technology and fuzzy logic

**UNIT - I** Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithm genetic modeling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.

**UNIT - II** Genetic Technology: steady state algorithm, fitness scaling, inversion. Genetic Programming: Genetic Algorithm in problem solving, Implementing a Genetic Algorithm: computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search: Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.

**UNIT - III** Introduction to genetics - based machine learning: Classifier system, Rule and Message system, Apportionment of credit, Knowledge based Techniques, Genetic Algorithms and parallel processors.

**UNIT - IV** Introduction: Background, Uncertainty and imprecision, Statistics and random processes, Uncertainty in information, Fuzzy sets and membership, Chance versus ambiguity, Classical sets - operations on classical sets to functions, Fuzzy sets-fuzzy set operations, Properties of fuzzy sets, sets as points in hypercube.

**UNIT - V** Classical Relations And Fuzzy Relations: Cartesian product, Crisp relations-cardinality of crisp relations, Operations on crisp relations, Properties of crisp relations,



Compositions, Fuzzy relations cardinality of fuzzy relations, Operations on fuzzy relations, Properties of fuzzy relations, Fuzzy Cartesian product and composition, Non interactive fuzzy sets, Tolerance and equivalence relations crisp equivalence relation, Crisp tolerance relation, Fuzzy tolerance, Max-min Method, other similarity methods.

**TEXT BOOKS:** 1. David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning"

2. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

**REFERENCE BOOKS:** 1. William B. Langdon, Riccardo Poli, "Foundations of Genetic Programming".

2. P. J. Fleming, A. M. S. Zalzal "Genetic Algorithms in Engineering Systems "

3. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers"

Melanie Mitchell- 'An introduction to Genetic Algorithm'- Prentice-Hall of India. 5.

Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by

Rajasekharan and Rai – PHI Publication. 6. Fuzzy Sets, Fuzzy Logic, and Fuzzy Systems

by Lotfi A. Zadeh Fuzzy logic with engineering application by Timothy J. Ross-wiley

**COURSE OUTCOMES:**

CO	Statement	Blooms Taxonomy Level
CO1	Understand the Fundamentals of genetic algorithm	Understand
CO2	Discuss Knowledge based techniques in Genetic Algorithm and techniques in genetic search	Understand
CO3	Understand genetics-based machine learning	Understand
CO4	Analyze and Understand Classical Relations and Fuzzy Relations	Analyze
CO5	Application of various relations	Apply

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

<b>CO4</b>				2						1	2	1			
<b>CO5</b>			1			1	1				1	1			