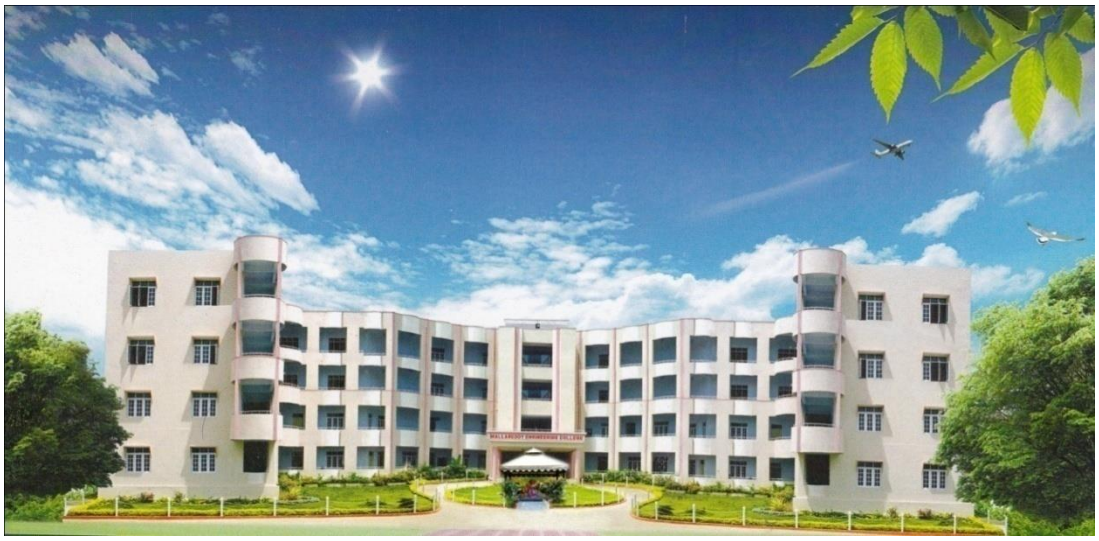
Course Structure and Detailed Syllabus

For

B.Tech-Four Year Degree Programme

(MR21 Regulations)

Effective from the Academic Year 2021-22 onwards



Department of AIML

Malla Reddy Engineering College

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

Malla Reddy Engineering College

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

Department of AIML

VISION

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

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.

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

PROGRAMME OUTCOMES (POs)

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

Malla Reddy Engineering College

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

Department of AIML

Course Structure and Syllabus for MR21 Regulations

(Effective from A.Y: 2021–22 Onwards)

I Year I Semester							
S.No	**Category**	**Course Code**	**Name of the Subject**	**Contact Hours/Week**			**Credits**
				L	**T**	**P**	
1.	BSC	B0B01	Linear Algebra and Numerical Methods	3	1	-	4
2.	BSC	B0B17	Engineering Chemistry	3	1	-	4
3.	ESC	B0501	Programming for Problem Solving	3	-	-	3
4.	ESC	B0301	Engineering Graphics	2	-	2	3
5.	BSC	B0B09	Semiconductor Physics	3	1	-	4
6.	ESC	B0502	Programming for Problem Solving Lab	-	-	2	1
7.	BSC	B0B11	Applied Physics Lab	-	-	2	1
8.	BSC	B0B18	Engineering Chemistry Lab	-	-	2	1
Total				**14**	**4**	**8**	**21**
Total Contact Hours				**27**			

I Year II Semester							
S.No	**Category**	**Course Code**	**Name of the Subject**	**Contact Hours/Week**			**Credits**
				L	**T**	**P**	
1.	HSMC	B0H01	English	3	-	-	3
2.	ESC	B0201	Basic Electrical and Electronics Engineering	3	-	-	3
3.	BSC	B0B02	Probability and Statistics	3	-	-	3
4.	ESC	B0504	Python Programming	3	1	-	4
5.	ESC	B0506	Python Programming Lab	-	1	2	2
6.	HSMC	B0H02	English Language and Communication Skills Lab	-	-	3	1
7.	ESC	B0202	Basic Electrical and Electronics Engineering Lab	-	-	2	1
8.	ESC	B1201	Engineering and IT Workshop	-	-	2	2
Total				**12**	**2**	**9**	**19**
Total Contact Hours				**23**			

Malla Reddy Engineering College

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

Department of AIML

Course Structure and Syllabus for MR21 Regulations

(Effective from A.Y: 2021–22 Onwards)

II Year I Semester							
S. No	**Category**	**Course Code**	**Name of the Course**	**Teaching Hours/Week**			**Credits**
				L	**T**	**P**	
1	PCC	B0507	Discrete Mathematics	3	-	-	3
2	PCC	B0508	Computer Organization and Architecture	3	-	-	3
3	PCC	B0509	Data Structures	3	-	-	3
4	PCC	B7301	Artificial Intelligence-I	3	-	-	3
5	PCC	B0510	Object Oriented Programming	3	-	-	3
6	PCC	B0512	Data Structures Lab	-	-	3	1.5
7	PCC	B7302	Artificial Intelligence-I Lab	-	-	3	2
8	PCC	B0513	Object Oriented Programming Lab	-	1	2	1.5
9	MC	B00M1	Gender Sensitization	-	-	2	-
			Total	15	1	10	20
			Total Contact Hours	**26**			

II Year II Semester							
S. No	**Category**	**Course Code**	**Name of the Course**	**Teaching Hours/Week**			**Credits**
				L	**T**	**P**	
1	BSC	B0B07	Applied Statistics and Optimization Techniques	3	-	-	3
2	PCC	B0511	Operating Systems	3	-	-	3
3	**PCC**	**B7303**	**Introduction to Machine Learning**	3	-	-	3
4	PCC	B0516	Design & Analysis of Algorithms	3	-	-	3
5	**Professional Elective–I**						
	PEC-I	B0522	Computer Graphics	3	-	-	3
		B1204	Android Application Development				
		B1202	Web Technologies				
		B6706	R Programming				
		B7304	**Data Science and Engineering**				
6	PCC	B0514	Operating Systems Lab	-	1	2	2
7	PCC	**B7305**	**Introduction to Machine Learning Lab**	-	-	3	1.5
8	PCC	B0521	Design & Analysis of Algorithms Lab	-	-	3	1.5
9	MC	B00M2	Environmental Science	2	-	-	-
			Total	**17**	**1**	**8**	**20**
			Total Contact Hours	**26**			

Malla Reddy Engineering College

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

Department of AIML

Course Structure and Syllabus for MR21 Regulations

(Effective from A.Y: 2021–22 Onwards)

III Year I Semester							
Sl.No	**Category**	**Course Code**	**Name of the Course**	**Contact Hours/Week**			**Credits**
				L	**T**	**P**	
1	PCC	B1207	Theory of Automata	3	-	-	3
2	PCC	B0525	Software Engineering and Modeling	3	-	-	3
3	PCC	B6201	Computer Networks	3	-	-	3
4	**PCC**	B6705	Advanced Python Programming	3	-	-	3
Professional Elective–II							
5	**PEC-II**	**B7306**	Computational Intelligence	3	-	-	3
		B1208	Information Retrieval				
		B7307	Optimization Techniques				
		B0535	Multimedia and Rich Internet Applications				
		B7308	Data Visualization				
Open Elective-I							
	OEC- I	**B0159**	Green Building	3	-	-	3
6	PCC	B6707	Advanced Python Programming Lab	-	-	2	1
7	PCC	B6202	Computer Networks Lab	-	-	3	1.5
8	MC	B00M3	Quantitative Aptitude &Verbal Reasoning-I	2	-	-	-
			Total	**20**	**-**	**5**	**20.5**
			Total Contact Hours	**25**			

Malla Reddy Engineering College

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

Department of AIML

Course Structure and Syllabus for MR21 Regulations

(Effective from A.Y: 2021–22 Onwards)

III Year II Semester							
S.No	**Course Category**	**Course Code**	**Name of the Course**	**Contact Hours/Week**			**Credits**
				L	**T**	**P**	
1	HMSC	B0H08	Engineering Economics and Accountancy	3	-	-	3
2	PCC	B0532	Compiler Design	4	-	-	4
3	PCC	B1213	DevOps	3	1	-	3
Professional Elective–III							
4	**PEC-III**	**B7309**	Pattern Recognition	3	-	-	3
		B0533	Distributed Systems				
		B6203	Cryptography and Network Security				
		B0534	Animation Techniques				
		B6217	Cyber Security				
Open Elective-II							
5	**OEC -II**	B0120	Disaster Management & Mitigation	3	-	-	3
6	HSMC	B0H03	English Communication and Presentation Skills Lab	-	-	2	1
7	PCC	B1220	DevOps Lab	-	-	2	1
8	PCC	B0543	Compiler Design Lab	-	1	2	2
9	MC	B00M4	Quantitative Aptitude &Verbal Reasoning-II	2	-	-	-
			Total	**18**	**1**	**7**	**20**
			Total Contact Hours	**26**			

Malla Reddy Engineering College

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

Department of AIML

Course Structure and Syllabus for MR21 Regulations

(Effective from A.Y: 2021–22 Onwards)

IV Year I Semester							
S.No	**Category**	**Course Code**	**Name of the Course**	**Contact Hours / Week**			**Credits**
				L	**T**	**P**	
1	HSMC	B0H09	Management Fundamentals	3	-	-	3
2	PCC	B7310	Data Analytics	3	-	-	3
3	PCC	B0536	Data Mining	3	-	-	3
Professional Elective–IV							
4	**PEC-IV**	B0527	Cloud Computing	3	-	-	3
		B1217	Augmented Reality and Virtual Reality				
		B0546	Business Analytics				
		B7311	Data and Visual Analytics in AI				
		B0541	Image Processing				
Professional Elective–V							
5	**PEC-V**	B1218	Software Project Management	3	-	-	3
		B1219	Mobile Communication				
		B6615	IoT With Machine Learning				
		B0548	Software Testing Methodologies				
		B6920	Ad-hoc Sensor Networks				
6	PCC	B7313	Data Analytics Lab	-	-	2	1.5
7	PCC	B0544	Data Mining Lab	-	-	2	2
8	PROJ	B00P1	Internship-III/Mini Project	-	-	4	2
			Total	15	-	8	**20.5**
			Total Contact Hours	**24**			

IV Year II Semester							
S.No	**Category**	**Course Code**	**Name of the Course**	**Contact Hours / Week**			**Credits**
				L	**T**	**P**	
Professional Elective–VI							
1	**PEC-VI**	B7312	AI for Robotics	3	-	-	3
		B0550	Deep Learning				
		B0537	Natural Language Processing				
		B1211	Soft Computing				
		B6917	Internet of Things				
2	**OEC-III**		**Open Elective-III**	3	-	-	3
3	PROJ	B00P2	Major Project	-	-	24	12
4	TSEM	B00P3	Seminar	-	-	2	1
			Total	**6**	**-**	**26**	**19**
			Total Contact Hours	**32**			

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. I Semester		
Code: B0B01	Linear Algebra and Numerical Methods	L	T	P
Credits: 4	Common For CSE, IT,CSE-AIML, DS, CS, IOT, and B.Tech-AIML	3	1	-

Prerequisites: NIL

Course Objectives:

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

Module-I: Matrix Algebra [12 PERIODS]

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

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

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

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

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

Module III: Algebraic &Transcendental equations [12 Periods]

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

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

Module IV: Interpolation [12 Periods]

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

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

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

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

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. M . K Jain, S R K Iyengar, R.K Jain, Numerical Methods for Scientific and Engineering Computation, New age International publishers.
5. S.S.Sastry, Introductory Methods of Numerical Analysis,5th Edition, PHI Learning Private Limited 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 to East–West press, Reprint 2005.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

E – Resources

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

NPTEL

1. https://www.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy_2iUCG87BLKl8eISe4fHKdE2_j2B_T&index=5 (Matrices – System of linear Equations)
2. https://www.youtube.com/watch?v=wrSJ5re0TAw (Eigen values and Eigen vectors)
3. https://www.youtube.com/watch?v=yuE86XeGhEA (Quadratic forms)
4. https://www.youtube.com/watch?v=WbmLBRbp0zA (Bisection Method)
5. https://www.youtube.com/watch?v=0K6olBTdcSs (Regula Falsi and Newton Raphson Method)

6. https://www.youtube.com/watch?v=KSFnfUYcxoI (Interpolation)
7. https://www.youtube.com/watch?v=QugqSa3Gl-w&t=2254s (Numerical Solution of ODE)
8. https://www.youtube.com/watch?v=NihKCpjx2_0&list=PLbMVogVj5nJRILpJJO7KrZa8Ttj4_ZAgl(Numerical Solution of ODE)
9. https://www.youtube.com/watch?v=hizXlwJO1Ck (Numerical Integration)

Course Outcomes:

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech I Semester		
Code:B0B17	Engineering Chemistry	L	T	P
Credits: 4	(Common for ALL)	3	1	-

Prerequisites: NIL

Course objectives:

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

Module I: Water and its treatment [10 Periods]

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

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

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

Module III: Electrochemistry and Corrosion [17 Periods]

A. Electrochemistry:

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

B. Corrosion: [7 Periods]

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

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

Introduction to Isomers - classification of isomers - structural (chain, positional & functional)

and stereoisomerism-geometrical (cis-trans & E-Z system) - characteristics of geometrical isomerism, optical isomerism (chirality - optical activity, specific rotation, enantiomers and diastereomers) of tartaric acid and lactic acid. Conformational isomerism ofn-Butane. Introduction to bond cleavage (homo & hetero cleavage) - reaction intermediates and their stability. Types of organic reactions - Mechanism of substitution (SN^1& SN^2) and (E_1&E_2) reactions with suitable example. Ring opening (Beckmann rearrangement), oxidation and reduction (Cannizaro reaction), cyclization (Components of Diels-Alder reaction-Mechanism of Diels-Alder reaction with suitable example) reactions. Synthesis of Paracetamol, Aspirin and their applications. Introduction to Spectroscopy, Basic concepts of nuclear magnetic resonance spectroscopy, chemical shift and spin-spin splitting.

UNIT-V FUELS AND COMBUSTION [08 PERIODS]

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

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

Text Books:

1. P.C.Jain and Monica Jain, "**A Text Book of Engineering Chemistry"**, DhanpatRai Publications, New Delhi, 16th Edition 2014.
2. S.S. Dara and S.S. Umare, "**A Text Book of Engineering Chemistry"**, S Chand Publications, New Delhi, 12th Edition 2010.
3. A.Jaya Shree, "Text book of Engineering Chemistry", Wiley, New Delhi, 2018.

Reference Books:

1. B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath,**"Text Book of Engineering chemistry"**,Cengage Learning India Pvt.Ltd,2016.
2. M.G. Fontana and N. D. Greene, "**Corrosion Engineering"**, McGraw Hill Publications, New York, 3rd Edition, 1996.
3. K. P. C. Volhardt and N. E. Schore, **"Organic Chemistry: Structure and Function"**, 5thEdition, 2006.

Course Outcomes:

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. I Semester		
Code: B0501	**Programming for Problem Solving**	L	T	P
Credits: 3	Common for CE, EEE, ME, ECE, CSE, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIML, IT and Mi.E	3	-	-

Prerequisites: NIL

Course Objectives:

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

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

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

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

MODULEII: Conditional Statements and Repetition Statements [09 Periods]

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

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

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

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

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

MODULE IV: Strings and Pointers [09 Periods]

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

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

MODULE V: Structures and File Handling [10 Periods]

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

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

Textbooks

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

References

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

E–Resources

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

Course Outcomes:

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. I Semester		
Code: B0301	Engineering Graphics (Common for All)	L	T	P
Credits: 3		2	-	2

PREREQUISITES: NIL

Course Objectives:

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

Module I:

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

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

Scales: Plane Scale, Diagonal scale, Vernier Scale.

Module II:

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

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

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

Module III:

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

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

Module IV:

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

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

Module V:

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

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

TEXT BOOKS

1. K.L.Narayana, S. Bheemanjaneyulu "Engineering Drawing with Auto CAD-2016" New Age InternationalPublishers, 1st Edition, 2018.
2. N.D. Bhat, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.

REFERENCES

1. K.L.Narayana, P.Kannaiah, "Engineering Drawing", SciTech Publishers. 2nd Edition, 2017
2. K.Venugopal,"Engineering Drawing",NewAge International Publishers, 3rd Edition, 2014.
3. K. V. Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, 2015.
4. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2011.

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

E - RESOURCES

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

Course Outcomes:

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)		B.Tech. I Semester	
Code: B0B09	Semiconductor Physics	L	T	P
Credits: 4	Common for Sem-I: B. Tech-AIML, CSE-AIML, CSE-CS, CSE-IoT and CSE-DS & Sem-II: CSE and IT	3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:

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

Module–I:Quantum Mechanics [8 Periods]

Introduction, Plank's theory of black body radiation, deduction of Wien's 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]

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.

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, 1st Edition, 2017.
2. Jasprit Singh,"Semiconductor Optoelectronics: Physics and Technology", McGraw-Hill, 1995.
3. Morris Mano, "Digital Design", Prentice - Hall, 1995.

Reference Books:

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

E-Resources

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

Journals:

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

NPTEL Videos:

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

Course Outcomes:

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. I Semester		
Code: B0502	Programming for Problem Solving Lab	L	T	P
Credits: 1	Common for CE, EEE, ME, ECE, CSE, CSE-CS,CSE-AIML, CSE-DS, CSE -IOT, B.Tech-AIML, IT and Mi.E	-	-	2

Prerequisites: NIL

Course Objectives:

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

Software Requirements: C

List of Programs:

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

8. Write a C program to perform the following:
   a. Addition of Two Matrices
   b. Multiplication of Two Matrices.

9. Write a C program that uses functions to perform the following operations:
   a. To insert a sub-string into given main string from a given position.
   b. To delete n characters from a given position in a given string.
   c. To find substring in a given string

10. a. Write a C program to determine if the given string is a palindrome or not
    b. Write a C program to count the lines, words and characters in a given text.

11. a. Write a C program to swap two numbers, which implement call by value and call by reference.
    b. Write a C program to display the below student details using structures

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

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

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

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

Text Books:

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

References:

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

Course Outcomes:

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. I Semester		
Code:B0B11	Applied Physics Lab (Common for B.Tech-AIML, CSE-AIML, CSE-CS, CSE-IoT, CSE-DS ,CSE and IT	L	T	P
Credits: 1		-	-	2

Course objectives:

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

List of Experiments:

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

Course Outcomes:

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

COs	Course Outcomes	Bloom's Taxonomy Level
CO1	Develop skills to impart practical knowledge in real time solution	Analyze
CO2	Understand principle, concept, working, application and comparison of results with theoretical calculations	Understand
CO3	Design new instruments with practical knowledge	Analyze
CO4	Understand measurement technology	Understand
CO5	Use new instruments and real time applications in engineering studies	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	1	1	-	-	-	-	2	3	2	-	2	-	-	-
CO2	2	1		-	-	-	-	3	2	2	-	2	-	-	-
CO3	2	1	1	-	-	-	-	2	3	2	-	2	-	-	-
CO4	1	1	1	-	-	-	-	3	2	2	-	2	-	-	-
CO5	1	1		-	-	-	-	2	3	2	-	2	-	-	-

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. I Semester		
Code: B0B18	Engineering Chemistry Lab	L	T	P
Credits: 1	(Common for ALL)	-	-	2

Course Objectives:

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

List of Experiments:

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

Course outcomes:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Acquire knowledge about the chemistry lab, kind of experiments that can be performed and the precautions to perform four types of titrations	Analyze
CO2	Learn and apply basic technique used in chemistry laboratory for estimation hardness & alkalinity of water.	Apply
CO3	Understand about mineral analytic technique for estimation of ions/metal ions in minerals.	Analyze
CO4	Apply instrumental techniques such as colorimetry, conductometry & potentiometry.	Understand
CO5	Learn to determine physical properties like free chlorides in water, viscosity & surface tension.	Understand

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code:B0H01	English	L	T	P
Credits: 3	Common for CE, EEE, ME, ECE, CSE, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIML, IT and Mi.E	3	-	-

Course Objectives:

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

MODULE – I

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

MODULE – II

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

MODULE – III

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

MODULE – IV

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

MODULE – V

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

Reading **:** Reading for Specific Purposes, Reading Comprehension practice
Writing **:** Paraphrasing & Summarizing,

Prescribed Textbook:

Reference Books:

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

Related Websites:

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

Course Outcomes:

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

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

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

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			

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code: B0201	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, π- section Filters.

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

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

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

Text Books

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, **" Basic Electrical and Electronics Engineering"**, S.Chand and Company Limited, New Delhi, 1st Edition, 2017.
2. R.L.Boylestad and Louis Nashlesky, **"Electronic Devices & Circuit Theory"**, Pearson Education, 2007.

References

1. V.K. 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, 2nd Edition, 2005.

E - Resources

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

Course Outcomes:

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

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

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	3	3	3	3					3			3	-	-	-
CO2	3	3	3	3					3			3	-	-	-
CO3	3	3	3	3					3			3	-	-	-
CO4	3	3	3	3					3			3	-	-	-
CO5	3	3	3	3					3			3	-	-	-

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code:B0B02	Probability and Statistics	L	T	P
Credits: 3	Common for CSE, IT, CSE-AIML, , CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML	3	-	-

Prerequisites: NIL

Course Objectives:

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

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

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

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

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

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

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

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

Large sample tests:

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

MODULE IV: Small sample tests: **[12 Periods]**

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

MODULE V: Correlation, Regression: [10 Periods]

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

Text Books

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

References

1.P. G. Hole, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).

2.S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

3.W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.

E–Resources

a) Concerned Website links:

1.http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20&%20Statistics.pdf(Probability& Statistics for Engineers & Scientists text book)

2. http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf (Random variables and its distributions)

4. 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:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	The students will understand and appreciate the role of P&S in data analytics and big data analysis	Understand
CO2	Students would be able to find the Probability in certain realistic situation	Apply
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.	Analyze
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.	Understand
CO5	Students will understand how to forecast the future observations.	Apply

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code: B0504	Python Programming	L	T	P
Credits: 4	Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML	3	1	-

Course Objectives: This course will enable students to

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

MODULE - I **[10 Periods]**

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

MODULE - II **[9 Periods]**

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

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

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

MODULE - III **[10 Periods]**

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

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

MODULE – IV **[10 Periods]**

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

MODULE - V **[9 Periods]**

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

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

Text Books

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

Reference Books

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

E–Resources

1. "Learn Python - Free Interactive Python Tutorial", https://www.learnpython.org/
2. "Free Python Tutorial - Python For Beginner," https://www.udemy.com/share/101EfoBUcccV1SQHw
3. "Basics of Python for Data Science", https://olympus.greatlearning.in/courses/11265
4. "Beginners Guide / Programmers - Python Wiki", https://wiki.python.org/moin/BeginnersGuide/Programmers
5. "Introduction to Python", https://www.datacamp.com/courses/intro-to-python-for-data-science

Course Outcome :

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

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

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

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	O1	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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code: B0506	Python Programming Lab Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives:

This course enables the students to develop various applications using python.

Software Requirements: Python

List of Programs:

1 a) Write a program to purposefully raise Indentation Error and correct it.
   b) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).
   c) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

2 a) Write a Program for checking whether the given number is a even number or not.
   b) Using for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10.
   c) Write a program using for loop that loops over a sequence. What is sequence?
   d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

3 a) Find the sum of all the primes below two million.
   b) Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89
   c) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.
   d) Write a program to count the numbers of characters in the given string and store them in a dictionary data structure
   e) Write a program to use split and join methods in the given string and trace a birthday with a dictionary data structure.

4 a) Write a program to combine two lists into a dictionary.
   b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

5 a) Write a program to print each line of a file in reverse order.
   b) Write a program to compute the number of characters, words and lines in a file.

6 a) Write a function ball _collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.
   Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius. If (distance between two balls centers) <= (sum of their radii) then (they are colliding)
   b) Find mean, median, mode for the given set of numbers in a list.

7 a) Write a function nearly_ equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
   b) Write a function dups to find all duplicates in the list.
   c) Write a function unique to find all the unique elements of a list.

8 a) Write a function cumulative_product to compute cumulative product of a list of numbers.
   b) Write a function reverse to reverse a list. Without using the reverse function.

9 Create a Regular Expression and implement the following
   a) Recognize the following strings: “bat,” “bit,” “but,” “hat,” “hit,” or “hut.”
   b) Match any pair of words separated by a single space, i.e., first and last names.
   c) Match any word and single letter separated by a comma and single space, as in last name, first initial.
10 Write a python program to implement multithreading scenarios.
11 Write a python program to simulate the banking operations using Class.
12 Write a python program to demonstrate the Queue / Stack operations using Class.

Text Books

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

Reference Books

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

Course Outcomes:

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code: B0H02	**English Language and Communication Skills Lab** (Common for CE, EEE, ME, ECE, CSE, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIML , IT and Mi.E)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

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

Course Objectives:

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

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

Listening Skills:

Objectives:

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation

2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

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

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

Speaking Skills:

Objectives:

1. To make students aware of the role of speaking in English and its contribution to their success.

2. To enable students to express themselves fluently and appropriately in social and professional contexts.

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

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

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

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

Module - I:

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

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

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

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

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

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

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

Reference Books:

1. Roach, Peter. English Phonetics and Phonology. 4th edition, Cambridge University Press, 2009.
2. Hughes, John and Mallett, Andrew. *Successful Presentations DVD and Student's Book Pack*. Oxford University Press, 2013.
3. Hancock, Mark. *English Pronunciation in Use* (Intermediate). 2nd edition, Cambridge

University Press, 2009.
4.Karia, Akash. *Public Speaking Mastery: Speak Like a Winner*. Kindle edition, 2013.
5.Lucas, Stephen. *The Art of Public Speaking.* 11th edition, Tata McGraw Hill, 2011.

Websites:

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

Course Outcomes:

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

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

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

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

2021-22 Onwards (MR21)	**Malla Reddy Engineering College (Autonomous)**	B.Tech. II Semester		
Code: B0202	**Basic Electrical And Electronics Engineering Lab** (Common for all branches)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Course Objectives:

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

List of Experiments:

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

Course Outcomes:

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

COs	Course Outcomes	Bloom's Taxonomy Level
CO1	Experimentally verify the basic circuit theorems, KCL and KVL	Understand
CO2	Measure power, power factor and phase angle in RC circuits experimentally.	Apply
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	Analyze
CO4	Draw the characteristics of different semiconductor devices like PN junction Diode, Zener Diode, BJT and JFET by conducting suitable experiments.	Understand
CO5	Experimentally verify the working of half and full wave rectifier by using PN Junction diodes.	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		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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. II Semester		
Code: B1201	Engineering and IT Workshop Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML	L	T	P
Credits: 1.5		-	-	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:
At the end of the course, students will be able to:

CO	Statement	Blooms Taxanomy 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	Understand
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	Understand
CO3	To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools and LaTeX	Understand

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B0507	Discrete Mathematics Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

The main objectives of the course are to:

- Introduce concepts of mathematical logic for analyzing propositions and proving theorems.
- Use sets for solving applied problems, and use the properties of set operations algebraically.
- Work with relations and investigate their properties.
- Investigate functions as relations and their properties.
- Introduce basic concepts of graphs, digraphs and trees.

MODULE I: Mathematical Logic [10 Periods]

Basic Logics - Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology.

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

MODULE II: Predicate Logic and Relations [10 Periods]

Predicate Logic - Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Proof of automatic Theorem.

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

MODULE III: Functions and Algebraic Structures [10 Periods]

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

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

MODULE IV: Counting Techniques and Theorems [09 Periods]

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

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

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

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

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

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

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Apply the concepts of connectives and normal forms in real time applications	**Apply**
CO2	Summarize predicate logic, relations and their operations	Summarize
CO3	**Describe** functions, algebraic systems, groups and Boolean algebra	**Describe**
CO4	Illustrate practical applications of basic counting principles, permutations, combinations, and the pigeon-hole methodology	**Illustrate**
CO5	Analyze techniques of generating functions and recurrence relations	**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	2				3							2	3		
CO2	3											2	3		
CO3		3										2	3		
CO4	3	3	2	3								2		3	
CO5					3							2		3	

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B0508	Computer Organization and Architecture	L	T	P
Credits: 3	Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML	3	-	-

Prerequisites: No prerequisites

Objectives:

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

MODULE – I **[10 Periods]**

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

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

MODULE – II **[10 Periods]**

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

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

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

MODULE – III **[9 Periods]**

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

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

MODULE – IV **[10 Periods]**

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

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

MODULE – V **[9 Periods]**

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

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

Textbook:

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

References:

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

E-Resources:

https://books.google.co.in/books?isbn=8131700704
http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7Eh9eBOsT1ELoYpKlg_xngrkluevXOJLs1TbxS8q2icgUs3hL4_KAi5So5FgXcVg
http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7xAYUzYSlXl4zudlsolr-e7wQNrNXLxbgGFxbkoyx1iN3YbHuFrzI2jc_70rWMEwQ
http://nptel.ac.in/courses/106106092/

Course Outcomes:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the theory and architecture of central processing unit	Understand
CO2	Analyze some of the design issues in terms of speed, technology, cost, performance	Analyze
CO3	Design a simple CPU with applying the theory concepts	Design
CO4	Use appropriate tools to design verify and test the CPU architecture	Understand
CO5	Learn the concepts of parallel processing, pipelining and inter processor communication	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			
CO2		2	3									1			
CO3	2	2	3	2	2							2			
CO4	3														
CO5	3														

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B0509	Data Structures	L	T	P
Credits: 3	Common for CSE, IT, CSE-AIML, CSE-DS, CSE-CS, CSE-IOT and B.Tech-AIML	3	-	-

Prerequisites: A course on "Programming for Problem Solving "

Course Objectives:

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

MODULE-I: [10 Periods]

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

MODULE-II: [09 Periods]

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

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

MODULE-III: [10 Periods]

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

MODULE-IV: [10 Periods]

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sortings: 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, 2nd Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudo code approach with C ", Thomson (India), 2nd Edition, 2004.

References:

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

E-Resources:

1. http://gvpcse.azurewebsites.net/pdf/data.pdf
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf

3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
5. http://nptel.ac.in/courses/106102064/1

Course Outcomes:

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B7301	Artificial Intelligence-I	L	T	P
Credits: 3	B.Tech-AIML	3	-	-

Pre-Requisites:

- Basic Programming in Python
- Data Structures

Objectives:

- To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Module-I: Overview of AI **[9 Hours]**

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Module-II: Searching **[9 Hours]**

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions**.**

Module -III: Knowledge Representations **[10 Hours]**

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules-based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempstershafer theory.

Module -IV: Natural Language Processing **[10 Hours]**

First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, learning from observation Inductive learning, Decision Trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

Module -V: Expert Systems **[9 Hours]**

Introduction, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties in knowledge acquisition, methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence.

Text Books:

1. S. Russel and P.Norvig, "Artificial Intelligence–A Modern Approach", Second Edition, Pearson Education

2. 2. David Poole, Alan Mackworth, Randy Goebel," Computational Intelligence: a logical approach", Oxford University Press.

3. 3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.

4. 4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

Reference:

1. https://nptel.ac.in/courses/106105077

2. https://nptel.ac.in/courses/106106126
3. https://aima.cs.berkeley.edu
4. https://ai.berkeley,edu/project_overview.html (for Practical's)

Course Outcomes:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Understanding fundamentals of AI and LISP	Understanding
CO2	Understanding about Search and Control Strategies	Understanding
CO3	Understand different types of Knowledge Representations	Understanding
CO4	Understand how to process Natural Language	Understanding
CO5	Understand of expert systems and Learning process	Understanding

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	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B0510	Object Oriented Programming	L	T	P
Credits: 3	Common for CSE, IT,CSE(DS),CSE(AIML),CSE(CS),and CSE(IOT) and B.Tech-AIML	3	-	-

Prerequisites: Computer Programming

Course Objectives:

This course will make students able

- To learn and understand the concepts and features of object oriented programming
- To acquire the knowledge in Java's exception handling mechanism, multithreading
- To explore concepts of Applets and event handling mechanism.
- To gain the knowledge in programming using Layout Manager and swings.
- To design interactive applications for internet purpose

MODULE-I: OOP Concepts & Introduction to C++, Java [9 Periods]

Introduction to OOPs & C++: Introduction to object oriented concepts: Object, class, methods, instance variables; C++ program structure; accessing class data members; Overview of Inheritance, Overloading, Polymorphism, Abstraction, Encapsulation.

Introduction to Java: History of JAVA, Java buzzwords, data types, variables, scope and life time of variable, arrays, operators, expressions, control statements, type conversion and type casting, simple Java program.

MODULE II: Basics of Java [11 Periods]

Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, This Key Word, Garbage Collection, Overloading Methods, Constructors, Parameter Passing, Recursion,

String Handling: String, String Buffer, String Tokenizer.

Inheritance - Base Class Object, Subclass, Member Access Rules, Super Uses, Using Final with Inheritance, Method Overriding, Abstract Classes

MODULE III: Interfaces and Exception Handling [10 Periods]

Interfaces: Defining an interface, implementing interface, differences between classes and interfaces, extending interfaces. Packages - Defining, creating and accessing a package, importing packages, access control, exploring package-java.io (file handling).

Exception Handling: Concepts of Exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of try, catch, throw, throws and finally, built-in exceptions, creating own exception subclasses

MODULE IV: Multithreading and Collection Classes [09 Periods]

Multithreading: Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Collection Classes: ArrayList, LinkedList, HashSet, LinkedHashSet, TreeSet, PriorityQueue, ArrayDequeue, EnumSet.

MODULE V: Event Handling, Layout Manager and Swings [09 Periods]

Event Handling: Events, Event sources, event classes, event listeners, delegation event model, handling mouse and keyboard events, adapter classes.

Layout Manager: Border, Grid, Flow, Card and Gridbag.

Swings: Introduction, limitations of AWT, components, containers, exploring swing-JApplet, JFrame and JComponent, Icons and Labels, TextFields, buttons – the JButton class, Checkboxes, Radio buttons, Combo boxes, Tabbed Panes, ScrollPanes, Trees and Tables.

Text Books:

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

References:

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

E-Resources:

1. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-RPf64_TFk2i4LJhgQFPQWAEt-Zobbm3twyubjRA1YOe9WVwkN2qGcxBwdHaPdi_mMQ
2. https://ndl.iitkgp.ac.in/result?q={"t":"search","k":"object%20oriented%20programming", "s":["type=\"video\""],"b":{"filters":[]}}
3. http://www.rehancodes.com/files/oop-using-c++-by-joyce-farrell.pdf
4. http://www.nptel.ac.in/courses/106103115/36

Course Outcomes:

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

CO	Course Outcome	Bloom’s Taxonomy Level
CO1	Differentiate structured programming and object oriented programming and know the concepts of classes, objects, members of a class.	Analyze
CO2	Apply object oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface.	Apply
CO3	Capable of handling run time errors using Exceptional Handling and develop applications for concurrent processing using Thread Concept.	Apply
CO4	Design Applets that take user response through various peripheral devices such as mouse and keyboard by event handling mechanism.	Apply
CO5	Design interactive applications for use on internet	Apply

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B0512	Data Structures Lab	L	T	P
Credits: 1.5	(Common for CSE, IT, CSE(DS), CSE(AIML), CSE(CS), and CSE(IOT) and B.Tech-AIML	-	-	3

Prerequisites: A Course on "Programming for problem solving"

Objectives:

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

Software Requirements: C

List of Programs:

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

Text Books

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

References

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

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Develop C programs for computing and real life applications using basic data structures like stacks, queues, linked lists, Binary Search Trees	Apply
CO2	Make use of basic data structures implementing various tree and graph traversal operations and algorithms	Understand
CO3	Apply the concepts of basic data structures and implement advanced operations AVL Trees, Red –Black Trees, and Splay Trees concepts.	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	2										3	2	
CO2	2	2	3										2	3	
CO3		2	3										2	3	1

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B7302	Artificial Intelligence-I Lab B.Tech-AIML	L	T	P
Credits: 2		-	-	3

List of Experiments:

Implementation: PYTHON / PROLOG / LISP

1. Write a program to conduct uninformed search.
2. Write a program to conduct informed search.
3. Write a program to conduct game search.
4. Write a program to construct a Bayesian network from given data.
5. Write a program to infer from the Bayesian network.
6. Write a program to illustrate Hidden Markov Model.
7. Write a program to run value and policy iteration in a grid world.
8. Write a program to do reinforcement learning in a grid world.
9. Write a program to implement Adaptive Dynamic Programming.
10. Write a program to implement Active Dynamic Programming.
11. Write a program to implement Q Learning.
12. Case Study

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Implement Various Searching Algorithms	Apply
CO2	Demonstrate different types of AI Models	Understand
CO3	Analyze Adaptive and Active Programming	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		2	3										3	2	1
CO2			3		2								2	3	
CO3		2	2		2										1

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code: B0513	**Object Oriented Programming Lab** **Common for CSE, IT, CSE-DS, CSE-AIML, CSE-CS, CSE-IOT and B. Tech-AIML**	**L**	**T**	**P**
Credits: 1.5		**-**	**-**	**3**

Prerequisites: NIL

Course Objectives:

This course will make students able to learn and understand the concepts and features of object-oriented programming and the object-oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading, to explore concepts of Applets and event handling mechanism. This course makes students to gain the knowledge in programming using Layout Manager and swings.

Software Requirements: Java

List of Programs:

1. **Write Java Programs that implement the following.**
   a) Constructor
   b) Parameterized Constructor
   c) Method Overloading
   d) Constructor Overloading
2. **Write a Java program**
   a) Checks whether a given string is a palindrome or not.
   b) For sorting a given list of names in ascending order.
   c) That reads a line if integers and then displays each integer and the sum of all integers (use string tokenizer class of java.util).
3. **Write Java programs that uses the following keywords…**
   a) this
   b) super
   c) static
   d) final
4. **Write a Java program to implement**
   a) Method Overriding.
   b) Dynamic Method Dispatch.
   c) Multiple Inheritance.
   d) Access Specifiers.
5. **Write a Java program that**
   a) Reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
   b) Reads a file and displays the file on the screen, with a line number before each line.
   c) Displays the number of characters, lines and words in a test file.
6. **Write a Java program for handling**
   a) Checked Exceptions.
   b) Unchecked Exceptions.
7. **Write a Java program**
   a) Creates three threads. First threads displays "Good Morning "for every one Second , the second thread displays "Hello" for every two seconds, the third thread Displays "Welcome" for every three seconds.

b) That correctly implements producer consumer problem using concept of inter thread communication.

8. **Write a Java program which demonstrates the use of following collection classes**
   a) Array List
   b) Hash Set
   c) Deque
9. **Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*,/ operations. Add a text field to display the result.**
10. **Write a Java program for handling**
    a) Mouse Events.
    b) Key Events.
11. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text field's num1 and num2. The division of num1 and num2 is displayed in the result field when the divide button is clicked. If num1 or num2 were not an integer, the program would throw number format exception. If num2 were zero, the program would throw an arithmetic exception and display the exception in the message dialogue box.
12. Write a Java program that

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

Text Books:

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

References:

1. P.J. Deitel and H.M. Deitel, "**Java for Programmers**", Pearson education.
2. P. Radha Krishna, "**Object Oriented Programming through Java**", Universities Press.
3. Bruce Eckel," **Programming in Java**", Pearson Education.
4. S. Malhotra and S. Choudhary," **Programming in Java**", Oxford Univ. Pres

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Build simple java programs using Object Oriented Programming.	Apply
CO2	Create user defined packages to build real time applications	Apply
CO3	Develop applications on files, exceptions, threads and applets	Develop
CO4	Construct GUI based applications	Design
CO5	Design Interactive applications for use on internet	Design

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. III Semester		
Code:B00M1	Gender Sensitization	L	T	P
Credits: NIL	(An Activity-based Course) Common for CE, EEE, ME, ECE,MiE, CSE, T,CSE(DS), CSE(AIML), CSE(CS), and CSE(IoT))	-	-	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.

Course Objectives:

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

MODULE I: UNDERSTANDING GENDER **[06 PERIODS]**

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudestowards Gender-Construction of Gender-Socialization: Making Women, Making Men

- Preparing for Womanhood. Growing up Male. First lessons in Caste.

MODULE II: GENDER ROLES AND RELATIONS **[06 PERIODS]**

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

MODULE III: GENDER AND LABOUR **[07 PERIODS]**

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

MODULE IV: GENDER - BASED VIOLENCE [07 PERIODS]

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a HumanRights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping withEveryday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. RebuildingLives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

MODULE V: GENDER AND CULTURE [06 PERIODS]

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and PopularLiterature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender andPopular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

NOTE: SINCE IT IS INTERDISCIPLINARY COURSE, RESOURCE PERSONS CAN BE DRAWN FROM THE FIELDS OF ENGLISH LITERATURE OR SOCIOLOGY OR POLITICAL SCIENCE OR ANY OTHER QUALIFIED FACULTY WHO HAS EXPERTISE IN THIS FIELD FROM ENGINEERING DEPARTMENTS.

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

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

ASSESSMENT AND GRADING:

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

TEXT BOOKS:

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

REFERENCES:

1. Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We Were Making History...' Life Stories of Women in the ToIrmgana People's Struggle. New Delhi: Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by -the- numbers-where-Indan-womenworkP
3. K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada
4. http://harooreollins.co.in/BookDetailasp?FlookCndet,3732
5. 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.

6. 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.
7. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

E-RESOURCES:

1.http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm (UNDERSTANDING GENDER)

2.https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)

http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in labour-market-in- india/40442/ (GENDER AND LABOUR)

3.http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004(ISSUES OF VIOLENCE)

4.http://www.nordiclabourjournal.org/emner/likestilling (GENDER AND BIOLOGY)

Course Outcomes:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Students will have developed a better understanding of important issues related to gender in contemporary India.	Apply
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.	Apply
CO3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.	Develop

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B0B07	Applied Statistics and Optimization Techniques (Common for CSE, IT,CSE(DS),CSE(AIML),CSE(CS), CSE(IOT) and B.Tech-AIML	L	T	P
Credits: 3		3	-	-

Module–I: Analysis of Variance & Analysis of Co-variance [12 Periods]

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

Module–II: 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 (maxmin) method of optimal strategies, mixed strategies –Value of the game- two-person zero sum game, method of dominance, graphical method

Method V: Queuing Theory [10Periods]

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

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

Proposed Text Books:

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

Proposed Reference Books:

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

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

CO	Statement	Blooms Taxanomy Level
CO1	Perform Analysis of variance, ANCOVA and design of experiments in manufacturing firms.	Apply
CO2	Advanced design of experiments and their applications.	Understand
CO3	The students will learn the concept of quality control, Six Sigma and its importance to real lifeproblems.	Analyze
CO4	The student will be able to understand the concept of Multiple regression and Application ofTime-series,	Understand
CO5	The students would be able to find the expected queue length, the ideal time, the traffic intensityand the waiting time.	Apply

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B0511	Operating Systems (Common for CSE, IT, CSE(DS), CSE(AIML), CSE(CS), CSE(IOT)) and B.Tech-AIML	L	T	P
Credits: 3		3	-	-

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"** 7th 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"**, 2nd Edition, TMH

E-Resources:

1.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
4.http://nptel.ac.in/courses/106108101/

Course outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Distinguish between the different types of operating system environments	Apply
CO2	Apply the concepts of process scheduling. Develop solutions to process synchronization problems	Analyze
CO3	Identify Deadlocks, prevention of deadlocks, avoid deadlocks	Apply
CO4	Analyze various memory management techniques	Apply
CO5	Identify various issues of Operating Systems file 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	3		1									2	1		2
CO2	2	2										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B7303	Introduction to Machine Learning	L	T	P
Credits: 3	B.Tech-AIML	3	-	-

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**]

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**]

Neural Networks: Introduction, Perceptron, Multilayer Perceptron,

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

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
5. http://nptel.ac.in/courses/106106139/
6. http://nptel.ac.in/courses/106105152/

Course Outcomes:

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

CO	Course Outcome	Bloom’s Taxonomy Level
CO1	Design a learning system and know about the learning tasks.	Analyze
CO2	Apply decision tree learning in classification tasks	Apply
CO3	Develop neural networks algorithms in machine learning.	Apply
CO4	Illustrate Bayesian learning and instance-based learning.	Analyze
CO5	Examine the concepts of reinforcement learning and deep learning concepts	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										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B0516	Design and Analysis of Algorithms (Common for CSE,) IT, CSE(DS), CSE(AIML), CSE(CS), and CSE(IoT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Data Structures

Course Objectives:

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

MODULE I: Basics of Algorithm Design [09 Periods]

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

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

MODULE II: Algorithm Methods [10 Periods]

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

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

MODULE III: Dynamic Programming and Optimization Techniques [10 Periods]

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

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

MODULE IV: Backtracking and Branch and Bound [10 Periods]

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

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

MODULE V: NP-Hard and NP-Complete problems [09 Periods]

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

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

E-Resources:

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

Course Outcomes:

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B0522	Computer Graphics [Professional Elective - I]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course is to enable the students to understand the fundamental concepts of display devices and output primitives, to demonstrate 2D transformations, viewing and clipping algorithms, explore different representations of 3D objects and illumination models, to understand 3D transformations and viewing, discuss surface detection and animation methods.

MODULE I: Introduction of Graphics [10 Periods]

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

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

MODULE II: Transforming and Viewing [10 Periods]

2-D Geometrical Transforms-Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-Dviewing - Viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland–Hodgeman polygon clipping algorithm.

MODULE III: 3D Objects Representation [10 Periods]

A: Surfaces and Curve: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves.

B: Models and M ethods: BezierandB, Spline surfaces, Basic illumination models, polygon rendering methods.

MODULE IV: 3D Geometric transformations and Viewing [09 Periods]

3-D Geometric Transformations: Translation, rotation, scaling, reflection and Shear transformations, composite transformations.

3-D V iewing: Viewing pipeline, viewing coordinates, view volumes and general projection transforms, clipping.

MODULE V: Surface detection Methods and Animation [09 Periods]

Visible Surface Detection Methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP- tree methods, area sub-division and octree methods.

Computer Animation - Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Textbooks:

1. Donald Hearnand M.Pauline Baker, **"Computer Graphics C Version"**, Pearson Education.
2. Foley, VanDam, Feinerand Hughes, **"Computer Graphics Principles &practice"**, 2nd edition in C, Pearson Education.

References:

1. Donald Hearnand M.Pauline Baker, **"Computer Graphics"**, 2nd Edition, PHI / Pearson Education.
2. Zhigandxiang, Roy Plastock, Schaum's outlines, **"Computer Graphics",** 2nd edition, Tata Mc Grawhill.

3. David F.Rogers, **"Procedural Elements for Computer Graphics"**, Tata Mc Grawhill,2nd edition.

E-Resources:

1. http://www.hiteshpatel.co.in/ebook/cg/Computer_Graphics_C_Version.pdf
2. http://ptgmedia.pearsoncmg.com/images/9780321399526/samplepages/0321399528.pdf
3. http://social.cs.uiuc.edu/papers/pdfs/g5kar.pdf
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7y_TqI7sLJ_1X3zVWNHhVwSwBCdfRRvSTrPP45TFWuzrxWT5ea_k_dP1rirZCeNbWw

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	**Develop** simple graphics applications	Understand
CO2	**Apply** 2D objects transformations	Understand
CO3	**Use** the Concepts of 3D Object representations.	Apply
CO4	**Design** 3D object transformations and viewing.	Design
CO5	**Build** Animation sequences	Design

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code:B1204	Android Application Development [Professional Elective - I]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course aims the students to learn the essentials of mobile apps development, aids in developing simple android applications, identify the essentials of android design, file settings, study about user interface design and develop android APIs.

MODULE I: Mobile and Information Architecture [10 Periods]

Introduction to Mobile: A brief history of Mobile, The Mobile Eco system, Why Mobile? Types of Mobile Applications.

Mobile Information Architecture: Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

MODULE II: Introduction to Android and Installation [10 Periods]

Introduction to Android - History of Mobile Software Development, The Open Handset Alliance-Android platform differences.

Android Installation - The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building a Sample Android application.

MODULE III: Android Application Design and Settings [10 Periods]

Android Application Design Essentials - Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents.

Android File Settings - Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, working with different types of resources.

MODULE IV: Android UID and Techniques [09 Periods]

Android User Interface Design - Essentials User Interface Screen elements, Designing User Interfaces with Layouts.

Animation Techniques - Drawing and Working with Animation- Drawing on the screen – Working with Text-Working with Bitmaps-Working with shapes-Working with animation.

MODULE V: Android APIs-I & APIs-II [09 Periods]

Android APIs-I - Using Common Android APIs Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers.

Android APIs-II - Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Text Books:

1.James Keogh, **"J2ME: The Complete Reference"**, Tata McGrawHill.

2.Lauren Darcey and Shane Conder, **"Android Wireless Application Development",** Pearson Education, 2nded. (2011).

References:

1. Reto Meier, **"Professional Android 2 Application Development",** Wiley India Pvt Ltd.
2. Mark L Murphy, **"Beginning Android"**, Wiley India Pvt Ltd.
3. Barry Burd, **"Android Application Development All in one**" 1st edition, Wiley India Pvt Ltd.

E-Resources:

1. http://onlinevideolecture.com/ebooks/?subject=Android-Development
2. https://developer.android.com/training/basics/firstapp/index.html
3. IEEE Transactions on Mobile Computing
4. International Journalof Interactive Mobile Technologies
5. http://nptel.ac.in/courses/106106147/

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Classify different types of Platforms	Analyze
CO2	Appreciate the Mobility landscape	Understand
CO3	Familiarize with Mobile apps development aspects	Analyze
CO4	Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications	Design
CO5	Perform testing, signing, packaging and distribution of mobile apps	Apply

CO- PO, PSO Mapping

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B1202	Web Technologies [Professional Elective - I]	L	T	P
Credits: 3		3	-	-

Objectives

1. To introduce PHP language for server side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server side programming with Java Servlets and JSP
4. To introduce Client side scripting with Java script and AJAX.

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

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc.,

Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

File Handling in PHP: File operations like opening, closing, reading, writing, appending, and deleting etc. on text and binary files, listing directories.

MODULE-II: **[09 Periods]**

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

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

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

MODULE IV: **10 Periods]**

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

MODULE-V: **[09 Periods]**

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

TEXT BOOKS:

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

REFERENCES:

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

E-RESOURCES:

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

Course Outcome:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Gain knowledge of client side scripting, validation of forms and AJAX programming	Understand
CO2	Have understanding of server side scripting with PHP language	Understand
CO3	Have understanding of what is XML and how to parse and use XML Data with Java	Apply
CO4	Introduce Server side programming with Java Servlets and JSP	Understand
CO5	Develop Client side applications	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				2		3	3	3	
CO2	3	3	3			3				3		3	3	3	
CO3	3	3	3			2				3		2	3	3	
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B6706	R Programming	L	T	P
Credits: 3	[Professional Elective–II]	3	-	-

Prerequisites: programming for problem solving

Course Objectives:

- Learn Fundamentals of R.
- Covers how to use different functions in R, how to read data into R, accessing R packages, writing R functions, debugging, and organizing data using R functions.
- Cover the Basics of statistical data analysis with examples.
- The whole syllabus will give an idea to collect, compile and visualize data using statistical functions.

Learning Outcomes:

- Understand the basics of Fundamentals of R.
- Understands the loading, retrieval techniques of data.
- Understand how data is analysed and visualized using statistic functions.

Module-I **[09 periods]**

Introduction to R: What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), packageDescription(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and–inf.

Module-II **[08 periods]**

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame

Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables - **Operators**: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators –

Decision Making: if statement, if – else statement, if– else if statement, switch statement

R Loops: repeat loop, while loop, for loop - Loop control statement: break statement, next statement.

Module-III **[10 periods]**

R-Function : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values - R-Strings – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower() - R Vectors – Sequence vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting

R List -Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector

R Matrices – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division

R Arrays: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements

R Factors –creating factors, generating factor levels gl().

Module-IV **[10 periods]**

Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, Expand Data Frame: Add Column, Add Row - Joining columns and rows in

a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() - R-CSV Files - Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File – R -Excel File – Reading the Excel file.

Module-V **[9 periods]**

Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode - Standard Deviation – Correlation - Spotting Problems in Data with Visualization: visually Checking Distributions for a single Variable - R –Pie Charts: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – R Histograms – Density Plot - R – Bar Charts: Bar Chart Labels, Title and Colors.

Text Books

1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN: 978-93-5260-455-5.
2. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN: 978-93-5260-524-8.

References:

1. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, Mining of Massive Datasets, v2.1, CambridgeUniversity Press.
2. Foster Provost and Tom Fawcett, Data Science for Business, What You Need to Know about Data Mining andData-Analytic Thinking, O‟Reilly.
3. Cathy O‟Neil and Rachel Schutt, Doing Data Science, Straight Talk from the Frontline, O‟Reilly.
4. Samir Madhavan, Mastering Python for Data Science, Packt Publishing, 2015.

E-Resources:

1. http://datasciencemasters.org/.
2. http://learnds.com/
3. https://www.datascienceweekly.org/

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Understand and apply basic concepts of R for data science.	Understand
CO2	Learn and apply the fundamental concepts of data science.	Understand
CO3	Design suitable linear regression models to extract useful information.	Apply
CO4	Develop and analyze regression models for the given data.	Apply
CO5	Handle time series data using ARIMA models	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	2			2								1		
CO2			3											2	
CO3					3									2	
CO4				2											
CO5			3		3									3	3

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code:B7304	Data Science and Engineering (Professional Elective–I)	L	T	P
Credits: 3		3	-	-

Prerequisites: Statistics and Basic Programming knowledge

Objectives:

- Introduce R as a programming language
- Introduce the mathematical foundations required for data science
- Introduce the first level data science algorithms
- Introduce a data analytics problem solving framework
- Introduce a practical capstone case study

Module-I: Introduction to R [9 Periods]

Basic fundamentals, installation and use of software, data editing, functions and assignments, matrix operations, missing data and logical operators, conditional executions and loops, data management with sequences and repeats, sorting, ordering, and lists, Vector indexing, Data frames, Graphics and plots

Module-II: Linear Algebra for Data Science [10 Periods]

Algebraic view - vectors, matrices, product of matrix & vector, rank, null space, solution of over-determined set of equations and pseudo-inverse

Geometric view - vectors, distance, projections, Eigen value decomposition

Module-III: Statistics [10 Periods]

Descriptive statistics, notion of probability, distributions, mean variance, covariance, and covariance matrix, understanding univariate and multivariate normal distributions, introduction to hypothesis testing, confidence interval for estimates.

Module-IV: Optimization Techniques [9 Periods]

Optimization, Typology of data science problems and a solution framework, Simple linear regression and verifying assumptions used in linear regression, Multivariate linear regression, model assessment, assessing importance of different variables, subset selection.

Module-V: Classification and Clustering [9 Periods]

Introduction to classification and clustering, Distance measures - Clustering transformation and feature ordering - Clustering in feature selection - Feature selection through entropy minimization. Classification using Logistic Regression and kNN and K-Means Clustering,

Books and References:

- Introduction to Linear Algebra - By Gilbert Strang
- Applied Statistics and Probability For Engineers – By Douglas Montgomery
- Introduction to Statistics and Data Analysis-With Exercises, Solutions and Applications in R", Christian Heumann, Michael Schomaker and Shalabh, Springer, 2016
- The R Software-Fundamentals of Programming and Statistical Analysis, Pierre Lafaye de Micheaux, Rémy Drouilhet, Benoit Liquet, Springer 2013
- A Beginner's Guide to R (Use R) By Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters, Springer 2009

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Describe a flow process for data science problems (Remembering)	Remembering
CO2	Classify data science problems into standard typology (Comprehension)	Comprehension
CO3	Develop R codes for data science solutions (Application)	Application
CO4	Correlate results to the solution approach followed (Analysis)	Analysis
CO5	Assess the solution approach (Evaluation)	Evaluation

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B0514	Operating Systems Lab (Common for CSE, IT, CSE(DS), CSE(AIML), CSE(CS), and CSE(IoT) and B.Tech-AIML)	L	T	P
Credits: 2		-	1	2

Prerequisites: NIL

Course Objectives:

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

Software Requirements: C++/JDK

List of Programs:

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

Text Books:

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

References:

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

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Implement various CPU scheduling algorithms, Bankers algorithms used for deadlock avoidance and prevention	Apply
CO2	Develop disk scheduling algorithms and apply File organization techniques	Apply
CO3	Simulate file allocation method	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									2	1		
CO2	2	2										2	2		
CO3	1	2										1	1		

2021-22 Onwards (MR21)	Malla Reddy Engineering College **Malla Reddy Engineering College** (Autonomous)	B.Tech. IV Semester		
Code: B7305	**Introduction to Machine Learning Lab**	**L**	**T**	**P**
Credits: 1.5	**B.Tech-AIML**	**-**	**-**	**3**

Prerequisites: Computer Programming, Python

Course Objective:

- To implement the various supervised and unsupervised learning techniques along with the clustering and classification methods

List of Experiments:

1. Introduction to Python, Numpy and Pandas
2. Implementation of Simple Linear Regression
3. Implementation of Multiple Linear Regression
4. Implementation of Logistic Regression
5. Implementation of Regression Models With Regularization
6. Implementation of Dimensionality Reduction using PCA
7. Implementation of SVM
8. Implementation of Decision Tree on real word data set
9. Implementation of Naïve Bayes Classifier
10. Implementation of K-Means Clustering
11. Implementation of ANN

Reference Books:

1. Willi Richert, Luis Pedro Coelho, "Building Machine Learning with Python", Packt Publishing, 2013.

Course Outcomes:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Design a learning system and know about the learning tasks.	Analyze
CO2	Apply decision tree learning skin classification tas	Apply
CO3	Develop neural networks algorithms in machine learning.	Apply
CO4	Illustrate Bayesian learning and instance-based learning.	Analyze
CO5	Examine the concepts of reinforcement learning and deep learning concepts	Apply

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B0521	Design And Analysis of Algorithms Lab	L	T	P
Credits: 1.5	Common for CSE, IT, CSE-DS, CSE-AIML, CSE-CS, CSE-IoT and B.Tech-AIML	-	-	3

Course Objectives:

This course will make students

1. To analyze asymptotic performance of algorithms, understand different methods postfix, infix expressions, spanning tree algorithms, Strassen's matrix multiplication.
2. To develop solutions to Job sequencing problems, Knapsack algorithm, shortest path algorithms.
3. To implement solutions traveling sales person.
4. To apply dynamic programming method N-Queen's Problem.
5. To leam 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,**"FundamentalsofComputerAlgorithms"** Galgotia publications pvt. Ltd
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, **"Introduction to Algorithms"**, second edition, PHI Pvt. Ltd./ PearsonEducation
3. Parag Himanshu Dave, Himanshu Balchandra Dave, **"Design and Analysis ofalgorithms"** Pearson.

References:

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

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. IV Semester		
Code: B00M2	Environmental Science	L	T	P
Credits: NIL	Common for CSE, IT, CSE-DS, CSE-AIML, CSE-CS, CSE-IoT and B.Tech-AIML	2	-	-

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.

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: 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-sports 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, water shed 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:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Identify and analyze environmental problems as well as the risks associated with these problems	Analyze
CO2	Understand what it is to be a steward in the environment	Develop
CO3	Studying how to live their lives in a more sustainable manner	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	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B1207	Theory of Automata	L	T	P
Credits: 4		3	1	-

Prerequisites: NIL

Course Objectives:

Introduce central concepts in theory of computation and to design grammars and recognizers for different formal languages, and also to determine the decidability and intractability of computational problems.

Module-I: Finite Automata [10 Periods]

Finite Automata: Introduction, Central Concepts of Automata Theory, Deterministic Finite Automata, Nondeterministic Finite Automata, NFA to DFA Conversion, Finite Automata with Epsilon Transitions, Equivalence between NFA with and without Epsilon Transitions.

Regular Expressions: Regular Expressions, Identity Rules for Regular Expressions, Algebraic Laws for Regular Expressions, Equivalence between Finite Automata and Regular Expressions, Applications of Finite Automata and Regular Expressions.

Module-II: Regular Expression and Languages [10 Periods]

Properties of Regular Languages: Pumping Lemma for Regular Languages, Closure Properties of Regular Languages, Decision Properties of Regular Languages, Equivalence between two FSM's, Minimization of Finite Automata**.**

Grammars and Languages: Chomsky Hierarchy of Languages, Grammars and Languages Generated, Context-Free Grammars, Derivations, Parse Trees, Ambiguity in Grammars and Languages.

Module-III: Context Free Grammars and Push Down Automata [10 Periods]

Properties of Context Free Languages: Simplification of CFG's, Normal Forms for CFG's: CNF and GNF, Pumping Lemma for Context Free Languages, Closure Properties of Context Free Languages, Decision Properties of Context Free Languages

Pushdown Automata: Introduction, Formal Definition and Behavior of PDA, Language of PDA, Design of PDA, Equivalence of PDA and CFG's, DPDA.

Module-IV: Turing Machines [9Periods]

Turing Machines: Introduction, Formal Definition and Behavior of TM, Language of a TM, Design of TM's, Programming Techniques for TM's, Extensions to the TM's, Restricted TM's.

Module-V: Undecidability [9Periods]

Recursive and Recursively Enumerable Languages, Properties of Recursive and Recursively Enumerable Languages, The Church-Turing Thesis, A Language that is not Recursively Enumerable, An Undecidable Problem that is RE, PCP and MPCP

Text Book:

1. John E. Hopcroft, Rajeev Motwani, Jeffery D Ullman, "Introduction to Automata Theory Languages and Computation", 3rd Edition, Pearson Education, 2007.
2. Theory of Computer Science- Automata languages and computation –Mishra and Chandrashekaran, Third edition, PHI

Reference Books:

1. John C Martin, "Introduction to Language and Theory of Computation", 3rd Edition, TMH, 2003.
2. Daniel Cohen "Introduction to Computer Theory", 2nd Edition, Wiley Publications, 2007.

3. Mishra K., Chandrasekaran N.," Theory of Computer Science (Automata, Languages and Computation), 3rd Edition, Prentice Hall of India 2008.
4. Shyamalendra Kandar" Introduction to Automata Theory, Formal Languages and Computation‖, Pearson, 2013.

E-Resources:

1. https://books.google.co.in/books?isbn=8184313020
2. https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf
3. http://freevideolectures.com/Course/3379/Formal-Languages-and-Automata- Theory
4. http://nptel.ac.in/courses/106106049/
5. https://nptel.ac.in/courses/106104028/
6. http://online.stanford.edu/course/automata-theory

COURSE OUTCOMES:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Design finite automata, RE's for a given language.	Analyze
CO2	Define properties of RL's, Design grammars, minimize FA and also apply the concept of pumping lemma to prove that certain languages are not regular.	Develop
CO3	Design PDA's for various CFG's and CFL's, simplify the CFG's, define properties of CFL's.	Analyze
CO4	Define programming techniques of Turing machines and design Turing machines for decidable problems.	Apply
CO5	Apply mathematical and formal techniques for solving problems in computer science and also define concepts of computability theory, and complexity theory.	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									2	2	2	
CO2		2	2	2	2							2	2	2	
CO3		2	2	2	2							2	2	2	
CO4		2	2	2	2							2	2	2	
CO5		2	2	2	2							2	2	2	

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B0525	Software Engineering and Modeling	L	T	P
Credits: 3	B.Tech-AIML	3	-	-

Course Objectives:

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

Module I: Introduction to Software Engineering [09 Periods]

Basics terms of Software Engineering: Evolving role of software, changing nature of Software, Software Myths. A Generic View of Process:-Software engineering-A layered technology, The Capability Maturity Model Integration (CMMI)

Process Models: The water fall model, Incremental process models, evolutionary process models, and the unified process.

Module II: Requirements of Software Engineering [09Periods]

Software Requirements: Functional and non functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

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

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

Module III: Phases of Software Engineering [09 Periods]

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

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

Module IV: Test Strategies [09 Periods]

Methods of Testing: A strategic approach to software testing, Black box and White box Testing, Validation Testing, and System Testing.

Product Metrics: Software Quality, Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance Metrics for process and products: Software measurement, Metrics for software quality

Module V: Risk Management [09Periods]

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

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

Text Books:

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

References:

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

E Resources:

1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=one page&q&f=false
2. https://books.google.co.in/books?id=PqsWaBkFh1wC&printsec=frontcover&dq=software+engineering+by+ian+sommerville+FREE+download&hl=en&sa=X&ved=0ahUKEwjjv5fhpb_TAhUHOo8KHY5OAC4Q6AEIKjAB#v=onepage&q=software%20engineering%20by%20ian%20sommerville%20FREE%20download&f=false
3. http://ieeexplore.ieee.org/document/4807670/
1. https://link.springer.com/search?facet-journal id=40411&package=open accessarticles&query=&facet-sub-discipline=%22Software+Engineering%22
2. http://freevideolectures.com/Course/2318/Software-Engineering
3. http://freevideolectures.com/Course/2318/Software-Engineering/5

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Analyze the customer business requirements and choose the appropriate Process model for the given project	Analyze
CO2	Elicit functional and non-functional requirements using rigorous engineering methodology	Develop
CO3	Conceptualize and achieve requirements defined for the system using Architectural styles and Design patterns	Analyze
CO4	Design test cases and define metrics for standardization	Apply
CO5	Assess, mitigate and monitor the risks and assuring quality standards	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			3		3
CO2	2	3								3			3	2	
CO3			3	3						2				3	
CO4				2	3								2		
CO5						2	3	3					3	3	

2020-21 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B6201	Computer Networks	L	T	P
Credits: 3	Common for CSE, IT, CSE-DS, CSE-AIML, CSE-CS, CSE-IoT and B.Tech-AIML	3	-	-

Prerequisites: NIL

Course Objectives:

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

Module-I: Basics of Networking and Physical Layer [10 Periods]

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

Physical Layer: Digital transmission, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

Module-II: Data Link Layer [11 Periods]

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

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

Module-III: Network Layer [09 Periods]

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

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

Module-IV: Transport Layer [09 Periods]

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

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

Module-V: Application Layer [09 Periods]

DNS: Domain Name Space, DNS in internet, Electronic mail

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

TEXT BOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4thEdition,TMH, 2006.
2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, PearsonEducation/PHI.

References:

1. P.C .Gupta, **"Data communications and computer Networks"**, PHI.
2. S.Keshav, **"An Engineering Approach to Computer Networks"**, 2nd Edition, Pearson Education.

3. W.A. Shay, **"Understanding communications and Networks"**, 3rd Edition, Cengage Learning.
4. James F.Kurose & Keith W. Ross, **"Computer Networking: A Top-Down Approach Featuring the Internet"**, 3rd Edition, Pearson Education.

E-Resources:

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

Course Outcomes:

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

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

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

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

2020-21 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B6705	**Advanced Python Programming**	L	T	P
Credits: 3	Common for CSE, IT, CSE-DS, CSE-AIML, CSE-CS, CSE-IoT and B.Tech-AIML	3	-	-

Prerequisites: Python programming

COURSE OBJECTIVES:

1. To Proficient data manipulation using NumPy and Pandas, missing data, and arithmetic operations.
2. To know Effective data processing from diverse sources, merging, and group operations with Pandas.
3. To do analysis of time-based data, encompassing date handling, shifting, resampling, and moving window functions.
4. To develop the Competence in GUI development with Tkinter, CRUD operations in SQL and an introduction to Flask and Django.
5. To know about machine learning concepts via scikit-learn, covering preprocessing, supervised/unsupervised learning, and neural networks.

MODULE – I **[10 PERIODS]**

Numpy: Introduction to Numpy, Data types used in Numpy, Array Indexing and Slicing - Transposing Array and Swapping Axes - Saving and Loading Array - Universal Functions - Mathematical and Statistical Functions in Numpy.

Pandas: Introduction to Pandas , Pandas Data Indexing and Slicing, Handling missing data, Aggregation and Grouping , Arithmetic Operations between Data Frames and Series - Function Application.

MODULE – II **[10 PERIODS]**

Data Input, Input from Text files, Visual Inspection, Reading ASCII Data into Python, Read and write from MSExcel and CSV files, Reading Multiple CSV files, Processing a single Worksheet and Multiple Worksheets,Data Wrangling Combining and Merging Data Sets, Data Aggregation and Group Operations GroupBy Mechanics.

MODULE – III **[08 PERIODS]**

Time Series: Date and Time data types and tools, Time series Basics, Date ranges, Frequencies and Shifting, Time Zone Handling, Periods and Arithmetic's, Resampling and Frequency Conversion, Moving window functions.

MODULE – IV **[08 PERIODS]**

GUIS in Python : Tkinter: Introduction, Components and Events, An example GUI, Button, text widgets; SQL: Installation, DB Connection, CRUD operations(Create, Read, Update, Delete), Python package – Flask.

Django: Introduction, Installation, Creating a hello world page; API and Security, scikit-learn Techniques: Data Preprocessing, Supervised and Unsupervised:

MODULE-V **[09 PERIODS]**

Tensorflow: Introduction, create a simple project: Keras: Introduction and applications Data Analysis Use cases: USA.gov data from bitly- counting time zones with pandas, Movie lens 1M dataset-measuring rating disagreement, US Baby names-analyzing naming Trends.

TEXT BOOKS:

1. Python Data Science Handbook By Jake Vanderplas, oreally publishers, 2nd edition, 2012
2. The Hitchker's Guide to Python By Kenneth reitz and Tanya schelusser,2016 edition

REFERENCES:

1. Gowrishanker and Veena, "Introduction to Python Programming", CRC Press, 2019.
2. Python Crash Course, 2nd Edition, By Eric Matthes, May 2019 • NumPy Essentials, By Leo Chin and Tanmay Dutta, April 2016
3. Joel Grus, "Data Science from scratch", O'Reilly, 2015.
4. Wes Mc Kinney, "Python for Data Analysis", O'Reilly Media, 2012.
5. Kenneth A. Lambert, (2011), "The Fundamentals of Python: First Programs", Cengage Learning
6. Jake Vanderplas. Python Data Science Handbook: Essential Tools for Working with Data 1st Edition

7. Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Proficient use of NumPy and Pandas for data manipulation, including indexing, slicing, missing data handling, and arithmetic operations.	Understand
CO2	Skillful processing of data from various sources, merging datasets, group operations, and data aggregation using Pandas.	Apply
CO3	Ability to analyze and manipulate time series data, including date handling, shifting, resampling, and moving window functions.	Analyze
CO4	Development of GUIs using Tkinter, CRUD operations with SQL, and introduction to web development with Flask and Django.	Apply
CO5	Introduction to scikit-learn and TensorFlow/Keras techniques for data preprocessing, supervised and unsupervised learning, and basic neural networks.	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	1	2	3											
CO4	1	2	2	2										2	2
CO5	1	2												1	

2020-21 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B7306	Computational Intelligence	L	T	P
Credits: 3	Common for CSE, IT, CSE-DS, CSE-AIML, CSE-CS, CSE-IoT and B.Tech-AIML	3	-	-

Course Pre-requisite

- Strong knowledge of Mathematics and AI
- Good command over programming languages

Course Objectives:

To understand the fundamentals of key intelligent systems technologies

- To understand hybrid intelligent systems
- To understand evolutionary computation
- To practice in an integration of intelligent systems technologies for engineering applications
- To understand case studies problems

Modules-I:

Introduction: Computational Intelligence: Intelligence machines - Computational intelligence paradigms –History- Expert Systems: Rule-based expert systems –Uncertainty management – Fuzzy expert systems: Fuzzy sets and operations sets - Fuzzy rules and inference - Fuzzy expert systems.

Modules-II:

Artificial Neural Networks: Fundamental neuro computing concepts: artificial neurons, activation functions, neural network architectures, learning rules - Supervised learning neural networks: multi-layer feed forward neural networks, simple recurrent neural networks, time-delay neural networks, supervised learning algorithms - Unsupervised learning neural networks: self-organizing feature maps - Radial basis function networks -Deep neural networks and learning algorithms.

Modules-III:

Evolutionary computation: Representation: Chromosomes-fitness functions- selection mechanisms -Genetic algorithms: crossover and mutation - Genetic programming.

Modules-IV:

– Hybrid Intelligent Systems: Neural expert systems -Neuro-fuzzy systems – Evolutionary neural networks.

Modules-V:

Applications and Case Studies: Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction-Case studies.

Text Books:

1. A.P. Engelbrecht, “Computational Intelligence: An Introduction”, 2nd Edition, John Wiley & Sons, 2012

Reference Books

1. S.Rajasekaran and G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy logic and Genetic AlgorithmsSynthesis and Applications”, PHI Learning, 2003.
2. Marsland S, “Machine Learning: An Algorithmic Perspective”, CRC Press, 2009.

3. Russell and P. Norvig, "Artificial Intelligence – A Modern Approach", Prentice Hall, 2010.
4. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education , 2004.

Content beyond Syllabus:

- Application of intelligence on solving NP problems, Swarm Intelligence

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Explain the fundamentals of key intelligent systems technologies	Understand
CO2	Describe neural networks, fuzzy systems, and evolutionary computation	Apply
CO3	Explain the hybrid intelligent systems	Analyze
CO4	List the integration of intelligent systems technologies for engineering applications	Apply
CO5	To implement computational intelligence concepts in case studies	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			2								1		
CO2			3											2	
CO3					3									2	
CO4				2											
CO5			3		3									3	3

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B1208	Information Retrieval	L	T	P
Credits: 3	[Professional Elective - II]	3	-	-

Prerequisites: Databases and Data Mining

Course Objectives:

Information retrieval covers the tasks of indexing, searching, and recalling data, particularly text or other unstructured forms. It has an important role to play in a large number of applications viz., digital libraries, office automation, internet and e-commerce. The aim of the course is to study theoretical aspects as well as implementation issues of classical and modern retrieval problems.

Module-I **[9 Periods]**

Introduction to Information Retrieval

The nature of unstructured and semi-structured text. Inverted index and Boolean queries.

Text Indexing, Storage and Compression

Text encoding: tokenization, stemming, stop words, phrases, index optimization.

Index compression: lexicon compression and postings lists compression. Gap encoding, gamma codes, Zipf's Law. Index construction. Postings size estimation, merge sort, dynamic indexing, positional indexes, n-gram indexes, real-world issues.

Module-II **[10 Periods]**

Retrieval Models

Boolean, vector space, TFIDF, Okapi, probabilistic, language modeling, latent semantic indexing. Vector space scoring. The cosine measure. Efficiency considerations. Document length normalization. Relevance feedback and query expansion. Rocchio.

Performance Evaluation

Evaluating search engines. User happiness, precision, recall, F-measure. Creating test collections: kappa measure, interjudge agreement.

Module-III **[9 Periods]**

Text Categorization and Filtering

Introduction to text classification. Naive Bayes models. Spam filtering. Vector space classification using hyperplanes;

centroids; k Nearest Neighbors. Support vector machine classifiers. Kernel functions. Boosting.

Module-IV **[9 Periods]**

Text Clustering

Clustering versus classification. Partitioning methods. k-means clustering. Mixture of gaussians model. Hierarchical agglomerative clustering. Clustering terms using documents.

Advanced Topics

Summarization, Topic detection and tracking, Personalization, Question answering, Cross language information retrieval

Module-V **[9 Periods]**

Web Information Retrieval

Hypertext, web crawling, search engines, ranking, link analysis, PageRank, HITS.

Retrieving Structured DocumentsXML retrieval, Semantic Web

Text Books

1. Introduction to Information Retrieval Manning, Raghavan and Schutze, Cambridge University Press, draft.
2. Modern Information Retrieval Baeza-Yates and Ribeiro-Neto, Addison Wesley, 1999.
3. A comprehensive survey by Ed Greengrass
4. Mining the Web, Soumen Charabarti, Morgan-Kaufmann, 2002.References

- A Tutorial on Text Summarization, Dragomir Radev, SIGIR 2004 tutorial.
- The Anatomy of a Large Scale Hypertext Search Engine, Brin & Page
- Authoritative Sources in a Hyperlinked Environment, John Kleinberg
- Jeffrey Ullmans notes on PageRank
- Multilingual Text Retrieval, Oard and Dorr
- XML Information Retrieval, Norbert Fuhr
- A Short Introduction to Boosting, Rob Shaphire, Yoav Freund
- A Survey of Data Clustering Algorithms, Jain, Flynn, Murthy
- An in depth tutorial on Information Extraction, Ronen Feldman

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Ability to apply IR principles to locate relevant information large collections of data	Understand
CO2	Ability to design different document clustering algorithms	Analyze
CO3	Implement retrieval systems for web search tasks.	Analyze
CO4	Design an Information Retrieval System for web search tasks.	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								2		
CO2		3			3									2	
CO3	3	3			3										
CO4			2				2						2		1

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B7307	Optimization Techniques	L	T	P
Credits: 3	[Professional Elective - II]	3	-	-

Prerequisites:

- Ability to program in some language
- Prior exposure to fields such as machine learning, signal processing, operations research

Course Objectives:

- To introduce the basic concepts of linear programming
- To educate on the advancements in Linear programming techniques
- To introduce non-linear programming techniques
- To introduce the interior point methods of solving problems
- To introduce the dynamic programming method

Module-I **[9 Periods]**

Linear Programming: Introduction - formulation of linear programming model-Graphical solution–solving LPP using simplex algorithm – Revised Simplex Method.

Module-II: **[8 Periods]**

Advances In LPP: Duality theory- Dual simplex method - Sensitivity analysis–- Transportation problems– Assignment problems-Traveling sales man problem - Data Envelopment Analysis.

Module-III: **[12 Periods]**

Non Linear Programming: Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions–Reduced gradient algorithms–Quadratic programming method – Penalty and Barrier method.

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

Interior Point Methods: Karmarkar's algorithm–Projection Scaling method–Dual affine algorithm–Primal affine algorithm Barrier algorithm.

Module-V: **[11 Periods]**

Dynamic Programming: Formulation of Multi stage decision problem– Characteristics– Concept of sub- optimization and the principle of optimality–Formulation of Dynamic programming– Backward and Forward recursion– Computational procedure– Conversion of final value problem in to Initial value problem.

Text Books

- Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.
- R. Panneerselvam, "Operations Research", PHI, 2006.
- Hamdy ATaha, "Operations Research –An Introduction", Prentice Hall India, 2003

Reference Books:

1. Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
2. Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd. New Delhi, 2005.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the concepts of linear programming	Understand
CO2	Apply Linear programming techniques	Analyze
CO3	Apply non-linear programming techniques	Analyze
CO4	To solve problems using interior point methods	Apply
CO5	Understand the dynamic programming	Understand

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B0535	Multimedia and Rich Internet Applications	L	T	P
Credits: 3	[Professional Elective - II]	3	-	-

Prerequisites: NIL

Course Objectives:

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

MODULE I: **[09 Periods]**

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

MODULE II: **[10 Periods]**

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

MODULE III: **[12 Periods]**

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

MODULE IV: **[14 Periods]**

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

MODULE V: **[10 Periods]**

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the basic MRIA Fundamental concept	Understand
CO2	Ability to understand the fundamental concepts in video and digital audio	Analyze
CO3	Analyze the Rich Internet Applications (RIAS) with Adobe Flasl	Analyze
CO4	Ability to create and design rich internet applications.	Apply
CO5	Ability to develop different multimedia tools to produce web based and independent user interface	Understand

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B7308	Data Visualization B.Tech-AIML	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objective:

The students will be able to represent any type of dataset in visual form. They will also be able to draw insights from the data. They will also learn about different python visualization libraries.

Module 1: The Computer and the Human

Overview of Visualization, 2-D Graphics, SVG example, 2-D Drawing, 3-D Graphics, Photorealism, Non-Photorealism, the human retina: Perceiving Two Dimensions, Perceiving Perspective

Module 2: Visualization Tools

Line plots, area plots, histogram, bar charts, pie charts, scatter plots, bubble plots, waffle charts, word clouds

Module 3: Visualization of Numerical Data

Introduction, Data, Mapping, Charts, Glyphs, parallel coordinates, parallel coordinates, stacked graphs, Tufte's Design Rules, Using Color

Module 4: Visualization of Non-Numerical Data

Graphs and Networks, Embedding Planar Graphs, Graph Visualization, Tree Maps, Principal Component Analysis, Multidimensional Scaling

Module 5: Python Visualization Libraries

matplotlib, pandas, seaborn, ggplot, plotly

Text Books/Suggested References:

1.Taming Python by Programming, Jeeva Jose, Khanna Book Publishing House.
2.Data Visualization with Python and JavaScript: Scrape, Clean, Explore & Transform Your
3.Data, Kyran Dale, O'Reilly, 2016
4.Introduction to Computing & Problem Solving with Python, Jeeva Jose, Khanna Publishing House.
5.Data Visualization with Python: Create an impact with meaningful data insights using interactive and engaging visuals, Mario Döbler , Packt Publishers, 2019
6.Mastering Python Data Visualization, Kirthi Raman, Packt Publishers, 2015

E-Resources:

1. https://www.coursera.org/learn/python-for-data-visualization
2. https://onlinecourses.nptel.ac.in/noc22_cs28/preview

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Apply data visualizations in order to derive more meaning out of data.	Apply
CO2	Understand python visualization libraries.	Understand
CO3	Apply data visualization on different types of data.	Apply
CO4	Perceive hidden meanings from data using data visualization	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	2	2	2								3		2
CO2	3	3	2	2	2										1
CO3	3	3	3	2	2								1		
CO4	3	2	3	2	2								1		1

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B6707	Advanced Python Programming Lab	L	T	P
Credits: 1	B.Tech-AIML	-		2

Prerequisites: Python programming

1. Create NumPy arrays, perform arithmetic operations, and demonstrate array indexing and slicing.
2. Handle missing data in a dataset using Pandas by replacing NaN values.
3. Load data from a CSV file using Pandas, clean the data, and calculate statistical measures.
4. Read data from multiple CSV files, merge and aggregate data using Pandas.
5. Read data from an Excel file, process different sheets, and perform data wrangling.
6. Handle time series data, manipulate date and time, and calculate basic statistics.
7. Analyze time series data by resampling and applying moving window functions.
8. Create a GUI application using Tkinter that takes user inputs and displays results.
9. Establish an SQLite database connection, perform CRUD operations on a table, and display results.
10. Load a dataset using scikit-learn, preprocess data, and split into training and testing sets.
11. Build and train a simple linear regression model using scikit-learn, and evaluate its performance.

TEXT BOOKS:

1. Python Data Science Handbook By Jake Vanderplas, oreally publishers, 2nd edition, 2012
2. The Hitchker's Guide to Python By Kenneth reitz and Tanya schelusser,2016 edition

REFERENCES:

1. Gowrishanker and Veena, "Introduction to Python Programming", CRC Press, 2019.
2. Python Crash Course, 2nd Edition, By Eric Matthes, May 2019 • NumPy Essentials, By Leo Chin and Tanmay Dutta, April 2016
3. Joel Grus, "Data Science from scratch", O'Reilly, 2015.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the basic operations on Numpy Library	Understand
CO2	Calculate data using statistical measures in CSV Files	Analyze
CO3	Apply various data handling techniques	Apply
CO4	Develop applications using TKinter and Perform CRUD operations on database	Analyze
CO5	Build the applications using scilit-learn package	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	-	-												
CO2	-	2	2										1	2	
CO3	2	1	2	3											
CO4	1	2	2	2										2	2
CO5	1	2												1	

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B6202	Computer Networks Lab (Common for CSE, CSE (Cyber Security), CSE(AIML), CSE (DS), CSE (IOT), AI and IT	L	T	P
Credits: 1.5		-	-	3

Prerequisites: NIL

Course Objectives:

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

Software Requirements: Turbo C / JDK

LIST OF PROGRAMS

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

TEXT BOOKS:

1. Behrouz A. Forouzan, **"Data Communications and Networking"**, 4th Edition, TMH, 2006.
2. Andrew S Tanenbaum, **"Computer Networks"**, 4th Edition, Pearson Education/PHI.

REFERENCES:

1. P.C .Gupta, **"Data communications and computer Networks"**, PHI.
2. S.Keshav, **"An Engineering Approach to Computer Networks"**, 2nd Edition, Pearson Education.
3. W.A. Shay, **"Understanding communications and Networks"**, 3rd Edition, Cengage Learning.

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Implement data link layer farming methods.	
CO2	Analyze error detection and error correction codes.	
CO3	Implement and analyze routing and congestion issues in network design.	
CO4	Implement Encoding and Decoding techniques used in presentation layer.	
CO5	To be able to work with different network tools	

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. V Semester		
Code: B00M3	Quantitative Aptitude &Verbal Reasoning-I (Common for CSE, CSE (Cyber Security), CSE (AI and ML), CSE (DS), CSE (IOT), AI and IT)	L	T	P
Credits: Nil		2	-	-

Course objectives:

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

MODULE - I **[8 Periods]**

Quants: Percentages, Profit and Loss.

Percentages- Percentage Increase/Decrease; Results on Population; Results on Depreciation.

Profit & Loss- Cost Price; Selling Price: Profit or Gain; Gain Percentage; Loss Percentage.

Verbal: Sentence Completion

Sentence Completion- Formats of Question; Strategies to solve sentence completion questions-

Proactive and reactive solving, Identifying clues-Signposts, Types of signposts, Root words, Sentence structure clues.

Logical: Blood Relation

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

MODULE - II **[6 Periods]**

Quants: Interests

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

Verbal: Articles, Interrogatives

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

Logical: Clocks

Clocks: Introduction, Derivation of angles, Angles between hands of the clock, Hands together,

Hands at angular distance, Gain & Loss problems.

MODULE - III **[6 Periods]**

Quants: Ratio and Proportion, Averages

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

Verbal: Idioms and Miscellaneous Vocabulary

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

Logical: Coding and Decoding

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

MODULE - IV **[6 Periods]**

Quants: Time and Work;

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

Verbal: Voices and Speech

Voices- Introduction- Sentence, Parts of a sentence, Voice of a sentence, Types of voices, identifying the voice of a sentence, Changing the voice of a sentence.

Speech- Direct & Indirect, Identifying the speech, Change of Speech.

Logical: Directions

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

MODULE - V **[6 Periods]**

Quants: Mixtures and Alligations

Alligation- Mean Price; Rule of Alligation; a container contains x of liquid from which y units are taken out and replaced by water;

Verbal: Reading Comprehension

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

Logical: Cubes

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

Text Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal
2. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
3. "Fast Track Objective Arithmetic" by Rajesh Verma

Reference Books:

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

e-Resources: Concerned Website links:

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

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Develop Strong Mathematical Foundations: Gain a comprehensive understanding of fundamental mathematical concepts, including arithmetic, algebra, geometry, and data interpretation, providing a solid basis for tackling quantitative problems.	Apply
CO2	Enhance Problem-Solving Skills: Learn diverse problem-solving techniques and strategies to approach quantitative questions in a systematic manner, enabling efficient and accurate solutions.	Analyze
CO3	Improve Speed and Accuracy on Averages: Practice through a variety of exercises and timed quizzes to enhance computational speed and precision, vital for competitive exams and time-sensitive tasks	Enhance
CO4	Master Time and work: Acquire skills in interpreting data from time and work scenarios decisions based on the given information	Apply
CO5	Build Allegation and mixtures: Strengthen logical reasoning abilities to analyze and deduce patterns, aiding in solving complex quantitative problems.	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	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO2	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO3	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO4	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO5	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B0H08	Engineering Economics and Accountancy Common for CSE, IT, CSE-DS, CSE-AIML, CSE-CS, CSE-IoT and B.Tech-AIML	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

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

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

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

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

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

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

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

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

A. **Introduction to Markets & Market structures:** Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.
B. **Pricing Policies & Methods:** Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, PLC based pricing methods.

Module – IV Capital and Capital Budgeting [09 Periods]

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

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

Module–V Financial Accounting and Ratios [10 Periods]

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

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

Textbooks:

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

References:

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

E-Resources:

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

Course Outcomes:

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the concepts of managerial economics and their application in evaluating the demand.	Understand
CO2	Evaluate the production function and identifies the least cost combination to control the costs of production.	Apply
CO3	Understand the structures of various market types and their pricing policies.	Understand
CO4	Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques.	Understand
CO5	Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.	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							1		3		2		
CO2	3			2	1								2		
CO3		1			2						3			2	
CO4	2	1			3									2	
CO5		1			2						3		2		

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code:B0532	Compiler Design	L	T	P
Credits: 4		4	-	-

Prerequisites: Formal Languages and Automata Theory.

Course Objectives:

- To study the various phases in the design of a compiler
- To understand the design of top-down and bottom-up parsers
- To understand syntax directed translation schemes
- To introduce LEX and YACC tools
- To learn to develop algorithms to generate code for a target machine

MODULE I: **[09 Periods]**

Language Processors, the structure of a compiler, the science of building a compiler, programming language basics.

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

MODULE II: Syntax Analysis: **[10 Periods]**

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Recursive and Non recursive top down parsers, Bottom-Up Parsing,

Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

MODULE III: **[10 Periods]**

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

MODULE IV: **[10 Periods]**

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

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

MODULE V: **[09 Periods]**

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple CodeGenerator.

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

Text Books:

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

2) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

References:

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

E-Resources:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Design, develop, and implement a compiler for any language	Analyze
CO2	Use LEX and YACC tools for developing a scanner and a parser	Understand
CO3	Design and implement LL and LR parsers	Apply
CO4	Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity	Apply
CO5	Apply algorithms to generate machine code	Understand

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B1213	DevOps	L	T	P
Credits: 3		3	-	-

Course Objectives:

The main objectives of this course are to

1. Describe the agile relationship between development and IT operations.
2. Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability
3. Implement automated system update and DevOps lifecycle

Module-I: Introduction [8 Periods]

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

Module-II: Software Development and Architecture [10 Periods]

Software Development Models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing.

DevOps influence on Architecture: Introducing software architecture, the monolithic scenario, Architecture rules of thumb, the separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

Module-III: Project Management [9 Periods]

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

Module-IV: Testing Tools and Automation [10 Periods]

Testing Tools and Automation: Various types of testing, Automation of testing Pros and cons, Selenium-Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

Deployment of the System: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, SaltStack and Docker

Module-V: Code Monitoring [9 Periods]

Code monitoring tools: Nagios, Munin, Ganglia, Log handling. Introduction to issue trackers, Need of Issue Tracker: Workflows and issues, Problems with issue tracker proliferation, Trackers tools: Bugzilla, GitLab tracker, and Jira

Text Books

1. 1.Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

Reference Books

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN10: 9780134049847

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Identify components of DevOps environment	Analyze
CO2	Describe Software development models and architectures of DevOps	Apply
CO3	Apply different project management, integration, testing and code deployment tool	Apply
CO4	Investigate different DevOps Software development model	Analyze
CO5	Collaborate and adopt DevOps in real-time projects	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	3							3	2		
CO2	2	3			3		3					2		2	
CO3	3	3		2	3										
CO4			2				2						2		1
CO5	3			3		3						3	2		

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B6613	Pattern Recognition	L	T	P
Credits: 3	[Professional Elective -III]	3	-	-

Pre-requisite: An undergraduate level understanding of probability, statistics and linear algebra is assumed. A basic knowledge of Matlab will be useful.

Objectives:

This course covers the techniques and gain proficiency of pattern recognition that are fundamental to a wide variety of application areas such as medical research, biometrics, computer vision, etc.

Module-I:

Introduction to Pattern Recognition: Learning paradigms, Supervised and unsupervised learning; Bayesian decision theory: Minimum error rate classifier;

Module-II:

Parameter Estimation: Maximum likelihood and Bayesian Estimation; Hidden Markov models; Nonparametric techniques: Nearest neighbor rules, Parzen windows;

Module-III:

Decision trees: Axis-parallel, Oblique, Impurity measures; Feature selection: Forward, backward search;

Module-IV:

Component analysis and discriminant functions: Principal component analysis, Fisher linear discriminant, Perceptron, Support vector machines;

Module-V:

Generalization ability of learning methods: Bias and variance, Regularization; Bootstrapping, Boosting, Bagging; Unsupervised learning and clustering: k-Means methods.

Text Books:

1. R. O. Duda, P. E. Hart and D. G. Stork, Pattern classification, John Wiley & Sons, 2002.

References Books:

1. C. M. Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
2. V. N. Vapnik, The Nature of Statistical Learning Theory, Springer, 2000.
3. N. Cristianini and J. Shawe-Taylor, An Introduction to Support Vector Machines, Cambridge University Press, 2000.

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	A good knowledge of Bayesian decision theory and Bayesian learning.	
CO2	Fundamental understanding of classifiers such as linear discriminant function, quadratic	
CO3	discriminant function, nearest neighbor rule, neural network and SVM.	
CO4	A good understanding of feature selection algorithms.	
CO5	Ability to evaluate the performance of various classifiers on real-world datasets.	

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															

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B0533	Distributed Systems [[Professional Elective -III]]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks, DBMS and Operating Systems

Course Objectives:

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

MODULE I: Basic Concepts [09 Periods]

Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges- System Models-Architectural and Fundamental Models-Networking and Internetworking-Types of Networks – Internet Protocols

MODULE II: Processes and Distributed Objects [09 Periods]

Inter-process Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client -Server Communication - Group Communication - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications -

MODULE III: Operating System Issues I [10 Periods]

The OS Layer- Protection - Processes and Threads - Communication and Invocation- OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Distributed File Systems- File Service Architecture- Sun Network File System-The Andrew File System.

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

MODULE V: Distributed Transaction Processing [10 Periods]

Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery.

TEXTBOOKS:

1. George Coulouris, Jean Dollimore and Tim Kindberg , "Distributed Systems

Concepts and Design" , 3rd Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, "Principles and Pardigms", Pearson Education, 2002.

REFERENCES:

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

E- REFERENCES:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Design architectural models of distributed systems.	Analyze
CO2	Summarize communication between Distributed Objects.	Understand
CO3	Apply security algorithms on distributed systems.	Apply
CO4	Categorize various name services	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	1		1							2		2
CO2	3	2	2	1	2								2		2
CO3	3	3	3						2	1		2	2		2
CO4	3	2	2	2	2	1	1					1	2		2
CO5	3	2	2			1	1		2	1		1	2		2

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B6203	Cryptography And Network Security	L	T	P
Credits: 3	[Professional Elective - III]	3	-	-

Prerequisites: Computer Networks

Course Objectives:

This course enables the students to understand the main concepts of Security services and Attacks, categorize various Conventional Encryption Algorithms, compare various algorithms and fundamental ideas of public-key cryptography, illustrate various E-Mail privacy techniques and infer web security and intrusion detection systems.

Module-I: Introduction - Security Attacks and Mechanisms [10 Periods]

Security Attacks - Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non- repudiation, access Control and Availability)

Security Mechanisms - A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking and man-in-the-middle attacks.

Module-II: Encryption [09 Periods]

Conventional Encryption Principles - Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices.

Key Distribution - key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

Module-III: Cryptographic Techniques [10 Periods]

Cryptographic Techniques - Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates.

Key Management - Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

Module-IV: Email Privacy [09 Periods]

Email Privacy - Pretty Good Privacy (PGP) Characteristics of PGP, Cryptographic Keys and Key rings, PGP Message Generation.

S/MIME - S/MIME, MIME Types and Subtypes, Cryptographic algorithms in S/MIME.

Module-V: IP & Web Security [10 Periods]

IP Security - 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), Basic concepts of SNMP.Intruders, Viruses and related threats, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

Text Books:

1.William Stallings "**Network Security Essentials (Applications And Standards)",** 4th Edition, Pearson Education 2011.

2.Behrouz A . Forouzan, **"Cryptography And Network Security"** TMH 2007.

References:

1.Eric Maiwald, **"Fundamentals of Network Security**", Dreamtech press.

2.William Stallings, "**Cryptography and network Security**", 3rd Edition, PHI,Pearson.

3.Atul Kahate,"**Cryptography and Network Security**", 2nd edition, TMH.

E-Resources:

•http://sbmu.ac.ir/uploads/3._Network-security-essentials-4th-edition-william- stallings.pdf
•https://docs.google.com/file/d/0B5F6yMKYDUbrYXE4X1ZCUHpLNnc/edit
•https://www.ijirset.com/upload/2015/march/43_A_COMPARATIVE.pdf
•http://airccse.org/journal/ijcis/ijcisleaflet.pdf
•http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html
• http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRO7kjOasUj1lin1v_dK-KbzKa2DvORf95P_mMwhs8pOqinTDauGH9wz6GFBPImIE6A

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Analyze various security service mechanisms.	Analyze
CO2	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to various attacks.	Analyze
CO3	Apply cryptographic techniques in real time applications	Apply
CO4	Formulate web security services and mechanisms	Apply
CO5	Distinguish SSL, TLS and its applications.	Analyze

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

COs	Programme Outcomes (POs)												PSOs		
	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				3									2		

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B0534	Animation Techniques [Professional Elective - III]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Graphics

COURSE OBJECTIVES:

This course will enable the students to learn the fundamental concepts of animation, creating flash animation concepts, learn the 3d animation techniques, apply the motion capture software for animation and analyze various color models.

MODULE I: INTRODUCTION [09 PERIODS]

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

MODULE II: Creating Animation in Flash [10 Periods]

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation-Working with the Time line and Twin based animation - Understanding Layers – Action script.

MODULE III: 3D ANIMATION EFFECTS [10 PERIODS]

A: 3D Animation & its Concepts – Types of 3D Animation – Skeleton & Kinetic3D Animation.

B: Texturing & Lighting of 3D Animation – 3D Camera Tracking –Applications & Software of 3D Animation.

MODULE IV: Motion Capture [09 Periods]

Motion Caption – Formats – Methods – Usages – Expression – Motion Capture Softwares' – Script Animation Usage – Different Languages of Script Animation among the Software.

MODULE V: COLOR MODEL [10 PERIODS]

Concept Development –Story Developing –Audio & Video – Color Model –Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TEXT BOOKS

1.JukeParent,**"ComputerAnimation:AlgorithmsandTechniques**",3rdEdition, (Hardcover,RickParent).

2. Williams Richars, "**The Animator's Survival Kit--Revised Edition: A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Internet",** Faber & Faber, 2012.

REFERENCES

1. Alex Michael, **"Animating with Flash MX Professional Creative Animation Techniques"**, 1st edition Focal Press, 2003.

E-RESOURCES

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

COURSE OUTCOMES:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	**Understand** fundamental concepts of animation	
CO2	**Implement** animation using flash concepts	
CO3	**Outline** the scripting concepts in 3D animation methods.	
CO4	**Analyze** the different languages of scripting animation techniques	
CO5	**Apply** the story developing and color model in 3D animated movies	

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B6217	Cyber Security [Professional Elective - III]	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

This course makes the students to understand the basic concepts security policies, interpret security objectives, various catalog approaches, analyze cyber user, conflict, management, infrastructure issues, investigate various case studies on cyber security policies.

Module-I: Policies and Security Evolution [10 Periods]

Introduction - Cyber Security, Cyber Security policy, Domain of Cyber Security Policy, Laws and Regulations

Cyber Security Evolution - Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus, Policy, Cyber Security Evolution, Productivity, Internet, E-Commerce, Counter Measures, Challenges.

Module-II: Cyber Security Objectives and Guidance [10 Periods]

Security Objectives - Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, E-Commerce Systems, Industrial Control Systems, Personal Mobile Devices, Security Policy Objectives, Guidance for Decision Makers, Tone at the Top, Policy as a Project.

Catalog Approach - Cyber Security Management, Arriving at Goals, Cyber Security Documentation, the Catalog Approach, Catalog Format, Cyber Security Policy Taxonomy

Module-III: Policy Catalog and Issues [10 Periods]

Cyber Security Policy Catalog- Cyber Governance Issues, Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging, Cyber User Issues, Malvertising, Impersonation.

Cyber User and Conflict Issues - Appropriate Use, Cyber Crime, Geo location, Privacy, Cyber Conflict Issues, Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

Module-IV: Cyber Management and Infrastructures Issues [09 Periods]

Cyber Management Issues - Fiduciary Responsibility – Risk Management – Professional Certification – Supply Chain – Security

Cyber Infrastructure Issues-Principles–Research and Development–Cyber Infrastructure Issue–Banking and finance–Health care–Industrial Control systems.

Module-V: Case Study [09 Periods]

Government's Approach to Cyber Security Policy-Cyber security strategy-Brief History-Public policy development in the U.S Federal Government.

Espionage -The rise of cybercrime- Espionage and Nation-state Actions-Policy response to growing Espionage Threats-Congressional Action.

Text Books

1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs , Jeffrey Schmidt, Joseph Weiss "**Cyber Security Policy Guidebook**" John Wiley & Sons 2012.
2. Rick Howard "**Cyber Security Essentials**" Auerbach Publications 2011.

References

1. Richard A. Clarke, Robert Knake "**Cyberwar: The Next Threat to National Security & What to Do About It**" Ecco 2010
2. Dan Shoemaker "**Cyber security The Essential Body Of Knowledge**", 1st edition, Cengage Learning 2011.

E-Resources

1. http://www.esoln.net/edownload/Download/Cyber_Security_Policy_Guidebook.pdf
2. http://index-of.es/Hack/CyberSecuity.pdf
3. https://www.acm.org/education/TowardCurricularGuidelinesCybersec.pdf
4. https://www.cs.cmu.edu/~hovy/papers/14dgo-cybersecurity-taxonomy.pdf
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY77N9KJP4BJuXxkVQS Jo9fLOOf1gtbY8enNTX_Gat1aW0f-JrSQu1YTNmVwRFJ_mJ7Q
6. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY737OFS2a5kP6Ph6KB9 KG9RiRGN-S5LJoIuO6-Z-TBERz0mAxCmQX4GTFW2WfvuCVAg

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	**Explore** various security policies and evolution of security.	Analyze
CO2	**Investigate** more on various catalog approaches and cyber security objectives.	Understand
CO3	**Analyze** cyber user and conflict issues.	Apply
CO4	**Review** cyber management and infrastructure issues	Apply
CO5	**Examine** various case studies on cyber security policies	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	3		
CO2			3	2										2	
CO3		3	3			3						2	3		
CO4		2	3		3								2		
CO5		2				3								3	

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code:B0H03	English Communication and Presentation Skills Lab (Common for CSE, IT, CSE(CS),CSE(AIML),CSE(DS), CSE(IOT) and AIML)	L	T	P
Credits: 1		-	-	2

Pre-requisites: NIL

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

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

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

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

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

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

MODULE V: Job Hunt Process

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

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

REFERENCES:

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

E-RESOURCES:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Give Oral Presentations Confidently.	Analyze
CO2	Draft appropriate Resume in accordance with the context.	Analyze
CO3	Participate and present their view and ideas logically and confidently.	Apply
CO4	Understand the importance of communication in various settings.	Apply
CO5	Utilize the technology for career advancement.	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					2		2			
CO2										1		2			
CO3		1		1						2		2			
CO4					1	1			1	2		2			
CO5				1	1				1	2		2			

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code:B1220	DevOps Lab	L	T	P
Credits: 1		-	-	2

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:

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VI Semester		
Code: B0543	Compiler Design Lab	L	T	P
Credits: 2	(Common for CSE, IT, CSE(CS), CSE(AIML), CSE(DS), CSE (IOT) and AIML)	-	1	2

Prerequisites: NIL

Course Objectives:

1. To understand the various phases in the design of a compiler.
2. To understand the design of top-down and bottom-up parsers.
3. To understand syntax directed translation schemes.
4. To introduce lex and yacc tools.

Software Requirements: Turbo C / C++

List of Programs:

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

Text Books:

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

References:

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

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Ability to design, develop, and implement a compiler for any language.	Analyze
CO2	Able to use lex and yacc tools for developing a scanner and a parser.	Analyze
CO3	Able to design and implement LL and LR parsers.	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		2	
CO2	3	2										2		2	
CO3	2	2										2		2	
CO4	3	2						2				2		2	
CO5	3	2										2		2	

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code:B0H09	Management Fundamentals	L	T	P
Credits:3		3	-	-

Prerequisites: NIL

Course Objectives:

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

MODULE – I: Management and Principles of Management [09 Periods]

Introduction to Management: Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.

Management Theories: Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Corporate Social responsibility.

MODULE – II: Planning, Organization and types of Structures [10 Periods]

Planning: Need for planning- -Steps in the process of planning-Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).

Organization and types of Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE – III: Staffing and controlling [10 Periods]

Staffing: Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.

Controlling: process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE – IV: Operations and Materials Management [09 Periods]

Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.

Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

MODULE – V: Project Management and Contemporary Practices [10 Periods]

Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

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

TEXT BOOKS:

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

REFERENCES*:*

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

E RESOURCES:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Understand the various concepts, principles and theories of management.	Analyze
CO2	Understand the basic concepts of planning and various structures of organizations.	Analyze
CO3	Understand the process of staffing and controlling	Apply
CO4	Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization.	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			2	
CO2		3							2		1				2
CO3		3								2	1		3		
CO4		3		2	1										

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code:B7310	Data Analytics	L	T	P
Credits:3		3	-	-

Prerequisites:

- A course on "Database Management Systems".
- Knowledge of probability and statistics.

Course Objectives:

1. To explore the fundamental concepts of data analytics.
2. To learn the principles and methods of statistical analysis
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. 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: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.

Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

Module-V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B0536	Data Mining	L	T	P
Credits: 3	(Common for CSE, IT, CSE(CS),CSE(AIML), CSE(DS), CSE (IOT) and AIML)	3	-	-

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.

Module-I: Introduction [09Periods]

Motivation for Data Mining-Data Mining-Definition and Functionalities–Classification of DM Systems -DM task primitives-Integration of a Data Mining system with a Database or a Data Warehouse-Issues in DM–KDD Process

Module-II: Data Pre-processing [10 Periods]

Data summarization, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation, feature extraction , feature transformation, feature selection, introduction to Dimensionality Reduction, CUR decomposition.

Similarity and Dissimilarity Measurement: Similarity and Dissimilarity between simple attributes, Dissimilarities and similarities between data objects, Examples of Proximity measures, Issues in Proximity Calculation, Selection of right proximity measure.

Module-III: Classification and Association [09 Periods]

Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree.Methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction, Bayes' Theorem, Naïve Bayesian Classification, Bayesian BeliefNetworks, Data Generalization and summarization-based characterization-Attribute relevance - class comparisons, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP- Growth Algorithm.

Module-IV: Cluster Analysis: [10 Periods]

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering – Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering, Strengths and Weakness; Outlier Detection, Clustering high dimensional data, clustering Graph and Network data.

Module-V:Web Mining [10 Periods]

Introduction to Web Mining, Web content mining, Web usage mining, Web Structure mining, Web log structure and issues regarding web logs, Spatial Data Mining, Temporal Mining, And Multimedia Mining, Applications of Distributed and parallel Data Mining.

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.
3. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann

References

1. Hongbo Du, "**Data Mining Techniques and Applications: An Introduction**", Cengage

Learning.
2. Vikram Pudi and P. Radha Krishna, "**Data Mining**", Oxford.
3. Mohammed J. Zaki, Wagner Meira, Jr," Data **Mining and Analysis - Fundamental Concepts and Algorithms**", Oxford
4. Alex Berson, Stephen Smith," Data **Warehousing Data Mining & OLAP**", TMH.

E-Resources

1. http://www-users.cs.umn.edu/~kumar/dmbook/index.php
2. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf
3. http://www.ijctee.org/files/Issuethree/IJCTEE_1111_20.pdf
4. http://www.ccsc.org/southcentral/EJournal/2010/Papers/Yihao%20final%20paper%20CCSC%20for%20submission.pdf
5. https://gunjesh.wordpress.com/

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	**Understand** the basic concepts in data mining	Analyze
CO2	**Understand** the need and importance of data preprocessing techniques	Analyze
CO3	**Implementation** of a classification problems	Apply
CO4	**Implementing** various Clustering algorithms	Apply
CO5	**Understand** different types of Web Mining techniques	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	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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B. Tech. VII Semester		
Code: B0527	CLOUD COMPUTING [Professional Elective - IV]	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks

Course Objectives:

This course provides the students to gain knowledge in the cloud computing environment, security architecture and development of cloud services. Students will also examine the collaboration of real time cloud services and analyze the case studies from various cloud development tools.

MODULE I: Introduction to Cloud Computing [8 Periods]

Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

MODULE II: Virtualization [12 Periods]

Virtual Machines and Virtualization of Clusters and Data Centers: Levels of Virtualization, Virtualization Structures//Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products-VMware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

Module III: Cloud Computing Architecture over Virtualized Data Centers[8 Periods]

A:Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds.

B: Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

MODULE IV: Cloud Security [8 Periods]

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, Crypt Db: Onion Encryption layers-DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

MODULE V: Cloud Programming and Standards [12 Periods]

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

TEXT BOOKS

1. John W. Rittinghouse, "**Cloud Computing: Implementation, Management, and Security** ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "**Distributed and Cloud Computing From Parallel Processing to the Internet of Things**", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," **Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing),** Wiley Publishing ©2011

References:

1. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "**CryptDB: Protecting Confidentiality with encrypted Query Processing**"23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
2. Craig Gentry,"**A Fully Homomorhic Encryption Scheme**", September 2009.
3. David Marshall, Wade A. Reynolds, "**Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center**", Auerbach Publications, 2006.

E-Resources

1 http://www.motc.gov.qa/sites/default/files/cloud_computing_ebook.pdf
2 https://www.thesisscientist.com/docs/Study%20Notes/8ad50655-64f5-46d4-bc89-0c02feaf132f
3 http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-5ybmrhKBj79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA
4 http://www.springer.com/computer/communication+networks/journal/13677
5 http://nptel.ac.in/courses/106106129/28

Course Outcomes:

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

1. Understand the cloud enabling technologies and the Cloud service models.
2. Choose the levels of virtualization and tools for resource provisioning.
3. Compare the cloud platform architectures of virtualized data centers and Inter- cloud Resource Management.
4. Analyze the principles of Security and Trust management to protect confidentiality of data in the Cloud.
5. Propose the standards of Parallel and Distributed Programming Paradigms for improving user Access to Cloud Computing.

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B1216	Object Oriented Analysis and Design	L	T	P
Credits: 3	(Common for CSE, IT, CSE(CS),CSE(AIML), CSE(DS), CSE (IOT) and AIML)	3	-	-

Prerequisite: NIL

Course Objectives:

The student will be able to understand the Unified Modeling Language Principles and learns fundamental process pattern for object-oriented analysis and design.

Module I: Introduction to UML **[09 Periods]**

Importance of modeling, principles of modeling, object-oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

Module II: Behavioral and structural Modeling **[09 Periods]**

Basic Behavioral Modeling-I: Use cases, Use case Diagrams, Activity Diagrams.

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

Module III: Behavioral Model II **[12 Periods]**

Advanced Structural Modeling-Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Class & Object Diagrams-Terms, concepts, modeling techniques for Class & Object Diagrams.

Basic Behavioral Modeling-II: Interactions, Interaction diagrams

Module IV: Advanced Behavioral Modeling **[09 Periods]**

Advanced Behavioral Modeling**:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Module V: Architecture Modeling **[09 Periods]**

Component, Deployment, Component diagrams and Deployment diagrams.

Case Study**:** The Unified Library application.

Text Books

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, PearsonEducation.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt.Ltd.

Reference Books

1.Meilir Page-Jones: Fundamentals of Object-Oriented Design in UML, Pearson Education.

2.Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill.

3.Mark Priestley: Practical Object-Oriented Design with UML, Tata Mc Graw Hill.

4.Appling UML and Patterns: An introduction to Object–Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	**Analyze** the requirements through Use-Case View	Analyze
CO2	**Identify** all structural and behavioral concepts of the entire system	Analyze
CO3	**Develop** a model using UML concepts by different types of diagrams like Use case diagram, Class Diagram, Sequence Diagram etc.	Develop
CO4	**Design** event process and state chart diagrams for the models	Design
CO5	**Build** an application with object-oriented analysis and design concepts.	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	3		2	2	2						2	2	2
CO2		3		3	2	2	1				2		3	2	2
CO3	2	3	3	2	2	2	2				1		3	3	2
CO4		3		2	2	2	2							3	
CO5		3		2	2	2	2							3	

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B1217	Augmented Reality and Virtual Reality [Professional Elective - IV]	L	T	P
Credits: 3		3	-	-

Prerequisites: Fundamentals of Image Processing Course Objectives:

1.To describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

2.To explore the concepts of Virtual reality and develop 3D virtual environment.

3.To foundation to the fast growing field of AR and make the students aware of the various AR devices.

4.To help students build various types of VR experiences and use Unity to develop VR applications.

5.To expose students to the world of research, technology and innovation.

MODULE-I **[10 PERIODS]**

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

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

MODULE –II **[9 PERIODS]**

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

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

MODULE -III **[10 PERIODS]**

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

Applications: Medical applications, military applications, robotics applications.

MODULE -IV **[10 PERIODS]**

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

MODULE -V **[9 PERIODS]**

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

TEXT BOOKS:

1.Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.,

2.Killer Game Programming in Java, Andrew Davison, Oreilly-SPD, 2005.

REFERENCES:

1.Understanding Virtual Reality, interface, Application and Design, William R.Sherman,

Alan Craig, Elsevier(Morgan Kaufmann).

2.3D Modeling and surfacing, Bill Fleming, Elsevier(Morgan Kauffman).

3.3D Game Engine Design, David H.Eberly, Elsevier.
4.Virtual Reality Systems, John Vince, Pearson Education.

E-RESOURCES:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	**Apply** the describe how VR systems work and list the applications of VR.	Apply
CO2	**Understand** the system of human vision and its implication on perception and rendering.	Understand
CO3	**Create** and deploy a VR application.	Analyze
CO4	**Identify** the describe how AR systems work and list the applications of AR	Analyze
CO5	**Construct** the acquire knowledge in VR and AR technologies in terms of used devices, building of the virtual environment and modalities of interaction and modeling.	Design

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		

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B0546	Business Analytics	L	T	P
Credits: 3	[Professional Elective -V]	3	-	-

Prerequisites: NIL

Course Objective:

To understand the importance of ever-increasing volume, variety and velocity of data in organization and application of data analytical tools for decision making.

MODULE- I **[10 periods]**

Introduction to Data Analytics: Introduction to Data- Importance of Analytics- Data for Business Analytics –Big Data - Business Analytics in Practice. Data Visualization – Data Visualization tools, Data queries, Statistical methods for Summarizing data, Exploring data using pivot tables.

MODULE- II **[10 periods]**

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

MODULE- III **[8 periods]**

A: Predictive Analytics: Karl Pearson Correlation Techniques - Multiple Correlation-Spearman's Rank correlation-Simple and Multiple regressionRegressions by the method of least squares B: Building good regression models: Regression with categorical independent variables-Linear Discriminate Analysis-One way and Two Way ANOVA [6 periods]

MODULE- IV **[10 periods]**

Data Mining : Scope of Data Mining, Data Exploration and Reduction, Unsupervised learning – cluster analysis, Association rules, Supervised learning- Partition Data, Classification Accuracy, prediction Accuracy, k-nearest neighbors, Classification and regression trees, Logistics Regression.

MODULE- V **[10 periods]**

Simulation: Random Number Generation, Monte Carlo Simulation, What if Analysis, Verification and Validation, Advantages and Disadvantages of Simulation, Risk Analysis, Decision Tree Analysis.

Preferred books:

1. James Evans, Business Analytics, 2e, Pearson, 2017.
2. Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams Essential of Business Analytics, Cengage Learning.
3. Thomas Eri, Wajid Khattack& Paul Buhler : Big Data Fundamentals, Concepts, drivers and Techniques by Prentice Hall of India, New Delhi, 2015

E Resources:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Understand the basic concepts of data analytics and its relevance to business.	Understand
CO2	know the various descriptive statistical measures and their application	Understand
CO3	Understand the tools of predictive analytics and their application for business analysis	Understand
CO4	Understanding the basic concepts of data mining and its importance in business analytics.	Understand
CO5	Learn the concepts of simulation and its application to solve business problems	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							
CO2		3													
CO3		3				2		2							
CO4		2						2							
CO5		3		2				2							

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B7311	Data and Visual Analytics in AI	L	T	P
Credits: 3	[Professional Elective -V]	3	-	-

Pre-requisites: AI

Course Objective:

The student will be able to understand techniques and algorithms for creating effective visualizations based on principles from graphic design. They will also be introduced to several industry-standard software tools to create a compelling and interactive visualization of various types of data.

Module 1: Introduction [9 periods]

Data for Graphics, Design principles, Value for visualization, Categorical, time series, and statistical data graphics, Introduction to Visualization Tools

Module 2: Graphics Pipeline and Aesthetics and Perception [10 periods]

Introduction, Primitives: vertices, edges, triangles, Model transforms: translations, rotations, scaling, View transform, Perspective transform, window transform, Graphical Perception Theory, Experimentation, and the Application, Graphical Integrity, Layering and Separation, Color and Information, Using Space

Module 3: Visualization Design [9 periods]

Visual Display of Quantitative Information, Data-Ink Maximization, Graphical Design, Exploratory Data Analysis, Heat Map

Module 4: Multidimensional Data and Interaction [10 periods]

Query, Analysis and Visualization of Multi-Dimensional Relational Databases, Interactive Exploration, tSNE, Interactive Dynamics for Visual Analysis, Visual Queries, Finding Patterns in Time Series Data, Trend visualization, Animation, Dashboard, Visual Storytelling

Module 5: Collaboration [8 periods]

Graph Visualization and Navigation, Online Social Networks, Social Data Analysis, Collaborative Visual Analytics, Text, Map, Geospatial data

Text Books/Suggested References:

1. The Visual Display of Quantitative Information by E. Tufte, Graphics Press, 2nd Edition, 2001
2. Beginner's Guide for Data Analysis using R Programming, Jeeva Jose, Khanna Publishing 2019.
3. Data Visualization Handbook by J. Koponen, J. Hildén, CRC Press, 2019
4. The Book of Trees: Visualizing Branches of Knowledge by M. Lima, Princeton Architectural Press, 2014
5. Handbook of Graph Drawing and Visualization by R. Tamassia, CRC Press, 2013
6. Interactive Data Visualization for the Web by S. Murray O'Reilly Press, 2nd Edition, 2017

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Understand the key techniques and theory used in visualization, including data models, graphical perception, and techniques for visual encoding and interaction.	Understand
CO2	Apply knowledge to a number of common data domains and corresponding analysis tasks, including multivariate data, networks, text, and cartography.	Apply
CO3	Describe big data and use cases from selected business domains	Apply
CO4	Explain NoSQL big data management and other technologies such as Hadoop and HDFS	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												1	1	
CO2	1	2	2	4		3					2		1	1	
CO3	2	3	2		4		1	4				1	1	1	
CO4	3	2	2						4	5	3			2	2

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B0541	Image Processing	L	T	P
Credits: 3	[Professional Elective -V]	3	-	-

Pre-requisites: AI

Course Description

This course emphasizes general principles of image processing, rather than specific applications. Lectures will cover topics such as point operations, color processing, image thresholding/segmentation, morphological image processing, image filtering and DE convolution, noise reduction and restoration, scale-space techniques, feature extraction and recognition, image registration, and image matching. This course includes foundations of pattern recognition algorithms and machines, including statistical and structural methods. Data structures for pattern representation, feature discovery and selection, classification vs. description, parametric and non-parametric classification.

Course Objectives

The objective of this course is to

- imparts knowledge in the area of image and image processing
- understand fundamentals of digital image processing
- provide knowledge of the applications of the theories taught in Digital Image Processing
- learn the fundamentals of Pattern recognition and to choose an appropriate feature
- classification algorithm for a pattern recognition problems and apply them properly using modern computing tools such as MATLAB, C/C++ etc.

Module-I: Introduction to Image Processing [9 Periods]

Image formation, image geometry perspective and other transformation, stereo imaging elements of visual perception. Digital Image-sampling and quantization serial & parallel Image processing.

Module-II: Image Restoration [9 Periods]

Image Restoration-Constrained and unconstrained restoration Wiener filter , motion blur remover, geometric and radiometric correction Image data compression-Huffman and other codes transform compression, predictive compression two tone Image compression, block coding, run length coding, and contour coding.

Module-III: Segmentation Techniques [10 Periods]

Segmentation Techniques-thresh holding approaches, region growing, relaxation, line and edge detection approaches, edge linking, supervised and unsupervised classification techniques, remotely sensed image analysis and applications, Shape Analysis – Gestalt principles, shape number, moment Fourier and other shape descriptors, Skelton detection, Hough trans-form, topological and texture analysis, shape matching.

Module-IV: Pattern Recognition [9 Periods]

Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

Module-V: Statistical Patten Recognition [9 Periods]

Bayesian Decision Theory, Classifiers, Normal density and discriminant functions, Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods – Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM),Gaussian mixture models.

Text Books

1. Digital Image Processing – Ganzalez and Wood, Addison Wesley, 1993.
2. Fundamental of Image Processing – Anil K.Jain, Prentice Hall of India.
3. Pattern Classification – R.O. Duda, P.E. Hart and D.G. Stork, Second Edition John Wiley, 2006

Reference Books

1. Digital Picture Processing – Rosenfeld and Kak, vol.I & vol.II, Academic,1982
2. Computer Vision – Ballard and Brown, Prentice Hall, 1982
3. An Introduction to Digital Image Processing – Wayne Niblack, Prentice Hall, 1986
4. Pattern Recognition and Machine Learning – C. M. Bishop, Springer, 2009.
5. Pattern Recognition – S. Theodoridis and K. Koutroumbas, 4th Edition, Academic Press,2009

E-Resources:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Understand different types signal processing techniques used for image sharpening and smoothing	Understand
CO2	perform and apply compression and coding technique used for image data	Analyze
CO3	understand the nature and inherent difficulties of the pattern recognition problems	Understand y
CO4	understand pattern recognition problems and classification techniques such as Bayesian, maximum-likelihood	Apply
CO5	select a suitable classification process, features, and proper classifier to address a desired pattern recognition problem	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												1	1	
CO2	1	2	2	4		3					2		1	1	
CO3	2	3	2		4		1	4				1	1	1	
CO4	3	2	2						4	5	3			2	2
CO5	4	5	1									4	1		1

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B1218	Software Project Management	L	T	P
Credits: 3	[Professional Elective - V]	3	-	-

Course Objective:

It gives an in-depth knowledge of software project management and project planning. It also covers the Step Wise framework in project planning.

Module-I: Introduction to Software Project Management [10 Periods]

Software engineering problem and software product, software product attributes, Definition of a Software Project (SP), SP Vs. other types of project's activities covered by SPM, categorizing SPs, Project management cycle, SPM framework, types of project plan.

Project Analysis

Introduction, strategic assessment, technical assessment, economic analysis: Present worth, future worth, annual worth, internal rate of return (IRR) method, benefit-cost ratio analysis, including uniform gradient cash flow and comparison of mutually exclusive alternatives.

Module-II: Activity Planning and Scheduling [9 Periods]

Objectives of activity planning, Work breakdown structure, Bar chart, Network planning model: Critical path method (CPM), Program evaluation and review technique (PERT), Precedence diagramming method (PDM), Shortening project duration, Identifying critical activities.

Risk Management

Introduction, nature and identification of risk, risk analysis, evaluation of risk to the schedule using Z-values

Module-III: Resource Allocation [9 Periods]

Identifying resource requirements, resource allocation, resource smoothening and resource balancing. Monitoring and control, Introduction, collecting data, visualizing progress, cost monitoring, earned value analysis, project control

Module-IV: Managing Contracts and People [9 Periods]

Introduction, types of contracts, stages in contract, placement, typical terms of a contract, contract management, acceptance, managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises.

Module-V: Software Quality Assurance and Testing [10 Periods]

Testing principles and objectives, test plan, types and levels of testing, test strategies, program verification and validation, software quality, SEI-CMM,SQA activities, QA organization structure, SQA plan.

Software Configuration Management

Introduction, need, basic configuration, management function, baseline, configuration management responsibilities.

Recommended Books

1. Bob Hughes and Mike Cotterell, Software Project Management, Tata McGraw Hill, (2009)
2. Roger Pressman, A practitioner's Guide to Software Engineering, Tata McGraw Hill, (2014)
3. Head First PMP: A Brain Friendly Guide to Passing the Project ManagementProfessional Exam (2013)

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Apply the basics of Software Project Management in order to manage and deliverqualified product	Apply
CO2	Identify the Problem Effectively and Efficiently with proper documentation for the use in different software teams and organization.	Analyze
CO3	Comprehend and be able to carry on Technical as well as Cost Benefit Analysis and plan the activities within time schedules with CPM and PERT Analysis.	Apply
CO4	Competent to design Communication Plans, Procurement of Resources and Human Resource Management.	Apply
CO5	Perform Software Quality Assurance, Testing and Configuration Management effectively	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					2		2			
CO2										1		2			
CO3		1		1						2		2		1	
CO4					1	1			1	2		2			
CO5				1	1				1	2		2			

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B1219	Mobile Communication	L	T	P
Credits: 3	[Professional Elective - V]	3	-	-

Prerequisites: NIL.

Course objectives:

The student should be made to:

1. Understand the basic concepts of mobile computing
2. Understand Wireless LAN, Bluetooth and WiFi Technologies
3. Be familiar with the network protocol stack
4. Learn the basics of mobile telecommunication system
5. Be exposed to Ad-Hoc networks

Module I: Introduction **[09 Periods]**

Introduction to Mobile Computing, Applications of Mobile Computing- Generations of Mobile Communication Technologies

MAC Protocols: SDMA, TDMA, FDMA, CDMA

Module-II: **Mobile Telecommunication System** **[09 Periods]**

GSM, Architecture, Protocols, Connection Establishment, Frequency Allocation, Routing, Mobility Management, Security, GPRS, UMTS Architecture

Module-II: **III**: **Wireless Networks** **[09 Periods]**

Wireless LANs and PANs, IEEE 802.11 Standard, Architecture, Services: Bluetooth, Wi-Fi, WiMAX

Module-IV: **Mobile Network Layer** **[09 Periods]**

Mobile IP, DHCP, AdHoc, Proactive and Reactive Routing Protocols, Multicast Routing, Vehicular Ad Hoc networks (VANET), MANET Vs VANET, Security

Module-V: Mobile Transport and Application Layer **[10 Periods]**

Mobile TCP, WAP Architecture, WDP, WTLS, WTP, WSP, WAE, WTA Architecture, WML

Text Books:

1. Jochen Schiller, "Mobile Communications', PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt.Ltd, New Delhi – 2012.

References:

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, ―Principles of Mobile Computing‖, Springer, 2003.
3. William.C.Y.Lee,―Mobile Cellular Telecommunications-Analog and Digital Systems‖, Second Edition,Tata Mc Graw Hill Edition ,2006.
4. C.K.Toh, ―AdHoc Mobile Wireless Networks‖, First Edition, Pearson Education, 2002.
5. Android Developers: http://developer.android.com/index.html
6. Apple Developer: https://developer.apple.com/

7. Windows Phone Dev Center: http://developer.windowsphone.com
8. BlackBerry Developer: http://developer.blackberry.com
9. www.padeepz.net

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Explain the basics of mobile telecommunication system	Understand
CO2	Illustrate the generations of telecommunication systems in wireless network	Analyze
CO3	Understand the architecture of Wireless LAN technologies	Understand
CO4	Determine the functionality of network layer and Identify a routing protocol for a given Ad hoc networks	Apply
CO5	Explain the functionality of Transport and Application layer	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	2		2		3				3	2	2	2		2	
CO2	2	3	3									2	2		
CO3	2	3	2									2	2	1	
CO4	2	3	2									2		2	
CO5	2	3	2									2	2		

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B6615	IOT With Machine Learning	L	T	P
Credits: 3	[Professional Elective - V]	3	-	-

Module-I

Principles and Foundation of IoT and AI – what is IoT 101?,IoT reference model ,IoT platforms, IoT verticals ,Big Data and IoT, Infusion of AI – data science in IoT- Cross – industry standard for data minimg, AI platforms and IoT platforms, Data access and Distributed processing for IoT-TXT format, CSV format, XLSX format, Working with the JSON format, HDF5 format, SQL data, NoSQL data, HDFS

Module-II

Machine Learning for IoT, ML and IoT , Learning paradigms, prediction using linear regression, Logistic regression for classification, classification using support vector machines, Naïve Bayes, Decision trees, Ensemble learning.

Module-III

Deep Learning for IoT-Deep learning, multilayered perceptrons for regression and classification, Convolutional neural networks, Recurrent neural networks, autoencoders, Genetic algorithms for IoT Optimization-deterinistic and analytic methods, gradient desent, method, newton Raphson method ,Natural optimization methods, Introduction to genetic algorithms

Module-IV

Reinforcement learning for IoT- Introduction, RL terminology, Deep reinforcement learning, Simulated Environments, policy gradients.

Generative Models for IoT – introduction, generating images using VAEs, GANs

Module-V

Personal and Home IoT- personal IoT,Super shoes by MIT,Iot and smart Homes-human activity recognition, HAR using wearable sensors, HAR from videos,Smart lighting,AI for the indusrial IoT

Text Book:

1. Hands-On Artificial Intelligence for IoT-Expert Machine Learning and Deep Learning Techniques for Developing Smarter IoT Systems

References

1. Machine Learning and IoT: A Biological Perspective Shampa Sen, Leonid Datta, Sayak Mitra · 2018
2. Introduction to IoT with Machine Learning and Image Processing Shrirang Ambaji Kulkarni, Varadraj P. Gurupur, Steven L. Fernandes · 2020
3. Machine Learning Approach for Cloud Data Analytics in IoT Sachi Nandan Mohanty, Jyotir Moy Chatterjee, Monika Mangla · 2021

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VIII Semester		
Code: B0548	Software Testing Methodologies	L	T	P
Credits: 3	[Professional Elective - VI]	3	-	-

Prerequisites: Software Engineering

Course Objectives:

This Course enables the students to understand the principles and need for various types of testing test adequacy assessment using: data flow, transaction flow and path testing, describe strategies for generating system test cases, apply the essential characteristics of path product and regular expressions, explain about the people and organizational issues in Testing.

MODULE I: Introduction to Software Testing and Defects [08 Periods]

Introduction-Purpose of testing-Dichotomies-Software Testing Principles- Bugs, consequences of bugs, Taxonomy of bugs -The Tester's Role in a Software Development Organization-Black box testing and white box testing.

Defects- Cost of defects- Defect Classes- Defect Examples, software testing life cycle.

MODULE II:Testing Techniques [10 Periods]

Flow graphs and Path Testing- Basics concepts of path testing-predicates-path predicates and achievable paths- path sensitizing- path instrumentation, application of pathtesting.

Transaction and Data Flow Testing- Transaction flows- transaction flow testing techniques, Basics of dataflow testing - strategies in data flow testing–application of dataflowtesting.

MODULE III: Test Case Approaches andTestingTypes [11 Periods]

A: Test Case Design Strategies

Using Black Box Approach to Test Case Design -Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning– Compatibility testing – User documentation testing – Domain testing.

B: Testing Types

Alpha, Beta Tests, Usability and Accessibility testing – Configuration testing - Compatibility testing – Testing the documentation.

MODULE IV:Path Testing and Applications [10 Periods]

Paths, Path products and Regular Expressions-Path products and path expression-reduction procedure- applications- regular expressions and flow anomalydetection.

Logic Based Testing, State Graphs and Transition Testing- Overview decision tablespath expressions, k-v charts, state, State graphs, transition testing, good and bad state graphs, state testing, testability tips.

MODULE V: Software Testing Tools and Graph Matrices [09 Periods]

Graph Matrices and Applications- Motivational over view, matrix of graph, relations, power of matrix, node reductionalgorithm. Software Testing Tools- Taxonomy of Testing tools. Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT andCactus.

Textbooks:

1. Van Nostrand Reinhold, "Software Testing Techniques", Boris Beizer, 2nd Edition, New York,1990.

2. Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing Principles and Practices”, Pearson Education,2006.

References:

1. Sams Publishing, “Software Testing”, Ron Patton, Second Edition, Pearson education,2007.
2. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill,2004.
3. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education,1995.
4. Aditya P. Mathur, “Foundations of Software Testing – Fundamental algorithms and techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education,2008

E -Resources

1. https://books.google.co.in/books?isbn=8177222600
2. https://books.google.co.in/books?isbn=817758121X
3. http://www.uta.fi/sis/reports/index/R31_2014.pdf
4. http://nptel.ac.in/courses/106101061/18#

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Analyze the Conventional Blooms Taxanomy Level Software Management	Understand
CO2	Demonstrate the principles of conventional software Engineering, Life cycle Phases, and Artifacts of the process.	Analyze
CO3	Apply the Software testing Work Flows of the process, Checkpoints of the process and Iterative Process Planning.	Analyze
CO4	Develop automation Process, Project Control and Process instrumentation, tailoring the process in software testing.	Apply
CO5	Evaluate the project organizations and responsibilities, future software project management with case study.	Understand

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B6920	Adhoc Sensor Networks	L	T	P
Credits: 3	[Professional Elective –V]	3	-	-

Prerequisites

1. A course on "Computer Networks" and "Mobile Computing"

Course Objectives:

- To understand the concepts of sensor networks
- To understand the MAC and transport protocols for ad hoc networks
- To understand the security of sensor networks
- To understand the applications of adhoc and sensor networks

Module – I **[10 Periods]**

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

Module – II **[10 Periods]**

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

Module – III **[9 Periods]**

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

Module – IV **[9 Periods]**

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

Module – V **[8 Periods]**

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

Text Books:

1.Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.

2.Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

Course Outcomes:

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

CO	Statements	Blooms Taxonomy Level
CO1	Understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks	understand
CO2	Analyze protocols developed for Ad Hoc and sensor networks	Apply
CO3	Identify and address the security threats in Ad Hoc and sensor networks.	Analyze
CO4	Solve the issues in real-time application development based on ASN.	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	3	3										2	3
CO2	3	2	3	3									3		2
CO3	3	3	3	3									3	2	
CO4	3	3	3	3									3	2	2

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B7313	Data Analytics Lab	L	T	P
Credits: 1		-	-	2

Course Objectives:

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

List of Experiments:

1. Data Preprocessing
    a. Handling missing values
    b. Noise detection removal
    c. Identifying data redundancy and elimination
2. Implement any one imputation model
3. Implement Linear Regression
4. Implement Logistic Regression
5. Implement Decision Tree Induction for classification
6. Implement Random Forest Classifier
7. Implement ARIMA on Time Series data
8. Object segmentation using hierarchical based methods
9. Perform Visualization techniques (types of maps - Bar, Colum, Line, Scatter, 3D Cubes etc)
10. Perform Descriptive analytics on healthcare data
11. Perform Predictive analytics on Product Sales data
12. Apply Predictive analytics for Weather forecasting.

Text Books:

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

Reference Books:

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

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Understand linear regression and logistic regression	Understand
CO2	Understand the functionality of different classifiers	Understand
CO3	Implement visualization techniques using different graph	Analyze
CO4	Apply descriptive and predictive analytics for different types of data	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	3	3	3	3	3						3	3	3
CO2	3	2	3	2	3							2	3	3	3
CO3	3	3	3	3	3							3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code:B0544	Data Mining Lab	L	T	P
Credits: 2		-	1	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.arff.
2. Implementation of preprocessing on dataset labor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori Algorithm.
4. Implement Association rule process on 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:

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

COs	Statements	Blooms Taxonomy Level
CO1	**Analyze** the classification rules on various databases	Understand
CO2	**Deploy** association rules for any kind of databases.	Analyze
CO3	**Develop** clustering rules for applications.	**Develop**

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VII Semester		
Code: B0P01	Internship-III/Mini Project	L	T	P
Credits: 2		-	-	4

Objectives:

The objective of Project Stage-I is to enable the student take up investigative study in the broad field of Engineering / Technology, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a supervisor. This is expected to provide a good initiation for the student(s) towards R&D.

The work should contain:

1. Survey and study of published literature on the assigned /selected topic.
2. Working out a initial Method to the Problem relating to the assigned topic;
3. Conducting preliminary Analysis /Modeling/Simulation/Experiment/Design/Feasibility.
4. Preparing a Written Report on the Study conducted for Presentation to the Department.
5. Final Seminar, as oral Presentation before a departmental Committee.

Table: Guidelines for the Award of Marks

Evaluator	Max. Marks	Evaluation Criteria
Guide/ Supervisor	20	Project Review
	5	Report
Project Review Committee	5	Relevance of the Topic
	5	PPT Preparation
	5	Presentation
	5	Question and Answers
	5	Report
	5	Preparation

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VIII Semester		
Code: B7312	AI for Robotics	L	T	P
Credits: 3		3-	-	

Pre-requisites: Basics of AI

Course Objectives:

- To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content.
- Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.
- The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Module I - Problem solving and Scope of AI [10 Periods]

Introduction to Artificial Intelligence: Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques-search knowledge, abstraction.

Problem Solving

State space search-Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.

Module II - Knowledge Representation [9 Periods]

Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

Module III - Understanding Natural Languages [10 Periods]

Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation.

Module IV- Expert Systems [8 Periods]

Expert System: Need and justification for expert systems, knowledge acquisition, Case Studies: MYCIN, R1

Programming Language: Introduction to programming Language, LISP and PROLOG.

Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

Module V - Introduction to Robotics [9 Periods]

Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages

Text & References:

1. Russell Stuart, Norvig Peter, "Artificial Intelligence Modern Approach", Pearson Education series in AI, 3rd Edition, 2010.
2. Dan.W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Learning, 2009.
3. Donald.A. Waterman, "A guide to Expert Systems", Pearson, 2002.

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Describe human intelligence and AI Explain how intelligent system works.	Understand
CO2	Apply basics of Fuzzy logic and neural networks.	Analyze
CO3	pply Knowledge representation and semantic	Analyze
CO4	Apply Knowledge representation and semantic in Knowledge representation.	Apply
CO5	Develop some familiarity with current research problems and research methods in 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		2			
CO2										1		2			
CO3		1		1						2		2			
CO4					1	1			1	2		2			
CO5				1	1				1	2		2			

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VIII Semester		
Code: B0550	**Deep Learning**	L	T	P
Credits: 3	Professional Elective - VI] (Common for CSE, IT, CSE(CS),CSE(AIML),CSE(DS), CSE (IOT) and AIML)	3	-	-

Course Objectives

In this course students will be given an exposure to the details ofneural networks as well as deep learning architectures and to develop end-to-end models forsuch tasks. Students will learn to implement, train and debug their own neural networks. Every student has to develop a completeworking model to solve some real-world problem**.**

Module-I: Artificial Neural Networks (ANN) [9 Periods]

Basics of Artificial Neural Networks (ANN): Artificial neurons, Computational models of neurons, Structure of neural networks, Functional units of ANN for pattern recognition tasks

Feedforward Neural Networks: Pattern classification using perceprton, Multilayer feed forward neural networks (MLFFNNs), Backpropagation learning, Empirical risk minimization, Regularization, Autoencoders

Module-II: Deep Neural Networks (DNNs) [8 Periods]

Deep Neural Networks (DNNs): Difficulty of training DNNs, Greedy layer wise training, Optimization for training DNNs, Newer optimization methods for neural networks (AdaGrad, RMSProp, Adam), Second order methods for training, Regularization methods (dropout, drop connect, batch normalization)

Module-III: Convolution Neural Networks (CNNs) [10 Periods]

Convolution Neural Networks (CNNs): Introduction to CNNs – convolution, pooling, Deep CNNs, Different deep CNN architectures – LeNet, AlexNet, VGG, PlacesNet,

Training CNNs: Weights Initialization, Batch Normalization, Hyperparameter Optimization, Understanding and Visualizing CNNs.

Module-IV: Recurrent Neural Networks (RNNs) [9 Periods]

Recurrent Neural Networks (RNNs): Sequence modeling using RNNs, Back propagation through time, Long Short-Term Memory (LSTM), Bidirectional LSTMs, Bidirectional RNNs, Gated RNN Architecture

Module-V: Auto Encoders and Generative Adversarial Networks [9 Periods]

Auto Encoders: Types of Auto Encoders and its applications

Generative Adversarial Networks: Generative Adversarial Network, Deep Convolutional Generative Adversarial Networks

Applications: Applications in vision, speech and natural language processing

Text Books:

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.
2. Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola, Dive into Deep Learning, 2020

References Books

1. S. Haykin, Neural Networks and Learning Machines, Prentice Hall of India, 2010
2. Satish Kumar, Neural Networks - A Class Room Approach, Second Edition, TataMcGraw-Hill, 2013
3. Yegnanarayana, Artificial Neural Networks, Prentice- Hall of India, 1999
4. C.M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

E-Resources:

1. https://www.deeplearningbook.org
2. https://d2l.ai/

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Understand the concepts of TensorFlow, its main functions, operations and the execution pipeline	Understand
CO2	Implement deep learning algorithms, understand neural networks and traverse the layers of data abstraction which will empower the student to understand data more precisely.	Analyze
CO3	Learn topics such as convolutional neural networks, recurrent neural networks,	Analyze
CO4	Understand the language and fundamental concepts of artificial neural networks	Apply
CO5	Training deep networks and high-level interfaces and build deep learning models and interpret the results	Understand

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VIII Semester		
Code: B0537	Natural Language Processing	L	T	P
Credits: 3	[Professional Elective - VI]	3	-	-

Prerequisites: Formal Languages and Automata Theory

Course Objectives:

This course provides a broad introduction to NLP to determine whether the algorithm answers the goals of its designers, or if the system meets the needs of its users. And to demonstrate NLP with regular expression, Python programming, demonstrate Context Free Grammar, Probability theory to analyze various models of language, implement Naive Bayes, HMM, explore in detail about Probabilistic Context Free Grammars, Models, parsers and classifiers, grammar and techniques.

Module I: Introduction and Regular Expressions [10 Periods]

Natural Language Processing (NLP) - Introduction to NLP, Hands-on demonstrations, Ambiguity and uncertainty in language, Turing test, Chomsky hierarchy, regular languages, and limitations, Finite-state automata, Practical regular expressions for finding and counting language phenomena. Programming in Python - Programming in Python and String Edit Distance and Alignment: An introduction to programming in Python, Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. NLTK, String Edit Distance and Alignment Key algorithmic tool: Dynamic programming, String edit operations, Edit distance, and examples of use in spelling correction, and machine translation.

Module II: Context Free Grammars and Probability [09 Periods]

CFG - Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down andBottom-up parsing, Non-probabilistic Parsing Efficient CFG parsing with CYK, Dynamic programming algorithms, Early parser, Designing a little grammar, and parsing with test data. Probability - Introduction to probability theory, Joint and conditional probability, marginal, independence, Bayes rule, combining evidence. Example applications. Information Theory: “Shannon game”, Entropy, cross entropy, information gain, Application to language phenomena.

Module III: Language Models [10 Periods]

A: Language Modeling and Naive Bayes - Probabilistic language modeling and its applications, Markov models, N-grams, Estimating probability of a word, and smoothing. Generative models of language.

B: Part of Speech Tagging and Hidden Markov Models - Viterbi Algorithm for Finding Most Likely HMM Path, Dynamic programming with HMM, Use for part-ofspeech tagging, Chinese word segmentation, prosody, Information extraction.

Module IV: Probabilistic and Classifiers [10 Periods]

Probabilistic Context Free Grammars - Weighted context free grammars, Weighted CYK, Pruning and beam search, Parsing with PCFG, Probabilistic version of CYK, Human parsing, Experiments with Eye-Tracking

Parsers and Classifiers - Modern parsers, Maximum Entropy Classifiers-The maximum entropy principle and its relation to maximum likelihood, Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks.

Module V: Grammar and Techniques [09 Periods]

Grammar - Maximum Entropy Markov Models & Conditional Random Fields, Partof-speech tagging, Noun-phrase Segmentation and Information Extraction Models, Finite-state machines. Models and Techniques - Lexical Semantics Mathematics of Multinomial and Dirichlet distributions, Information Extraction & Reference Resolution - Various methods including HMMs, Models of Anaphora Resolution, Machine Learning Methods for Co-reference.

TEXT BOOKS:

1. Jurafsky and Martin, "Speech and Language Processing", Prentice Hall
2. Manning and Schutze, "Statistical Natural Language Processing", MIT Press

REFERENCES:

1. Cover, T. M. and J. A. Thomas, "Elements of Information Theory", Wiley.
2. James Allen, "Natural Language Understanding", The Benajmins/Cummings Publishing Company

E-RESOURCES:

1. https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/revised.pdf
2.https://hpi.de/fileadmin/user_upload/fachgebiete/plattner/teaching/NaturalLanguageProcessing/NLP2016/NLP01_IntroNLP.pdf
3. http://www.sciencedirect.com/science/article/pii/S1532046401910299
5. http://nptel.ac.in/courses/106101007/ 6. http://nptel.ac.in/courses/106105158/

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Be able to compose key NLP elements to develop higher level processing chains and Assess Evaluate NLP based systems and apply Python programming concepts in NLP.	Understand
CO2	Choose appropriate solutions CFG, probability for solving typical NLP sub problems	Analyze
CO3	Analyze NLP problems to decompose them in adequate independent components, models, and its applications.	Analyze
CO4	Evaluate language technology component use of probabilistic context free grammars, parsers and classifiers.	Apply
CO5	Elaborate the interaction between Grammar, models and techniques used in NLP.	Understand

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

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VIII Semester		
Code: B1211	Soft Computing	L	T	P
Credits: 3	[Professional Elective - VI]	3	-	-

Prerequisites:

- A strong mathematical background.
- Proficiency with algorithms.
- Programming skills in C, C++, or Java, MATLAB, etc.
- Critical thinking and problem-solving skills.

Course Objectives:

This course will cover fundamental concepts used in soft computing. The concepts of Fuzzy logic (FL) will be covered first, followed by Artificial Neural Networks (ANNs) and optimization techniques using Genetic Algorithm (GA). Applications of Soft Computing techniques to solve a number of real-life problems will be covered to have hands on practices.

Module-I: Introduction to Soft Computing [8 Periods]

Concept of computing systems, "Soft" computing versus "Hard" computing, Characteristics of Soft computing, Some applications of soft computing techniques.

Module-II: Fuzzy logic [9 Periods]

Introduction to Fuzzy logic, Fuzzy sets and membership functions, Operations on Fuzzy sets, Fuzzy relations, rules, propositions, implications and inferences, Defuzzification techniques, Fuzzy logic controller design.Some applications of Fuzzy logic.

Module-III: Genetic Algorithms [10 Periods]

Concept of "Genetics" and "Evolution" and its application to proablistic search techniques, Basic GA framework and different GA architectures, GA operators: Encoding, Crossover, Selection, Mutation, etc. Solving single-objective optimization problems using GAs.

Module-IV: Multi-objective Optimization Problem Solving [9 Periods]

Concept of multi-objective optimization problems (MOOPs) and issues of solving them, Multi-Objective Evolutionary Algorithm (MOEA), Non-Pareto approaches to solve MOOPs, Pareto-based approaches to solve MOOPs, Some applications with MOEAs.

Module-V: Artificial Neural Networks [9 Periods]

Biological neurons and its working, Simulation of biological neurons to problem solving, Different ANNs architectures, training techniques for ANNs, Applications of ANNs to solve some real-life problems.

Resources & References

The following text and reference books may be referred to for this course.

1. Fuzzy Logic: A Pratical approach, F. Martin, Mc neill, and Ellen Thro, AP Professional, 2000.
2. Fuzzy Logic with Engineering Applications (3rd Edn.), Timothy J. Ross, Willey, 2010.
3. Foundations of Neural Networks, Fuzzy Systems, and Knowldge Engineering, Nikola K. Kasabov, MIT Press, 1998.
4. Fuzzy Logic for Embedded Systems Applications, Ahmed M. Ibrahim, Elesvier Press, 2004.
5. An Introduction to Genetic Algorithms, Melanie Mitchell, MIT Press, 2000.

6. Genetic Algorithms in Search, Optimization and Machine Learning, David E. Goldberg, Pearson Education, 2002.
7. Practical Genetic Algorithms, Randy L. Haupt and sue Ellen Haupt, John Willey & Sons, 2002.
8. Neural Networks, Fuzzy Logis and Genetic Algorithms: Synthesis, and Applications, S. Rajasekaran, and G. A. Vijayalakshmi Pai, Prentice Hall of India, 2007.
9. Soft Computing, D. K. Pratihar, Narosa, 2008.
10. Neuro-Fuzzy and soft Computing, J.-S. R. Jang, C.-T. Sun, and E. Mizutani, PHI Learning, 2009.
11. Neural Networks and Learning Machines, (3rd Edn.), Simon Haykin, PHI Learning, 2011.

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Understand the fundamental principles and list out various neural network training strategies	Understand
CO2	Design Different fuzzification and defuzzification methods using fuzzy Systems	Apply
CO3	Apply genetic algorithm concepts in neural network and fuzzy system	Apply
CO4	Solving multi-objective optimization problems using Evolutionary algorithms (MOEAs)	Analyze
CO5	Applications of Soft computing to solve problems in varieties of application domains.	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	3	2									2		2
CO2	3	2	3	2										2	2
CO3	3	2	22												2
CO4	3			1	1										2
CO5	3	2	3	2	2								2	2	2

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B. Tech. VII Semester		
Code: B6917	Internet of Things [Professional Elective -V]	L	T	P
Credits: 3		3	-	

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 [09 Periods] 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 [09 Periods] 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 [10 Periods] 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) [10 Periods]

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 [10 Periods] 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 Madisetti
2. The Internet of Things: Key applications and Protocols" Wiley Publications 2nd 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 Things‖ by Adrian McEwen, Hakim Cassimally, Wiley
3. 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
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:

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

1. **Describe** the fundamental concepts of IoT and its applications
2. **Illustrate** M2M concepts with protocols.
3. **Develop** applications using Python Scripting Language.
4. **Build** real world applications by applying Raspberry PI.
5. **Examine** web-based services.

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

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VIII Semester		
Code: B00P2	Major Project	L	T	P
Credits: 12		-	-	24

Course Objectives:

1. Enable the student extend further the investigative study, either fully theoretical/practical or involving both theoretical and practical work.
2. The work shall be carried out under the guidance of a Supervisor from the department alone or jointly with a supervisor drawn from R&D laboratory/Industry.
3. Preparing an action plan for conducting the research by team members

Note: Students are instructed to

1. Conduct detailed Analysis//Simulation/Design/Problem Solving/Experiment as needed
2. Submit the project report in the specified format.
3. Attend the project seminars as per given schedule.
4. **Publish a paper** in Conference/Journal/Patent before external viva voce

Guidelines: awarding CIE marks: (Max. Marks: 60)

Evaluator	Max. Marks	Parameter
Department Review Committee	10	Review-I
	10	Review-II
	10	Pre-Submission Review
Supervisor	5	Regularity and Punctuality
	5	Progress of the Work
	5	Quality of the work
	5	Report Writing
	10	Analytical/Programming/Experimental Skills

Guidelines for awarding SEE marks: (Max. Marks: 140)

Evaluator	Max. Marks	Parameter
Internal and External Examiners	10	Idea / Innovations
	10	Applications
	10	Live Research Projects
	10	Scope for future enhancement
	10	Application to Society
	20	PPT Presentation
	40	Thesis Evaluation
	30	Viva-Voce

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Demonstrate a sound technical knowledge of their selected topic.	Knowledge
CO2	Conduct investigations through research-based methods to provide valid conclusions.	Apply
CO3	Provide solutions to societal complex problems gained knowledge as an individual or by team.	Analyze
CO4	Create/select/use modern tools to overcome the limitation of complex engineering solutions.	Apply
CO5	Communicate with engineering experts and the community at large in written and oral forms.	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	3	2	-	-	-	1	-	3	1	2	3	3	3	2
CO2	3	3	2	-	-	-	1	-	3	1	2	3	3	3	2
CO3	3	3	3	3	3	-	1	-	3	1	2	3	3	3	3
CO4	-	3	1	3	3	-	1	-	3	3	2	3	3	3	3
CO5	-	1	-	2	3	-	1	3	3	3	1	2	3	3	2

2021-22 Onwards (MR21)	Malla Reddy Engineering College (Autonomous)	B.Tech. VIII Semester		
Code: B00P3	Seminar	L	T	P
Credits: 1		-	-	2

Objectives:

The goal of a seminar is to introduce students to critical reading, understanding, summarizing, explaining and preparing report on state of the art topics in a broad area of his/her specialization. Seminar topics may be chosen by the students with advice from the faculty members and the student shall read further relevant articles in the domain.

Table: Guidelines for awarding marks (Max.Marks:100)

S.No	Parameter	Max. Marks
1	Relevance to Problem	10
2	Preparation of PPT	10
3	Presentation Skills in Reviews	20
4	Questions and Answers	10
5	Report preparation in a prescribed format	20
6	Final Seminar Presentation	30

Course Outcomes:

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

CO	Course Outcome	Blooms Taxonomy Level
CO1	Study the literature of emerging technologies to organize, analyze and consolidate the information.	Understand
CO2	Exhibit effective communication skills, stage courage, and confidence.	Analyze
CO3	Demonstrate intrapersonal skills.	Apply
CO4	Explain new innovations/inventions in the relevant field.	Apply
CO5	Prepare Seminar Report in a prescribed format.	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	3	2	2	3	3	3	1	2	2	2	3	3	3	3
CO2	-	2	2	1	1	3	3	1	1	3	2	3	2	-	1
CO3	3	2	2	2	1	3	3	-	1	2	1	3	3	3	3
CO4	3	2	2	2	1	3	3	-	1	2	1	3	3	-	1
CO5	3	2	1	1	2	3	3	-	1	3	2	3	2	-	1