MALLA REDDY (MR)
(DEEMED TO BE UNIVERSITY)

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Recognized under Section 3 of the UGC Act, 1956

School of Computer Science and Engineering
Cyber Security(CSE-CS)

Course Structure and Syllabus

Academic Year 2025-2026

Approved by AICTE, Accredited by NAAC with 'A++' Grade (Cycle-III)
Maisammaguda,Dhulapally(Post,ViaKompally)Medchal-Malkajgiri.Pin–500100,
www.mrdu.edu.in,

Malla Reddy (MR) Deemed to be University (MRDU)

Maisammaguda (H), Medchal-Malkajgiri District, Hyderabad– 500100

Course Structure

Department of Computer Science and Engineering-CS
B.Tech. Computer Science and Engineering-CS Programme

(MRDU Regulation 2025-26 Admitted Batch)

II B. TechI Semester			**Hours**			**Credits**	**Marks**		
Category	**Course Code**	**Subject**	**L**	**T**	**P**		**CIE**	**SEE**	**TOT**
BSC	250BT05	Statistical Foundation for Computer Science	3	1	-	4	50	50	100
PCC	2504T06	Artificial Intelligence: Concepts and Techniques	3	-	-	3	50	50	100
PCC	2505T06	Cloud Cyber Security	3	1	-	4	50	50	100
PCC	2505T07	Operating System Fundamentals	3	-	-	3	50	50	100
PCC	2505T08	ObjectOrientedProgrammingthroughJava	3	1	-	4	50	50	100
PCC	2505P06	Operating System Lab	-	-	2	1	50	50	100
PCC	2505P07	ObjectOrientedProgrammingthroughJavaLab	-	-	2	1	50	50	100
PCC		Internship/Project	-	1	2	2	50	50	100
MC	2500M05	EnvironmentalScience	1	1	-	-	100	-	100
PCC		*Skill Development Certificate- 1	-	-	2	1	100	-	100
PCC		*Skill Development Certificate- 2	-	-	2	1	100	-	100
		Total	**16**	**5**	**10**	**24**	700	400	

IV SEMESTER -MR25 REGULATIONS (MRDU)											
II B. Tech II Semester											
S.No	**Category**	**Exam mode**	**Course Code**	**Course Details**	**L**	**T**	**P**	**Credits**	**CIE**	**SEE**	**Total**
1	HSMC	Descriptive	250HT03	Management Science	3	1	-	4	50	50	100
2	PCC	Descriptive	2505T09	Database Management System	3	1	-	4	50	50	100
3	PCC	Descriptive	2507T03	Cloud Data Analytics	3	1	-	4	50	50	100
4	PEC	NPTEL	2505T11	Design and Analysis of Algorithms	3	-	-	3	50	50	100
5	PCC	Descriptive	2505T12	Software Engineering & Modeling	3	-	-	3	50	50	100
6	PCC	Practicals	2505P09	Database Management Systems Lab	-	-	3	1.5	50	50	100
7	PCC	Practicals	2505P10	Software Engineering & Modeling Lab	-	-	3	1.5	50	50	100
8	PCC	Internship	2505IN2	Internship -2	-	-	2	1	50		50
9	PCC	SKD	2505SD3	Skill Development Course -3		-	2	1	50		50
10	PCC	SKD	2505SD4	Skill Development Course -4		-	2	1	50		50
11	MC	CBT	2500M06	Gender Sensitization Lab	-	1	1	-	100		100
				Total	**15**	**4**	**13**	**24**	**600**	**350**	**950**

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B. Tech.VSemester		
Code: 250BT05	**Statistical Foundation for Computer Science** (CommonforCSE,IT,CSE(AIML),CSE(CS),CSE(DS), CSE(IOT),AIandCSIT)	L	T	P
Credits:4		3	1	-

Prerequisites: NIL

Course Objectives: To learn

1. The basic concepts of number theory and probability.
2. Random variables, probability distributions and moment generating functions.
3. Sampling distributions and testing of hypothesis for large samples.
4. t-distribution, F-distribution, chi square distribution and Testing of hypothesis for small samples.
5. Correlation, rank correlation, regression, and multiple regressions.

MODULE I: Number Theory and Probability [12 Periods]

Greatest Common Divisors and prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and The Fermat numbers.

Congruences: Introduction to congruences, linear congruences, systems of linear congruences.

Probability: Introduction, probability, conditional probability, Addition theorem, Multiplication theorem, Bayes Theorem

MODULE II: Random variables [11 Periods]

Random variable, 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.

Continuous probability distributions: Rectangular Distribution, Exponential Distribution, Normal distribution and properties, Moment generating function.

MODULE III: Sampling Distributions and Testing of Hypothesis (Large sample) [11 Periods]

Sampling Distributions: Definition of population-sample-sampling-statistic, parameter. Types of sampling, expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of mean and variance. Parameter estimations– likelihood estimate, point estimation and interval estimation, Unbiased estimator. Central Limit theorem (Without proof).

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

Large sample tests :(i)Test of significance for single mean (ii) Test of significance for difference of means(iii) Test of significance for single proportion (iv) Test of significance for difference of proportions

MODULE IV: Small Sample tests [9 Periods]

Student t-distribution, its properties and its assumptions, one sample t-Test, two sample t-test, paired t-test. 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.

MODULE V: Correlation and Regression: [5 Periods]

Scatter plot, Correlation, Coefficient of correlation, The Rank Correlation, Regression, Regression Coefficient, The lines of regression: simple regression.

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) Montgomery, "Applied Statistics and Probability for Engineers", 6th Edition, Wiley Publications.
4) Kenneth H.Rosen, Elementary number theory & its applications, sixth edition, Addison – Wesley,
   ISBN 978-321`-50031-1

REFERENCES:

1) S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
2) W. Feller, An Introduction to Probability Theory and its Applications, Vol.1, 3rd Ed., Wiley, 1968.

E – RESOURCES

a) Concerned Website links:

1) https://www.math.brown.edu/johsilve/frintch1ch6.pdf (Number Theory)
2) https://www.cuemath.com/data/probability/ (Probability)
3) https://online.stat.psu.edu/stat500/lesson/3/3.1 (Random Variables)
4) https://www.geeksforgeeks.org/understanding-hypothesis-testing/ (Testing of Hypothesis)
5) https://egyankosh.ac.in/bitstream/123456789/20554/1/Unit-11.pdf (Small sample tests)
6) https://www.cuemath.com/data/correlation-and-regression/ (Correlation and Regression)
7) https://corporatefinanceinstitute.com/resources/data-science/sampling-distribution/ (Sampling Distribution)
8) https://www.knime.com/blog/continuous-probability-distribution (Continuous Probability Distribution)

b) NPTEL Videos:

1) **https://www.youtube.com/watch?v=PgVV1e4_XLo&list=PLFW6lRTa1g82gyMcQGXl3dpWelEyMLxRH&index=3** (Number Theory)
2) https://www.youtube.com/watch?v=POv_YgCqAv8&list=PLbMVogVj5nJQWowhOG0-K-yI-bwRRmm3C&index=2 (Probability)
3) https://www.youtube.com/watch?v=UftY0e2ilM4 (Random Variables)
4) https://www.youtube.com/watch?v=6x1pL9Yov1k (Probability Distributions)
5) https://www.youtube.com/watch?v=0WYhD2r9-u8 Sampling Distributions)
6) https://www.youtube.com/watch?v=OQV8WmUdeIo&list=PLbMVogVj5nJSpj5sl-8tdKARg1lw2wEa- (Regression Analysis)

Course Outcomes: After Completing this course, the student must be able to

1) Understand Euclidean algorithm,fundamental theorem of arithmetic, congruence's and probability.
2) Solve problems with random variables, identify a suitable distribution for solving problems in a certain realistic situation, and find a moment generating function.
3) Understand sampling distribution and apply suitable test for testingof hypothesis for large samples of a single mean, a single proportion, a difference of means, and a difference ofproportions.
4) Analyse thet-test, F-test and chi square test, and then apply a suitable test for testing of hypothesis on the provided data.
5) Find the correlation coefficient, rank correlation coefficient, regression coefficient and regression lines.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO-PO Mapping (3/2/1 indicates strength of correlation) 3- Strong, 2-Medium, 1-Weak													**PSOs**		
COs	Program Outcomes(POs)														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	2	1								1	1	
CO 2	3	3	2	2	2							1	1	1	
CO 3	3	3	3	3	2							1	1	1	
CO 4	3	3	2	3	2								1	1	
CO 5	3	3	2	3	2								1	1	

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech.V Semester		
Code:2504T06	**ArtificialIntelligence: Concepts and Techniques (CommonforCSE,IT,CSE(AIML),CSE(CS),CSE(DS), CSE(IOT),AIandCSIT)**	L	T	P
Credits:3		3	-	-

Prerequisites:

1.Programmingforproblemsolving,DataStructures.

CourseObjectives:

Thestudentwill beableto

- KnowthemethodologyofProblem solving
- ImplementbasicAIalgorithms
- Designandcarryoutanempiricalevolutionofdifferentalgorithmsonaproblem formalization

MODULE–I **[10Periods]**

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

MODULE–II **[10Periods]**

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

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

MODULE–III **[9Periods]**

Logicconcepts:

Introduction,propositionalcalculus,proportionallogic,naturaldeduction system, axiomatic system, semantic tableau system in proportional logic, predicate logic

MODULE–IV **[9Periods]**

Knowledgerepresentation: Introduction,approachestoknowledgerepresentation,

knowledge representation using semantic network, extended semantic networks for KR
Advanced knowledge representation techniques: Introduction, conceptual dependency
theory,scriptstructure.

MODULE–V

[10Perio

ds]

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

CourseOutcomes:

Attheendofthecourse,studentwillbeableto

- UnderstandthefundamentalconceptsinArtificialIntelligence
- Analyzetheapplicationsofsearchstrategiesandproblemreductions
- Applythemathematicallogicconcepts.
- DeveloptheKnowledgerepresentationsinArtificialIntelligence.
- ExplaintheFuzzylogicsystems.

TEXTBOOK:

1. ArtificialIntelligence,SarojKaushik,CENGAGELearning,
2. Artificialintelligence,A modernApproach,2nd ed,StuartRussel,PeterNorvig,PEA
3. ArtificialIntelligence,Rich,KevinKnight,ShivShankar BNair,3rd ed,TMH
4. IntroductiontoArtificialIntelligence,Patterson,PHI

REFERENCEBOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, - George F Lugar, 5th ed, PEA
2. IntroductiontoArtificialIntelligence,Ertel,WolfGang,Springer3.Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

CO-PO,PSOMapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak															
COs	**ProgrammeOutcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	-												
CO2	-	2	2										1	2	
CO3	2	2	2	3											
CO4	2	2	2	2										2	2
CO5	1	2													

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech.V Semester		
Code: 2505T06	**Cloud Engineering** (CommonforCSE,IT,CSE(AIML),CSE(CS),CSE(DS), CSE(IOT),AIandCSIT)	L	T	P
Credits:3		3	-	-

Pre-requisites:

Operating systems, IP networking stack, web browsers and their communication, databases, programming, Linux and editing text files from the command line

Course Objectives:

1. To presents and compares different Google Cloud's computing and storage services, along with important resource and policy management tools.
2. To explore and deploy solution elements, including infrastructure components such as networks, virtual machines and applications services.
3. To explore and deploy solution elements, infrastructure components such as networks, systems and applications services.
4. To deploy solution elements, securely interconnecting networks, load balancing, autoscaling, infrastructure automation and managed services.
5. To overview the containers and Kubernetes, Kubernetes architecture, and Kubernetes operations

Module 1: Cloud Engineer Journey

Introduction, Setting Up a Cloud Solution Environment, Planning and Configuring a Cloud Solution, Deploying and Implementing a Cloud Solution, Ensuring Successful Operation of a Cloud Solution, Configuring Access and Security

Module-2: Google Cloud Fundamentals: Core Infrastructure

Introduction, Introducing Google Cloud, Resources and Access, Virtual Machines and Networks, Storage, Containers, Applications .

Module-3:Google CloudEssentials

Infrastructure- Introduction, Interacting with Google Cloud, Virtual Networks, Virtual Machines

Core Services- Identity and Access Management (IAM), Storage and Database Services, Resource Management, Resource Monitoring

Module-4:Google Cloud Infrastructure: Scaling and Automation

Introduction, Interconnecting Networks, Load Balancing and Autoscaling, Infrastructure Automation, Managed Services

Module-5:Google Kubernetes Engine

Introduction, Introduction to Google Cloud, Introduction to Containers and Kubernetes, Kubernetes Architecture, Kubernetes Operations

Textbooks/Reference Books:

1. Official Google Cloud Certified Associate Cloud Engineer Study Guide, Dan Sullivan, 2019 by John Wiley & Sons, Inc., (for Modules 1, 2, & 3) , http://repo.darmajaya.ac.id/4482/1/Official%20Google%20Cloud%20Certified%20Associate%20Cloud%20Engineer%20Study%20Guide%20%28%20PDFDrive%20%29.pdf
2. Scaling Google Cloud Platform, Swapnil Dubey, BPB Publications, 2022 (for module 4)
3. Kubernetes: Up and Running: Dive into the Future of Infrastructure, Kelsey Hightower, Brendan Burns and Joe Beda, O'Reilly Media; 1st edition (30 September 2017) (for module 5)

Course Outcomes:

At the end of the course, students are able to

1. Learn a basic infrastructure in Google Cloud, Select and use Google Cloud storage options.
2. Interact with the Google Cloud console and Cloud Shell, Deploy solutions, Implement VPC networks and firewall rules and Creating and customize VM instances using Compute Engine.
3. Deploying and managing applications, either on-premises or in a public cloud environment.
4. Identity and Access Management for resources, Implement data storage services, Manage and examine billing and Monitor resources.
5. Create and manage Google Kubernetes Engine clusters by using the Google Cloud console and gcloud/kubectl commands**.**

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech. IVSemester		
Code: 2505T07	OperatingSystem Fundamentals (CommonforCSE,IT,CSE(AIML),CSE(CS),CSE(DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:3		3	-	-

Prerequisites:

Acourseon"ComputerProgrammingandDataStructures".

Course Objectives:

- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introducetheissuestobeconsideredinthedesignanddevelopmentof operatingsystem
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

MODULEI: [10 Periods]

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time- shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

MODULEII: [9 Periods]

CPUScheduling-SchedulingCriteria,SchedulingAlgorithms,Multiple-Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks,
DeadlockPrevention,DeadlockAvoidance,DeadlockDetection,andRecoveryfrom Deadlock

MODULEIII: [10 Periods]

Process Management and Synchronization - The Critical Section Problem, SynchronizationHardware,Semaphores,andClassical Problems

ofSynchronization,Critical **Regions, Monitors Interprocess Communication Mechanisms:** IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

MODULEIV: **[10Periods]**

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

MODULEV: **[08 Periods]**

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

Courseoutcomes

- Willbeable to control access to a computerand thefiles that maybeshared
- Demonstrate the knowledge of the components of computers and their respective roles in computing.
- Abilityto recognizeandresolve userproblems with standardoperating environments.
- Gainpracticalknowledgeofhowprogramminglanguages,operatingsystems,and architectures interact and how to use each effectively.

TEXT BOOKS:

1. OperatingSystemPrinciples-AbrahamSilberchatz,PeterB.Galvin,GregGagne7th Edition, John Wiley.
2. Advancedprogramming intheUNIXenvironment, W.R. Stevens,Pearsoneducation.

REFERENCES:

1. OperatingSystems-InternalsandDesignPrinciples,WilliamStallings,FifthEdition–2005, Pearson Education/PHI
2. OperatingSystemADesignApproach-Crowley,TMH.
3. ModernOperatingSystems, Andrew S.Tanenbaum 2nd edition, Pearson/PHI
4. UNIXprogrammingenvironment,Kernighan andPike,PHI/PearsonEducation
5. UNIXInternals -TheNewFrontiers,U.Vahalia, PearsonEducation.

CO-PO,PSOMapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak															
COs	**ProgrammeOutcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3		1									2	1		2
CO2	2	2										2	1		
CO3	2														
CO4	2	2	1										2		
CO5	2	2	1										1		

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B. Tech. IIISemester		
Code:2505T08	Object Oriented Programming through Java (CommonforCSE,IT,CSE(AIML),CSE(CS),CSE(DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:4		3	1	-

Prerequisites: ComputerProgramming

CourseObjectives:

- Tounderstandthebasicobject-orientedprogrammingconceptsandapplytheminproblem solving.
- Toillustrateinheritanceconceptsforreusingthe program.
- Todemonstratemultitaskingbyusingmultiplethreads andevent handling
- Todevelopdata-centricapplications using JDBC.
- Tounderstand thebasics ofjavaconsoleandGUIbased programming

MODULE-I: [10Periods]

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

ModuleII: [10Periods]

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

MODULEIII: [09Periods]

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

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

MODULEIV: [10Periods]

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model,handlingmouseandkeyboardevents, Adapterclasses. TheAWTclass hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices,

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

MODULEV: [09Periods]

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

CourseOutcomes:

Attheendofthecourse,students willbeableto

- Demonstrate the behavior of programs involving the basic programming constructslike control structures, constructors, string handling and garbage collection.
- Demonstratetheimplementationofinheritance(multilevel,hierarchicalandmultiple) by using extend and implement keywords
- Usemultithreadingconcepts todevelopinterprocesscommunication.
- Understandtheprocessofgraphicaluserinterfacedesignandimplementationusing AWT or swings.
- Developappletsthatinteractabundantlywiththeclientenvironmentanddeployon the server.

TEXT BOOKS:

1. Javathecompletereference,7thedition,Herbertschildt, TMH.
2. UnderstandingOOPwithJava,updatededition, T.Budd,Pearson education.

REFERENCES:

1. AnIntroductiontoprogrammingandOOdesignusingJava,J.NinoandF.A.Hosch,John wiley & sons.
2. AnIntroductiontoOOP,thirdedition,T.Budd,Pearson education.
3. IntroductiontoJavaprogramming,Y.Daniel Liang,Pearsoneducation.
4. AnintroductiontoJavaprogrammingandobject-orientedapplicationdevelopment,R.A. Johnson- Thomson.
5. CoreJava2,Vol1,Fundamentals,Cay.S.HorstmannandGaryCornell,eighthEdition, Pearson Education.
6. CoreJava2,Vol2,AdvancedFeatures,Cay.S.HorstmannandGaryCornell,eighth Edition, Pearson Education
7. ObjectOrientedProgrammingwithJava,R.Buyya,S.T.Selvi,X.Chu,TMH.
8. JavaandObjectOrientation,anintroduction,JohnHunt,secondedition,Springer.9. Maurach‟s Beginning Java2 JDK 5, SPD.

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

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

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech. IVSemester		
Code: 2505P06	OperatingSystemsLab (CommonforCSE,IT,CSE(AIML),CSE(CS),CSE(DS), CSE (IOT), AI and CSIT)	L	T	P
Credits:1		-	-	2

Prerequisites: Acourseon"ProgrammingforProblemSolving",Acourseon"Computer Organizationand Architecture".

Co-requisite: Acourseon"OperatingSystems".

Course Objectives:

- Toprovideanunderstandingofthedesignaspectsofoperatingsystemconcepts throughsimulation
- IntroducebasicUnixcommands,systemcallinterfaceforprocessmanagement,interprocessco mmunication and I/O in Unix

SoftwareRequirements:UNIX/LINUXOperatingSystem,WindowsandTurboC/C++ List

of Experiments:

1. WriteCprogramstosimulatethefollowingCPUSchedulingalgorithmsa)FCFSb) SJF c) RoundRobin d) priority

2. WriteprogramsusingtheI/OsystemcallsofUNIX/LINUXoperatingsystem(open,read, write, close,fcntl, seek, stat, opendir, readdir)

3. WriteaCprogramtosimulateBankersAlgorithmforDeadlockAvoidanceand Prevention.

4. WriteaCprogramtoimplementtheProducer–ConsumerproblemusingsemaphoresusingUNIX/LINUX system calls.

5. WriteCprogramstoillustratethefollowingIPCmechanismsa)Pipesb) FIFOs

6. WriteCprogramstoillustratethefollowingIPCmechanismsa)MessageQueues b)SharedMemory

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

8. WriteCprogramstosimulatePagereplacementpoliciesa)FCFSb)LRUc)Optimal

Course Outcomes:

- Simulateandimplementoperatingsystemconceptssuchasscheduling,deadlock management, file management and memory management.
- AbletoimplementCprogramsusingUnix systemcalls

TEXTBOOKS:

1. Operating SystemPrinciples-AbrahamSilberchatz,PeterB.Galvin, Greg Gagne 7th Edition,John Wiley
2. AdvancedprogrammingintheUnixenvironment,W.R.Stevens,Pearsoneducation.

REFERENCEBOOKS:

1. OperatingSystems–InternalsandDesignPrinciples,WilliamStallings,FifthEdition–2005,Pearson Education/PHI
2. OperatingSystem-ADesignApproach-Crowley, TMH.
3. ModernOperatingSystems,AndrewSTanenbaum,2ndedition,Pearson/PHI
4. UNIXProgrammingEnvironment,KernighanandPike,PHI/PearsonEducation
5. UNIXInternals:TheNewFrontiers, U. Vahalia,Pearson Education

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

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech.		
Code:2505P07	ObjectOrientedProgramming through Java Lab (CommonforCE,EEE,ME,EEE,ECE,MiE)	L	T	P
Credits:1		-	-	2

Prerequisites: NIL

Course Objectives:

This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java‟s exception handling mechanism, multithreading.

SoftwareRequirements:JDK

List ofPrograms:

1. WriteaJAVAprogramtodisplaydefaultvalueofallprimitivedatatypeof JAVA.
2. Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
3. WriteaJavaProgramtoimplement
   a) DefaultConstructor
   b) Parameterizedconstructor
4. WriteaJavaProgramtoimplement
   a) Method overloading
   b) Method overriding
5. WriteaJavaprogram to implement
   a) SingleInheritance
   b) Multilevel Inheritance
   c) HierarchicalInheritance
6. WriteJavaprogramsthatusesthefollowingkeywords…
   a) this
   b) super
7. WriteJavaprogramsthat usesthefollowingkeywords…
   a) static
   b) final
8. WriteaJavaprogram to implement
   a) abstractmethod
   b) Interfaces
9. WriteaJavaprogramtocreateuserdefined packages.
10. WriteaJavaprogramtoimplement ExceptionHandlingusing
    a) try-catchclause
    b) MultipleCatchclauses
11. Write aJavaprogram that
    a) createuser defined Thread byextendingThread class.
    b) createuserdefinedThreadbyimplementingRunnableInterface
12. Write aJava program
    a) checkswhetheragivenstringisa palindromeor not.

b) forsortingagivenlist of names inascending order.

Course Outcomes:

Attheend ofthe course,studentswill beable to

1. Differentiate structured programming and object oriented programming and know the concepts of classes, objects, members of a class.
2. Apply object oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface.
3. Capableofhandlingrun timeerrors usingExceptional Handlingand exploringstrings.
4. DevelopapplicationsforconcurrentprocessingusingThread Concept.
5. CapableofhandlingIOoperationsusing Files.

TEXT BOOKS:

1. HerbertSchildt,"**JavaThecomplete reference**",TMH,8th edition,2011.
2. T.Budd, "**UnderstandingOOPwithJava**", PearsonEducation, updatededition, 1998.

REFERENCES:

1. P.J.Deiteland H.M.Deitel,"**Java forProgrammers**",Pearson education.
2. P.RadhaKrishna,"**ObjectOrientedProgrammingthroughJava**",UniversitiesPress.
3. BruceEckel," **ProgramminginJava**",Pearson Education.
4. S.MalhotraandS.Choudhary,"**ProgramminginJava**",OxfordUniv. Press.

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

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

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech. IIISemester		
Code: SKDC	**Internship/Project**	L	T	P
Credits:2	(CommonforAll)		1	2

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech. IIISemester		
Code:2500M05	**EnvironmentalScience**	L	T	P
Credits:NIL	(CommonforAll)	1	1	-

Pre-Requisites:NIL

Objectives

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

ModuleI:Ecosystems **[**5Periods]

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

ModuleII:Naturalresources,BiodiversityandBiotic resources:

A:NaturalResources: [5Periods]

Classification of Resources: Living and Non-Living resources, Renewable and non-renewableresources.Waterresources:useandoverutilizationofsurfaceandgroundwater, floodsanddroughts,Dams:benefitsandproblems.Mineralresources:useandexploitation, environmental effects of extracting and using mineral resources–case studies. Energy resources:growingenergyneeds,introductiontorenewableandnonrenewableenergy sources.

B:BiodiversityandBioticresources: **[4Periods]**

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

ModuleIII: ENVIRONMENTAL POLLUTIONAND CONTROL: **[7 Periods]**

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

B:SoilPollution,Soilassinkforpollutants,Impactofmodernagricultureonsoil, degradationofsoil.MarinePollution:MisuseofInternationalwaterfordumpingof hazardouswaste,Coastalpollutionduetosewageandmarinedisposalofindustrial effluents.

E-wasteanditsmanagement.Activity:Fieldvisit.

ModuleIV:GlobalEnvironmental Problems and Global effects: **[6 Periods]**

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

ModuleV:Towardssustainablefuture: **[5 Periods]**

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

Course Outcomes:

Aftercompletionofthe course, studentswill beable to:

1. Toenablethestudentsto realizetheimportanceof ecosystem,itsstructure, services. TomakethestudentsawareofDifferentnaturalfunctionsofecosystem,whichhelps to sustain the life on the earth.
2. Tousenaturalresourcesmore efficiently.
3. Tomakethestudentsawareoftheimpactsofhumanactionsontheenvironment,its effects and minimizing measures to mitigate them.
4. Toeducatethestudentsregardingenvironmentalissuesandproblemsatlocal,national and international level.
5. Toknow moresustainablewayofliving

Text Books:

1. R.Rajagopalan,**"EnvironmentalStudiesfromcrisistocure"**,OxfordUniversity Press 2nd Edition, 2005.
2. AnubhaKaushik,C.P.Kaushik,**"Environmentalstudies"**NewageInternational Publishers,4th Edition,2012

ReferenceBooks:

- ErachBharucha,"Environmentalstudies"UniversityGrantsCommission,and University Press, I Edition, 2005.
- M.AnjiReddy"TextbookofEnvironmentalScienceandTechnology" 3rdEdition, 2007
- RichardT.Wright,"EnvironmentalScience:towardsasustainablefuture"PHL

Learning,Private Ltd.NewDelhi,2ndEdition.,2008

- GilbertMcMastersandWendellP.Ela,"EnvironmentalEngineeringand science",3rd Edition, PHI Learning Pvt. Ltd.,2008**.**

E-Resources:

1. http://www.gdrc.org/uem/ait-terms.html(GlossaryofEnvironmental terms).
2. http://www.environmentalscience.org/(EnvironmentalsciencesLecturesseries).
3. Journalofearthscienceandclimaticchange(OMICS InternationalJournal).
4. Journalofpollutioneffects&control(OMICS InternationalJournal).
6. nptel.ac.in/courses/120108004/(PrinciplesofEnvironmentManagementLectures).
7. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html(NPTEL online video courses IIT lectures).

CO-PO,PSOMapping
(3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak

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

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech. IIISemester		
Code: SKDC	Skill Development Certificate-1 (CommonforAll)	L	T	P
Credits:1		-	-	2

2025-26 Onwards (MRDU)	Malla Reddy (MR) Deemed to be University	B.Tech. IIISemester		
Code: SKDC	Skill Development Certificate-2 (CommonforAll)	L	T	P
Credits:1		-	-	2

Skill Development Certificate Courses Syllabus

1. Real Time Operating Systems

Week 1: Introduction
Week 2: Characteristics of real-time systems
Week 3: Modelling time constraints
Week 4: Basic concepts in real-time operating systems

2. Fundamental Algorithm Design and Analysis

Week 1: Insertion Sort, Asymptotic Notation, Merge Sort, QuickSort, Divide and Conquer
Week 2: Heap Sort, Linear-time Sorting, Order Statistics
Week 3: Hashing, BST Sort, Augmenting Data Structures, Dynamic Programming
Week 4: Graphs : BFS, DFS, Prim's, Shortest Paths

3. Python for Data Science

CertificationType-CertificateofParticipation

Assessment Mode - Self-Pace Assessment Credits

Assigned - No Credit Available Duration -65hours

LearningOutcomes

Use Google Colaboratory notebooks to implement and test Python programs;,-explain how Python programming is relevant to data science;,-construct and operate on arrays using the numpy module;,-apply Python modules for basic statistical computation;,-construct and operate on dataframes using the pandas module;,-apply the pandas module to interactwithspreadsheetsoftware;,-implementPythonscriptsforvisualizationusingarraysanddataframes;,-applythe scikit-learn module to perform data mining;,-explain techniques for supervised and unsupervised learning;,-apply supervised learning techniques;,-apply unsupervised learning techniques;,-apply the scikit-learn module to build statistical models;,-implement Python scripts to perform regression analyses;,-apply the statsmodels module to build and analyze models for time series analysis;,-explain similarities and differences between AR, MA, and ARIMA models.

Topics

- WhatisDataScience?
- Pythonfor DataScience
- Thenumpy Module
- AppliedStatisticsinPython
- ThepandasModule
- Visualization
- DataMiningI–SupervisedLearning
- DataMiningII–ClusteringTechniques
- DataMiningIII-StatisticalModeling
- TimeSeriesAnalysis

4. Information Security

CertificationType-CertificateofParticipation
Assessment Mode - Self-Pace Assessment Credits
Assigned - No Credit Available Duration -45hours

LearningOutcomes

Explainthefundamentalprinciplesofinformationsecurity;,-identifymajorinformationsecuritythreatsand their modes of attack;,-describe cryptographic models and how they are used to provide security;,-explain the principles of access control models such as discretionary, mandatory, role, and rule-based;,-illustrate methods of identification and authentication such as passwords, pins, biometrics, and tokens;,-describe networksecuritymethodsincludingnetworkdesigns,firewalls,wirelessencryptionmethods,tunneling,and network protection tools;,-describe operating system (OS) hardening, malware protection, firewalls, and security tools;,-explain intrusion detection systems (IDS) and intrusion prevention systems (IPS), and the advantages and disadvantages of each system; and,-synthesize current privacy laws and the implications of violations on organizations.

Topics

IntroductiontoInformationSecurity Threats

and Attack Modes Cryptographic Models

AccessControl

IdentificationandAuthentication

Network Security

OperatingSystem(OS) Security

IntrusionDetectionandPreventionSystems

PrivacyLaws, Penalties,andPrivacyIssues

5. Building with Artificial Intelligence

CertificationType-CertificateofParticipation
Assessment Mode - Self-Pace Assessment Credits
Assigned - No Credit Available Duration -48hours

LearningOutcomes

Analyze the definition of 'intelligence', from the Turing test to the four basic orientations of modernAI;,-Analyzetheconceptof'agents'incontemporaryAI businesssolutions;,-Analyzethedifferenttypesof'agents' and theircapabilities;,-Describethe different kinds of machinelearning algorithms and their significancein buildingAI business solutions;,-Apply supervised machine learning algorithms and contemporary libraries to buildAI business solutions;,-Explain the principles of unsupervised machine learning and reinforcement learning models;,-Apply general AI-based problem-solving methods and their computational characteristics;,-Apply heuristically based search algorithms to improve their optimality;,-Apply natural language processing concepts and techniques with existing libraries for analysis and generative applications;,-Discuss the principles of logical reasoning and reasoning under uncertainty;,-Explain the basics of two-person, adversarial game-playing;-,-Throughout this course, you will also see learning outcomes in each unit to help organize your studies and gauge your progress.

Topics

- WhatIsArtificialIntelligence
- Agent-BasedApproachtoAI

- MachineLearningandItsImportance
- MachineLearningAlgorithms
- Problem-SolvingMethodsinAI
- SearchAlgorithms
- IterativeImprovementAlgorithms
- Game-PlayingModels
- NaturalLanguageProcessing
- ReasoningAgents

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	**B.Tech. IV Semester**		
Code:250HT03		**L**	**T**	**P**

	MANAGEMENT SCIENCE			
Credits:4		**3**	**1**	**-**

Course Objectives

1. To understand the fundamental concepts of management, organizational structures, leadership and decision-making processes.
2. To develop knowledge of production and operations management, work study, inventory control and quality management techniques.
3. To understand the principles and practices of human resource management, marketing management and strategic management.
4. To apply project management techniques, including PERT and CPM, for project planning, scheduling and control.

UNIT-I: Introduction to Management (8 Hours)

Concept and importance of Management, Functions of management, Evolution of Management thought, Fayol's principles of Management, Maslow's need hierarchy and Herzberg's two-factor theory of Motivation, Decision-making process, Designing organizational structure, Principles of Organization, Types of organization structures.

UNIT-II: Operations Management (8 Hours)

Plant Location Principles and types of plant Layout, Work study, Materials Management: Objectives, Need for inventory control, Inventory control techniques EOQ, ABC, HML, SDE, VED and FSN analysis.

UNIT-III: Human Resources Management and Marketing Management (12 Hours)

Human Resources Management (HRM): Concepts of HRM, Basic functions of HR manager, Job Evaluation and Merit Rating, Performance Appraisal, Methods of Performance appraisal, Concepts Compensation.

Marketing Management: Functions of marketing, Marketing Mix, Marketing strategies based on Product life cycle, Channels of distribution (Place), Promotional Mix.

UNIT-IV: Project Management (PERT/CPM) (10 Hours)

Network analysis, Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identify ing critical path, Difference between PERT and CPM (simple problems).

COURSE OUTCOMES

After completion of the course, the student should be able to:

- CO-1: Explain management principles, organizational structures, leadership theories and decision-making processes.
- CO-2: Apply operations management techniques, work study and inventory control methods to improve organizational productivity.
- CO-3: Analyze human resource management and marketing strategies to address organizational and business requirements.
- CO-4: Apply PERT and CPM techniques to plan, schedule and monitor projects effectively.
- CO-5: Evaluate strategic management practices and formulate appropriate strategies for organizational growth and performance improvement.

TEXTBOOKS

1. P. Vijaya Kumar and N. Appa Rao, Management Science, Cengage Learning, 2012.
2. A. R. Aryasri, Management Science, Tat a Mc Graw Hill, 2011.

REFERENCES

1. Harold Koontz and Heinz Weihrich, Essentials of Management, Tat a Mc Graw Hill, 2012.
2. Stephen P. Robbins and Mary Coulter, Management, Pear son Education.
3. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012.
4. Philip Kotler and Gary Armstrong, Principles of Marketing, Pear son Education.
5. C. B. Mamoria and S. V. Gankar, Personnel Management, Him a lay a Publishing House.
6. Lawrence R. Jauch and William F. Glueck, Business Policy and Strategic Management, Mc Graw Hill.

025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	**B.Tech. IV Semester**		
Code:2505T10	DATABASE MANAGEMENT SYSTEM	**L**	**T**	**P**

Credits:4		3	1	-

Course Objectives

- Tounderstandfundamentaldatabaseconcepts,databasearchitecturesanddatamodels.
- Tolearnrelationaldatabasedesign,keys,constraintsandnormalizationtechniques.
- To develop SQL queries and database applications using SQL programming concepts.
- To understand transaction management,concurrency control and database recovery techniques.
- To study database security,distributed databases and emerging database technologies.

MODULE–I:Introduction to Databases

- Database System Concepts and Characteristics
- Advantages and Disadvantages of DBMS
- File System vs.Database System
- Data Models:Hierarchical,Network,Relational and Object-Oriented Models
- DBMSA rchitecture:One-Tier,Two-Tier and Three-Tier Architecture
- Three-Schema Architecture
- Data Independence:Logical and Physical
- Entity-Relationship(ER)Model
- Extended ER(EER)Model
- Relational Model and Relational Integrity Constraints

MODULE–II:Relational Database Design

- Relational Database Concepts
- Keys:Super Key,Candidate Key,Primary Key,Alternate Key and Foreign Key
- Integrity Constraints
- Relational Algebra:Selection,Projection,Union,Set Difference,Cartesian Product and Joins
- Functional Dependencies
- Attribute Closure and Armstrong's Axioms
- Database Normalization
- First Normal Form(1NF)
- Second Normal Form(2NF)
- Third Normal Form(3NF)
- Boyce-Codd Normal Form(BCNF)
- Fourth Normal Form(4NF)and Fifth Normal Form(5NF)
- Lossless and Dependency-Preserving Decomposition
- Relational Schema Design

MODULE–III:SQLP rogramming

- Introduction to SQL and SQLD at a Types
- Data Definition Language(DDL)Commands
- Data Manipulation Language(DML)Commands
- Data Control Language(DCL)Commands
- Transaction Control Language(TCL)Commands
- Constraints:NOT NULL,UNIQUE,PRIMARY KEY,FOREIGN KEY,CHECK and DEFAULT
- SQLO per at or sand Expressions
- Aggregate Functions and String,Date and Numeric Functions
- GROUPBY and HAVINGC lauses
- Joins:Inner,Outer,Cross and Self Joins
- Nested Queries and Subqueries
- Set Operations:UNION,INTERSECT and MINUS

- Views and Indexes
- Stored Procedures and Functions
- Triggers and Cursors
- Common Table Expressions(CTE s)and Window Functions

MODULE–IV:Transaction Management and Query Processing

- Transaction Concepts and States
- ACIDP ropertiesof Transactions
- Transaction Schedules
- Serializability:Conflict and View Serializability
- Concurrency Control Techniques
- Lock-Based Protocol sand Two-Phase Locking(2PL)
- Timestamp-Based Concurrency Control
- Deadlocks:Detection,Prevention and Recovery
- Database Recovery Techniques
- Log-Based Recovery and Checkpointing
- Query Processing and Query Optimization
- Indexing Techniques and Query Execution Plans

MODULE–V:Database Security and Emerging Trends

- Database Security Concepts and Threats
- Database Authentication and Authorization
- Access Control Mechanisms and Role-Based Access Control(RBAC)
- Database Auditing and Data Privacy
- Database Backup and Restore
- Distributed Database Concepts and Architecture
- Data Replication and Sharding
- No SQLD at a bases:Concepts and Types
- Mongo DBF und a mental sand CRUDO perations
- CAPT heorem
- Cloud Databases and Database as a Service(DB a a S)
- New SQLD at a bases and Emerging Database Technologies

Course Outcomes

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

1 Explain fundamental database concepts,architectures and relational data models.

2 Design relational database schemas using keys,constraints and normalization techniques.

3 Develop SQL queries and database applications using advanced SQL programming concepts.

4 Apply transaction management,concurrency control and database recovery techniques.

5 Analyze database security mechanisms and emerging technologies such as No SQL,distributed and cloud databases.

Textbooks

1. Abraham Silberschatz,Henry F.Korthand S.Sudarshan,Database System Concepts,Mc Graw-Hill.
2. Ramez Elmasriand Shamkant B.Navathe,Fundamentals of Database Systems,Pear son.
3. Raghu Ramakrishnanand Johannes Gehrke,Database Management Systems,Mc Graw-Hill.

Reference Books

1. C.J.Date,An Introduction to Database Systems,Pear son.
2. Peter Rob and Car los Coronel,Database Systems:Design,Implementation,and Management, Cengage Learning.
3. Hector Garcia-Molina,Jeffrey D.Ullmanand Jennifer Widom,Database Systems:The Complete Book, Pear son.
4. Thomas Connollyand Carolyn Begg,Database Systems:AP ractical Approach to Design, Implementation, and Management, Pear son.

COURSE ARTICULATION MATRIX(CO–PO–PSO)

(Correlation levels:1–Slight,2–Moderate,3–Substantial,—No Correlation)

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	–	1	–	–	–	–	–	1	2	1	2
CO-2	3	3	3	1	2	–	–	–	–	–	1	3	2	2
CO-3	3	2	3	1	3	–	–	–	–	–	2	3	3	3
CO-4	3	3	2	2	2	1	–	–	–	1	2	3	2	2
CO-5	3	2	2	1	3	2	2	–	–	1	3	2	2	3

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2507T03	CLOUD DATA ANALYTICS	**L**	**T**	**P**
Credits:4		**3**	**1**	**-**

Course Objectives

- To understand cloud computing concepts and data analytics fundamentals.
- To study cloud-based data storage and processing frame works.
- To analyze big data using cloud analytics tools.
- Tounderstanddatavisualizationandmachinelearningincloudplatforms.
- To develop cloud-based analytical solutions for real-world applications.

MODULE–I:Introduction to Cloud Data Analytics

- Basicsof Cloud Computing
- Cloud Service Models
- Introduction to Data Analytics
- Big Data Concepts
- Cloud Analytics Applications

MODULE–II:Cloud Storage and Processing

- Distributed File Systems
- Hadoopand HDFS
- Map Reduce Concepts
- Cloud Databases
- Data Ware housing in Cloud

MODULE–III:Data Analytics Techniques

- Data Pre processing
- Data Mining Concepts
- Predictive Analytics
- Statistical Analysis
- Data Visualization Basics

MODULE–IV:Machine Learning in Cloud

- Introduction to Machine Learning
- Supervised and Unsupervised Learning
- Cloud MLP latforms
- Model Training and Evaluation
- Real-Time Analytics

MODULE–V:Security and Applications

- Cloud Security Basics
- Privacy Issues in Analytics
- Io Tand Cloud Analytics
- Business Intelligence Applications
- Future Trend sin Cloud Analytics

Course Outcomes

1. Understand cloud computing and data analytics concepts.
2. Apply cloud-based storage and processing frame works.
3. Analyzedatausinganalyticsandvisualizationtechniques.
4. Implementmachinelearningconceptsincloudenvironments.
5. Develop secure cloud-based analytical applications.

Text Books

1. Rajkumar Buyya,Mastering Cloud Computing,Mc Graw-Hill.
2. Tom White,Hadoop:The Definitive Guide,O'Reilly.
3. Seem a A chary a and Subhasini Chellappan,Big Data Analytics,Wiley.

Reference Books

1. Michael Minelli,Big Data,Big Analytics, Wiley.
2. Foster Provost and Tom Fawcett,Data Science for Business.
3. Ethem Alpaydin,Introduction to Machine Learning.

COURSE ARTICULATION MATRIX(CO–PO–PSO)
(Correlation levels:1–Slight,2–Moderate,3–Substantial,—No Correlation)

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	–	2	–	–	–	–	–	2	2	2	2
CO-2	3	3	2	1	3	1	–	–	–	1	2	3	3	2
CO-3	3	3	2	3	3	1	–	–	–	–	2	3	2	3
CO-4	3	3	2	2	3	1	–	–	–	1	3	3	3	3
CO-5	3	3	3	2	3	2	2	–	1	2	3	3	3	3

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2505T11	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P
Credits:4		3	1	-

Course Objectives

- To understand the fundamentals of algorithms,algorithm specific at ion,performance analysis,time and space complexity, and asymptotic notations.
- To study and apply algorithm design techniques such as Divide and Conquer and Greedy Method to solve computational problems efficiently.
- To understand Dynamic Programming techniques and apply them to optimization problems such as matrix chain multiplication, knapsack, and shortest path problems.
- To analyze and implement Back track ing and Branch and Boundtechniquesforsolvingcombinatorial and constraint satisfaction problems.
- To understand the concepts of NP-Hard and NP-Complete problems,non-deter min is tic algorithms, and computational complexity.

MODULE-I:Introduction

Algorithm,Algorithm Specification,Performance Analysis-Space complexity,Time complexity, Asymptotic Notations, Probabilistic analysis.

Set sand Dis joint Set Union–Introduction,union and find operations.

MODULE-II

Divide and Conquer:General method,Binary search,Quick sort,Merge sort,Strassen'smatrix multiplication.
Greedy Method:General method,knapsack problem,Jobsequencingwithdeadlines,Minimum cost spanning trees:
Prim's Algorithm,Kruskal's Algorithm,Single source shortest paths.

MODULE-III:Dynamic Programming

General method,Matrix chain multiplication,All pairs shortest path,Optimalbinarysearchtrees, 0/1 knapsack problem, Reliability design, Travelling sales person problem.

MODULE-IV

Back track ing:General method,The8-queens problem,sum of sub sets,graph coloring,Hamiltoniancycles.
Branch and Bound:Introduction,FIFO branch and bound,LC branch and bound.

MODULE-V

Branch And Bound:0/1knapsack problem-LCB ranch and Bound solution,FIFOB ranch and Bound solution, Travelling sales Person.

NP-Hard and NP-Complete Problems:Basic concepts,Non deter min is tic algorithms,the classes NP-

Hard and NP-Complete,Cook’s theorem.

Course Outcomes

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

1. Analyze algorithms using time and space complexity, asymptotic notations, probabilistic analysis, and randomized algorithms.
2. Apply Divide and Conquer and Greedy algorithm techniques to solve searching, sorting, optimization, and graph-related problems.
3. Design and analyze Dynamic Programming algorithms for solving optimization problems such as matrix chain multiplication, knapsack, shortest paths, and Travelling Sales person problems.
4. Apply Back track ing and Branch and Boundtechniquestosolvecombinatorialproblemssuchas N-Queens, graph coloring, Hamiltonian cycles, and sub set sum.
5. Analyzecomputationalcomplexityandclassifyproblemsinto NP,NP-Hard,and NP-Complete categories using concepts such as non-deter min is tic algorithms and Cook's theorem.

TEXTBOOK:

1. Ellis Horowitz,Sartaj Sahniand Sanguthevar Rajasekharam,"Fundamentalsof Computer Algorithms", 2nd Edition, Univesity Press, 2008.

REFERENCES:

1. T.H.Cor men,C.E.Leiserson,R.L.Rivest,and C.Stein"Introductionto Algorithms",3rd Edition, PHI / Pear son Education, 2009.

2. R.C.T.Lee,S.S.Tseng,R.C.Changand T.Tsai,"Introductionto Design and Analysis of Algorithms A strategic approach", 2nd Edition, Tat a Mc Graw Hill, 2009.

3. Allen We iss,"Datastructuresand Algorithm Analysis in C++",2nd Edition,Pear son Education, 2009.

4. Aho,Ullmanand Hopcroft,"Designand Analysisofalgorithms",3rd Edition,Pear son Education, 2008.

WEB REFERENCE:

http://nptel.iitm.ac.in/courses/106101060/

COURSE ARTICULATION MATRIX(CO–PO–PSO)
(Correlation levels:1–Slight,2–Moderate,3–Substantial,—No Correlation)

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	2	2	–	–	–	–	–	2	3	1	2
CO-2	3	3	3	2	3	–	–	–	–	–	2	3	2	3
CO-3	3	3	3	3	3	–	–	–	–	–	2	3	2	3
CO-4	3	3	3	2	3	–	–	–	–	–	2	3	2	3
CO-5	3	3	2	3	2	–	1	–	–	–	3	3	1	2

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2505T12	SOFTWARE ENGINEERING&MODELING	**L**	**T**	**P**
Credits:4		**3**	**1**	**-**

Course Objectives

- To understand software engineering principles and software development life cycle models.
- To study requirements engineering and software design techniques.
- To learn UML modeling for software systems.
- To understand software testing and quality assurance.
- To develop software project management and main ten an ces kills.

MODULE–I:Introduction to Software Engineering

- Software Engineering Fundamentals
- Software Development Life Cycle
- Process Models
- Agile Development
- Software Project Planning

MODULE–II:Requirements Engineering

- Requirements Analysis
- Functional and Non-functional Requirements
- Feasibility Study
- Software Requirement Specification
- Requirement Validation

MODULE–III:Software Design and Modeling

- Software Design Principles
- UMLD iagrams
- Use Case Modeling
- Class and Sequence Diagrams
- Architectural Design

MODULE–IV:Software Testing and Quality

- Software Testing Concepts
- Unit and Integration Testing
- Validation and Verification
- Software Quality Assurance
- Software Metrics

MODULE–V:Software Maintenance and Project Management

- Software Maintenance
- Risk Management
- Cost Estimation
- Configuration Management
- CASET ools

Course Outcomes

1. Understand software engineering principles and SDLC models.
2. Analyze and document software requirements.
3. Design software systems using UML modeling techniques.
4. Apply software testing and quality assurance methods.
5. Manage software projects and maintenance activities.

Text Books

1. Roger S.Press man,Software Engineering:AP ractitioner's Approach,Mc Graw-Hill.
2. Ian Sommerville,Software Engineering,Pear son.
3. Grady Booch,Object-Oriented Analysis and Design with Applications.

Reference Books

1. Pankaj Jalote,An Integrated Approach to Software Engineering.
2. Rajib Mall,Fundamentals of Software Engineering.
3. Ali Bahrami,Object-Oriented Systems Development.

COURSE ARTICULATION MATRIX(CO–PO–PSO)
(Correlation levels:1–Slight,2–Moderate,3–Substantial,—No Correlation)

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	–	1	–	–	–	–	1	2	2	1	2
CO-2	3	3	2	2	2	1	–	–	2	–	2	3	2	2
CO-3	3	3	3	2	3	1	–	1	2	1	2	3	3	3
CO-4	3	3	2	3	3	1	2	–	1	–	2	3	2	2
CO-5	3	2	3	2	2	2	2	2	2	3	3	3	2	3

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2505P10	DATABASE MANAGEMENT SYSTEM LAB	**L**	**T**	**P**
Credits:1.5		**-**	**-**	**3**

Course Objectives

- To provide practical knowledge of relational database management systems.
- To develop SQL programming and query processing skills.
- To implement normalization and database design techniques.
- To per form transaction management and database operations.
- To develop database applications using DBMS tools.

List of Experiments

1. Creation of databases and tables using appropriate data types and constraints.
2. Implementation of DDL and DML commands.
3. Writing SQL queries using joins and subqueries.
4. Normalizationofdatabaseschemasupto1NF,2NF,3NFand BCNF.
5. Creatingandmanipulatingviews,indexes,and triggers.
6. Developing stored procedures and user-defined functions.
7. Implementation of transaction control commands(COMMIT,ROLLBACK and SAVE POINT).
8. Implementation of database constraints,primary keys,foreignkeysandreferentialintegrity.
9. Performing aggregate operations using GROUP BY,HAVING and built-in SQL functions.
10. Implementing database security using user accounts,GRANT and REVOKE commands.
11. Implementation of database backup and recovery operations.
12. Mini Project:Design and development of a database application using a DBMS tool.

Course Outcomes

1. Design and create relational databases.
2. Execute SQL queries for database operations.
3. Apply normalization techniques.
4. Implement transaction and security concepts.
5. Develop simple database applications.

Text Books

1. Korth,Silberschatzand Sudarshan,Database System Concepts.
2. Elmasriand Navathe,Fundamentals of Database Systems.

Reference Books

1. C.J.Date,An Introduction to Database Systems.
2. Raghu Ramakrishnan,Database Management Systems.

COURSE ARTICULATION MATRIX(CO–PO–PSO)

(Correlation levels:1–Slight,2–Moderate,3–Substantial,—No Correlation)

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	1	2	–	–	–	–	–	1	3	2	2
CO-2	3	3	2	2	3	–	–	–	–	–	1	3	2	3
CO-3	3	3	3	2	2	–	–	–	–	–	1	3	2	2
CO-4	3	3	2	2	3	1	1	–	–	1	2	3	2	2
CO-5	3	2	3	2	3	1	1	2	2	2	3	3	3	3

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2505P10	SOFTWARE ENGINEERING&MODELING LAB	**L**	**T**	**P**
Credits:1.5		**-**	**-**	**3**

Course Objectives

1. To understand practical aspects of software engineering and modeling.
2. To develop software requirement and design documents.
3. To practice UML modeling techniques.
4. Toimplementsoftwaretestinganddebuggingmethods.
5. To use CASE tools for software development.

List of Experiments

1. Preparation of Software Requirement Specification(SRS)for a given application.
2. Development of Use Case Diagrams using UML tools.
3. Design of Class and Sequence Diagrams for a software system.
4. Development of Activity and State Chart Diagrams.
5. Preparation of Software Design Documentation.
6. Design and execution of test cases using different testing techniques.
7. Software Project Planning and Schedulingusing CASE Tools.
8. Preparation of Data Flow Diagrams(DFD)and Entity Relationship(ER)Diagrams.
9. Implementation of Unit Testing and Integration Testing.
10. Software Cost Estimation using the COCOMO Model.
11. Software Risk Analysis and Configuration Management.
12. Mini Project:Software Development with SRS,UMLM odeling,Design and Testing Documentation.

Course Outcomes

1. Analyzesoftwarerequirementsandspecifications.
2. Develop UML models for software systems.
3. Apply software design and testing techniques.
4. Use CASE tools for software development.
5. Prepare software project documentation.

Text Books

1. Roger S.Press man,Software Engineering:AP ractitioner's Approach.
2. Ian Sommerville,Software Engineering.

Reference Books

1. Rajib Mall,Fundamentals of Software Engineering.
2. Grady Booch,Object-Oriented Analysis and Design

COURSE ARTICULATION MATRIX(CO–PO–PSO)

(Correlation levels:1–Slight,2–Moderate,3–Substantial,—No Correlation)

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	2	3	1	2	1	–	–	–	2	–	1	3	1	2
CO-2	2	3	3	2	2	–	–	–	3	–	1	3	2	2
CO-3	3	3	3	2	3	–	–	–	2	–	2	3	3	2
CO-4	2	2	2	2	3	–	1	–	1	1	3	2	2	3
CO-5	2	2	2	1	2	–	1	2	3	3	2	2	2	3

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2505IN2	**Internship– II**	**L**	**T**	**P**
Credits:1		**-**	**-**	**2**

Objective:To provide students with practical industrial exposure,work place experience,and opportunities to apply theoretical knowledge to real-world engineering problems.

Recommended guidelines:

1. Students shall undergo an internship in an industry,research organization,start up,government organization,or an approved technical institution.
2. The internship must be relevant to the student's branch of engineering.
3. The department shall approve the internship organization and proposed activities before commencement.
4. Students shall work under an industry mentor or design a ted supervisor.
5. Students must maintain an internship diary or weekly progress report.
6. Students shall submit an internship completion certificate issued by the organization.
7. A comprehensive internship report shall be submitted to the department.
8. Students shall present their internship experience before an evaluation committee.
9. The department shall verify the authenticity of the internship and submitted documents.

Suggested evaluation scheme (50):

Assessment component	**Marks**
Industry mentor evaluation	20
Internship attendance and progress	10
Internship report	20
Total	50

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2505SD3	Skill Development Course– III	**L**	**T**	**P**
Credits:1		**-**	**-**	**2**

Objective:Toenhancestudents'technicalcompetencies,practicalskills,and professional cap abilities through structured, hands-on learning activities.

Recommended guidelines:

1. The course shall focus on a specific technical or professional skill relevant to the student's engineering discipline.
2. The course content shall emphasize practical learning rather than theoretical instruction.
3. The department may off er skill-based training in emerging technologies and industry-relevant tools.
4. Students shall complete prescribed practical exercises,assignments,andmini-projects.
5. The course may be delivered through:
    - Hands-on laboratory sessions.
    - Industry-oriented training.
    - Certificationprogrammes.
    - On line learning platforms such as NPTEL,SWAYAM,Coursera,or approved platforms.
    - Practical workshops and technical boot camps.
6. Students shall maintain evidence of completed activities,practical work,and learning outcomes.
7. A final practical assessment or demonstration shall be conducted by the department.

Suggested evaluation scheme:

Assessment component	**Marks**
Practical exercises/ assignments	20
Skill demonstration/mini-project	20
Continuous assessment/ participation	10
Total	50

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2505SD4	Skill Development Course–IV	**L**	**T**	**P**
Credits:1		**-**	**-**	**2**

Objective:To develop advanced technical,analytical,problem-solving,andemployabilityskillsthroughpracticaland application-oriented learning.

Recommended guidelines:

1. The course shallfocusonadvancedorspecializedskillsbeyondthosecoveredin SKD-III.
2. The course content shouldbealignedwithcurrentindustryrequirementsandemergingtechnologies.
3. Students shall under take an individual or team-based practical project.
4. The department may introduce industry-recognizedcertificationsorspecializedtechnicaltraining.
5. Studentsshalldemonstratetheabilitytoapplyacquiredskillstosolvepracticalengineering problems.
6. Assessment shall be based on practical implementation,project execution,technical documentation,and demonstration.
7. Students shall submit a portfolio containing evidence of their learning and completed activities.

Suggested evaluation scheme:

Assessment component	**Marks**
Practical exercises/ assignments	20
Skill demonstration/mini-project	20
Continuous assessment/ participation	10
Total	50

2025-26 Onwards (MRDU)	Malla Reddy(MR)Deemed to be University	B.Tech. IV Semester		
Code:2500M06	GENDER SENSITIZATION LAB	**L**	**T**	**P**
Credits:-		**-**	**1**	**1**

Course Objectives

1. To create awareness about gender equality and gender sensitization in society.
2. To understand social,cultural,andlegalperspectivesrelatedtogenderissues.
3. To promote respect,empathy,and inclusive behavior among students.
4. Todevelopcommunicationandinterpersonalskillsformaintaininggenderharmony.
5. To encourage ethical values and social responsibility towards gender justice.

MODULE–I:Introduction to Gender Sensitization

- Concept of Gender and Sex
- Gender Role sand Stereotypes
- Gender Equality and Equity
- Importance of Gender Sensitization
- Gender Issues in Society

MODULE–II:Women Empowermentand Rights

- Women Empowerment Concepts
- Constitutional Rights of Women
- Legal Protection and Safety Measures
- Women and Education
- Women in Leadership and Employment

MODULE–III:Social and Cultural Perspectives

- Gender Discrimination
- Socializationand Media Influence
- Workplace Ethics and Gender Respect
- Prevention of Harassment
- Inclusive Society and Diversity

MODULE–IV:Communication and Inter personal Skills

- Effective Communication
- Respectful Behavior and Team work
- Conflict Resolution

- Emotional Intelligence
- Building Positive Relationships

MODULE–V:Case Studies and Activities

- Case Studies on Gender Issues
- Group Discussions and Role Plays
- Awareness Programs
- Ethical and Professional Practices
- Community Participation Activities

Course Outcomes

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

1. Understand the concepts of gender equality and gender sensitization.
2. Identify social and cultural issues related to gender discrimination.
3. Demonstraterespectfulandinclusivebehaviorinacademicandprofessionalenvironments.
4. Apply legal and ethical knowledge related to gender rights and safety.
5. Participate effectively in awareness and social responsibility activities.

Text Books

1. N.Jay a pal an, Women Studies,Atlantic Publishers.
2. S.Khanna,Gender Equality and Women Empowerment,Academic Publications.
3. Government of India, Hand book on Gender Sensitization.

Reference Books

1. Kamla Bhasin,Understanding Gender.
2. Judith Lorber,Gender Inequality:Feminist Theories and Politics.
3. UNESCOP ublicationson Gender Equality and Inclusion.

COURSE ARTICULATION MATRIX(CO–PO–PSO)

(Correlation levels:1–Slight,2–Moderate,3–Substantial,—No Correlation)

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	1	2	–	–	–	2	2	1	1	–	2	2	1	1
CO-2	1	3	–	2	–	3	2	1	2	–	2	3	1	2
CO-3	1	2	1	–	–	3	3	3	3	1	2	2	2	2
CO-4	1	2	–	1	–	3	3	2	3	1	2	2	1	2
CO-5	1	2	1	2	–	3	3	3	3	2	3	3	2	2