RVR & JCCOLLEGEOFENGINEERING (Autonomous),CHOWDAVARAM,GUNTUR-19
B.Tech.,ComputerScience&Engineering(IoT)

(R-20)

Semester-IV (Second Year)

S.No	Course Code	Course Title	HoursPer Week		Scheme of Examination			Category
			L	P	Internal Marks	Sem EndExamMarks	Credits	
1	CO221	Probability & Statistics	3	0	30	70	3	BS
2	CO/CS/IT/CD222	Database Management Systems	3	0	30	70	3	PC
3	CO/CS/IT/CM223	Operating Systems	3	0	30	70	3	PC
4	CO224	IoT Architecture & Protocols	3	0	30	70	3	PC
5	CO225	Computer Networks	3	0	30	70	3	PC
6	CO261	Probability & Statistics Lab	0	3	30	70	1.5	BS
7	CO/CS/IT/CD262	Database Management Systems Lab	0	3	30	70	1.5	PC
8	CO263	Operating Systems Lab	0	3	30	70	1.5	PC
9	COSL2	**Scripting Languages** (Skill Oriented Course–II)	1	2	100	-	2	SC
10	CO/CS/IT/CM/CDMC 4	Ethics & Human Values	2	0	100	-	-	MC
		TOTAL	**18**	**11**	**440**	**560**	**21.5**	

Category	CREDITS
Basic Science Course	3
Professional Core Courses	16.5
Skill Oriented Basic Course	2
TOTAL CREDITS	**21.5**

CO 221	Probability and Statistics	L	P	C
		3	0	3

Course Objectives:

The student who successfully completes this course will have:

1. The ability to understand the basic principles of various probability distributions.
2. The ability to know the sample distributions of the data
3. The basic concepts of testing of hypothesis and their applications for the data.
4. The skill to predict the future behavior based on time series data.

Course Outcomes:

On completion of this course, students will be able to:

CO1. Apply various formulae to analyze and interpret the data.

CO2. Apply the knowledge of distribution theory to both software and hardware design problems

CO3. Apply the basic concepts of testing of hypothesis and derive the conclusions for the data.

CO4. Forecast the behavior of the data by various models in time series.

Course Content:

UNIT – I **CO1** **14 Periods**

Probability distributions: Random Variables, Binomial distribution, Poisson distribution, and Geometric distribution.

Probability densities: Continuous random variables, Normal distribution, Normal approximation to the Binomial distribution, Uniform distribution, Log-normal distribution, Gamma distribution, Beta distribution, Weibull distribution.

UNIT – II **CO2** **14 Periods**

Sampling distribution: Population and samples, the sampling distribution of mean (σ known), the sampling distribution of mean (σ unknown), the sampling distribution of variance.

Testing of Hypotheses (Parametric Tests): Inferences Concerning Means: Point estimation, Interval estimation, tests of hypothesis, Null hypothesis and tests of hypothesis, hypothesis concerning one mean, inferences concerning two means

UNIT – III **CO3** **14 Periods**

Testing of Hypotheses (Parametric Tests) (Contd…):

Inferences Concerning Variances*:* The estimation of variances, hypothesis concerning one variance, hypothesis concerning two variances.

Inferences Concerning Proportions: The estimation of proportions, hypothesis concerning one proportion, hypothesis concerning several proportions, The analysis of r×c tables, Goodness of fit.

UNIT – IV **CO4** **14 Periods**

Testing of Hypotheses (Non-Parametric Tests): Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test. Tolerance region.

Basics of Time Series Analysis& Forecasting: Stationary, ARIMA, Models: Identification, Estimation and Forecasting.

Learning Resources:

Text Book:

1. Miller & Freund's Probability and Statistics for Engineers–Richard A. Johnson.

Reference Books:

1. U. Dinesh Kumar, Business Analytics: The science of data-driven decision making.
2. S.M Ross, Introduction to Probability and Statistics for Engineers and Scientists.
3. P.G. Hoel, S.C. Port and C.J. Stone, Introduction to Probability Theory, Universal Book Stall.
4. W.Feller, An Introduction to Probability Theory and its Applications, Vol.1,3rd Ed., Wiley.
5. S.C. Gupta and V.K. Kapoor., Fundamentals of Mathematical Statistics, Sultan Chand &Co.

CO /CS/IT/CD 222	Database Management Systems	L	P	C
		3	0	3

Course Objectives:

At the end of the course the students will understand

1. Fundamental concepts and architectures of database system
2. Features and design of conceptual and relational data models
3. Formal relational Languages and SQL to query, update, and manage a database
4. The concepts and protocols related to transaction processing, concurrency control and recovery

Course Outcomes:

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

CO1. Discuss the fundamental concepts and architecture of database systems.

CO2. Query the database using relational algebra and SQL.

CO3. Explain the concepts of relational data model and design database using Normalization process.

CO4. Develop conceptual database schema for a given specification.

CO5. Describe the role of transaction processing, concurrency control and recovery in a multi User database system.

Course Content:

UNIT – I **CO1** **11 Periods**

Introduction: Database system Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators.

Introduction to the Relational Model: Structure of RDBMS, Database Schema, Keys, Relational Query Languages, Relational Operations.

UNIT – II **CO2** **15 Periods**

Formal Relational Query Languages - The Relational Algebra and Relational Calculus

SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database, Join Expressions, Views, Transaction, Integrity Constraints, SQL Data Types and Schemas, Authorization

UNIT – III **CO3 and CO4** **12 Periods**

Database Design and the E-R Model - Overview of the Design Process, The Entity- Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity- Relationship Diagrams, Reduction to Relational Schemas.

Relational Database Design - Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms, Database-Design Process.

UNIT – IV **CO5** **12 Periods**

Transactions: Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes, Snapshot Isolation

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management.

Learning Resources:

Text Book:

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Sixth Edition, McGraw Hill Publishers.

Reference Books:

1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.

2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill.

CO /CS/IT/CM 223	Operating Systems	L	P	C
		3	0	3

Course Objectives:

At the end of this course the students will understand

1) To introduce the structure and functions of the operating system.
2) To provide the knowledge of how the operating system manages the resources
3) To expose the students to the issues related to executing multiple process in the system.

Course Outcomes:

Describe the fundamental concepts of an operating system functionality, and processes.

CO1. Apply the concepts of multithreading and IPC mechanisms.

CO2. Analyze the performance of CPU scheduling algorithms, page replacement algorithms, and disk scheduling algorithms.

CO3. Demonstrate the methods to solve critical section problem and deadlock handling in a system.

CO4. Differentiate the effectiveness and the hardware support required for contiguous, non-contiguous, and virtual memory management schemes.

CO5. Differentiate the file systems for applying different allocation and access techniques.

Course Content:

UNIT – I **CO1** **14 Periods**

Introduction: What Operating Systems Do, Operating-System Operations, Resource Management, Security and Protection, Virtualization, Distributed Systems, Kernel Data Structures.

Operating System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Operating-System Structure.

Processes: Process Concept, Process Scheduling, Operations on Processes, inter process Communication, IPC in shared-memory Systems, IPC in Message-passing Systems.

UNIT – II **CO2** **14 Periods**

Threads and Concurrency: Overview, Multicore Programming, Multithreading Models, Implicit Threading, Threading Issues.

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling.

Synchronization: Background, The Critical-Section Problem, Peterson 'solution, Hardware support for Synchronization, Mutex Locks, Semaphores, Monitors. Classic Problems of Synchronization.

UNIT – III **CO3** **14 Periods**

Dead Locks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Main Memory: Background, Contiguous Memory Allocation, Paging, Structure of the Page Table, Swapping.

Virtual-Memory: Background, Demand Paging, Page Replacement, allocation of frames, Thrashing - Memory Compression, Other considerations.

UNIT – IV **CO4 and CO5** **10 Periods**

Mass-Storage Structure: Overview of Mass-Storage Structure, HDD Scheduling.

Files System Interface: File Concept, Access Methods, Directory Structure, Protection, Memory mapped files.

File-Systems Implementation: File-System Structure, File-System operations, Directory Implementation, Allocation Methods, and Free-Space Management.

Learning Resources:

Text Book:

1) Operating System Concepts-Abraham Silberchatz, Peter B Galvin, Greg Gange Tenth Edition, WILEY.

Reference Books:

1. Operating Systems, Internal and Design Principles, Stallings, 8th Edition-2015, Pearson education/PHI.
2. Operating system, A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tenenbaum 4th Edition Pearson/PHI.
4. An Introduction to Operating Systems, Concepts and Practice, 4th Edition, PHI, 2013- Pramod Chandra P. Bhatt.
5. Operating Systems- A concept-based approach –DM Dhamdhere -3rd Edition TMH.

CO 224	IOT Architecture and Protocols	L	P	C
		3	0	3

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: IoT network architecture, design, connectivity technologies

LO2: interoperability between systems, IoT connectivity technologies

LO3: communication technologies, infrastructure protocols, discovery protocols in IoT

LO4: data protocols, identification protocols, device management, semantic protocols in IoT

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: Examine various IoT network architectures and connectivity technologies

CO2: Inspect various interoperable IoT protocols for wireless devices

CO3: Analyze infrastructure and discovery protocols for IoT

CO4: Interpret protocols to track, monitor and manage IoT devices

UNIT – I **CO1** **12 Periods**

IoT Network Architecture and Design: Drivers behind New Network Architectures, The OneM2M IoT Standardized Architecture, The IoT World Forum (IoTWF) Standardized Architecture, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack

IoT Connectivity Technologies: Introduction, IEEE 802.15.4- 802.15 standards, Architecture, Topology, Addressing Modes and Packet Structure, Security, Zigbee-Overview, PHY and MAC Layer, Protocol Stack, Addressing Modes and Packet Structure, Topology, Security; Z-Wave-Overview, Protocol Stack, Addressing, Topology and Routing

UNIT – II **CO2** **12 Periods**

IoT Connectivity Technologies: LoRa-Introduction, Physical Layer, MAC Layer and Topology, Physical Layer, MAC Layer, Protocol Stack and Topology, Thread, ISA100.11A, Wireless HART, RFID, NFC, DASH7, Weightless, NB-IoT, Wi-Fi, Bluetooth

UNIT – III **CO3** **12 Periods**

IoT Communication Technologies: Introduction Constrained Nodes, Constrained Networks, Types of Constrained Devices, Low Power and Lossy Networks

Infrastructure Protocols: Internet Protocol Version 6 (IPv6), LOADIng, RPL, 6LoWPAN, QUIC, Micro Internet Protocol (uIP), Nano Internet Protocol (nanoIP), Content-centric networking (CCN)

Discovery Protocols: Physical Web, Multicast DNS (mDNS), Universal Plug and Play (UPnP)

UNIT – IV **CO4** **12 Periods**

Data Protocols: MQTT-Publish-Subscribe, Architecture, Packet Structure and Communication Format MQTT-SN-Architecture, Topology, Transparent and Aggregating Gateways, Gateway advertisement and Discovery, COAP-Architecture, Message Formats, Usage Example; AMQP, XMPP, SOAT, REST, WebSocket

Identification Protocols: EPC, uCode, URIs

Device Management: TR-069, OMA-DM

Semantic Protocols: JSON-LD, Web Thing Model

Text Books:

[1] SudipMisra, Anandarup Mukherjee, Arijit Roy, *Introduction to IoT*, New Delhi: Cambridge University Press, 2020. (Chapter 7,8)
[2] David Hanes, Gonzalo Salgueiro, Patrick Grossetete Robert Barton, Jerome Henry, *IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things*, Indianapolis: Cisco Press, 2017. (Chapter 2)
[3] Perry Lea, *Internet of Things for Architects*, Birmingham: Packet Publishing, 2018.

Reference Books:

[1] Jeeva Jose, *Internet of Things*, New Delhi: Khanna Publishing, 2018.
[2] Kamal Raj, *Internet of Things - Architecture and Design Principles,* New Delhi: McGraw Hill Education India, 2017
[3] MayurRamgir, *Internet of Things- Architecture, Implementation, and Security,* New Delhi:Pearson Education, 2019

CO 225	Computer Networks	L	P	C
		3	0	3

Course Objectives

1. Fundamental concepts of computer networks.
2. Different error control, flow control techniques and Collision-Free Protocols.
3. Various routing, congestion control algorithms and QoStechniques.
4. Design issues of transport layer and protocols of application layer.

Course Outcomes

CO1. Compare ISO reference model with TCP/IP and determine various guided media.
CO2. Verify the transmission errors using error detection and correction methods.
CO3. Apply various routing algorithms and compare IPv4.0 and IPv6.0.
CO4. Contrast various transport layerservices and apply different application layer protocols.

Course Content:

Unit I **CO1** **14 Periods**

Introduction: Network Hardware, Network Software, Reference Models.
Physical Layer: The theoretical basis for data communication, Guided media, digital modulationand multiplexing, switching.

UNIT II **CO2** **12 Periods**

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols.
The Medium Access Control Sub-layer: Multiple Access Protocols- ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Ethernet**,** Data Link Layer Switching.

UNIT III **CO3** **12 Periods**

The Network Layer: Network Layer Design Issues, Routing Algorithms-Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast routing, multicast routing, Congestion control algorithms, Quality of Service- Application Requirements, Traffic Shaping, Packet Scheduling, Admission Control, Internetworking, The Network Layer in the Internet-The IP version 4.0 protocol, IP Addresses, IP Version 6.0, Internet Control Protocols, Label Switching and MPLS

UNIT IV **CO4** **12 Periods**

The Transport Layer: The Transport Service-Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols –Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Congestion control-Desirable Bandwidth allocation, Regulating the sending rate, The Internet Transport Protocols: Introduction to UDP, Remote procedure call, Real-Time transport protocols, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release.
The Application Layer: DNS- The Domain Name System, Electronic mail, world wide web.

Learning Resources:

Text Book:

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Fifth Edition, PearsonEducation.

Reference Books:

1. James F. Kurose, Keith W. Ross, Computer Networking, Third Edition, Pearson Education
2. Behrouz A Forouzan, Data Communications and Networking, Fourth Edition, TMH (2007).
3. Kurose & Ross, *COMPUTER NETWORKS*, A Top-down approach featuring the Internet, PearsonEducation, Alberto Leon, Garciak.

CO 261	Probability & Statistics Lab	L	P	C
		0	3	1.5

Course Objectives:

The student who successfully completes this course will have:

1. The knowledge to use R for statistical programming, computation, Modeling and graphics.
2. The skill to write functions and use R in an efficient way.
3. The ability to fit some basic types of statistical models using R.
4. The idea to expand the knowledge of R on their own.

Course Outcomes:

On completion of this course, students will be able to:

CO1. Write the programs in R to solve the statistical problems.

CO2. Apply various built in functions in R to solve the computational and modeling problems.

CO3. Interpret the statistical data by various functions of graphical representation.

CO4. Understand- reading, writing, working and manipulating the data in various data frames.

Lab–Course Plan & Delivery:

LIST OF EXPERIMENTS	PERIODS
1. Graphical representation of data a) Barplot b) Frequency polygon	3
2. Graphical representation of data a) Histogram b) Pie chart c) Scatterplot	3
3. Measures of central tendency a) Mean b)Median c) Mode	3
4. Measures of central tendency a) Geometric Mean b) Harmonic Mean	3
5.Measures of dispersion a) Range b) Quartile deviation	3

6. Measures of dispersion a) Mean deviation b) Standard deviation	**3**
7. Goodness of fit a) Binomial b) Poisson	**3**
8. Goodness of fit a) Normal b) Contingency table	**3**
9. Parametric tests a) t-test for one-mean b) t-test for two means	**3**
10. Parametric tests a) paired t-test b) F-test	**3**
11. Non-parametric tests a) Sign test b) Wilcoxon-Signed rank test	**3**
12. Non-parametric tests a) Mann-Whitney test b) Kolmogorov-Smirnov test	**3**
13. Time series a) Trendline b) Non-linear trendline	**3**
14. Time series a) Moving averages b) ARIMA	**3**

Learning Resources:

Text Books:

1. Hands-on Programming with R, Garrett Grolemund, O'Reilly.

2. R for Everyone: Advanced Analytics and Graphics , Jared P.Lander, Addison-Wesl

CO /CS/IT/CD 262 **Database Management Systems Lab** **L P C**
0 3 1.5

Course Objectives:

At the end of the course the students will understand

1. Syntax and usage of DDL, DML, DCL, and TCL statements, asserting database integrity constraints during database creation.
2. Semantics of SQL for implementing the user queries on a relational database.
3. Block structured PL / SQL programming concepts.

Course Outcomes:

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

CO1. Define, manipulate and control data using Structured Query Language (SQL).
CO2. Identify various database integrity constraints during database creation.
CO3. Construct SQL statements for satisfying end user queries by utilizing functions, set operations, Joins, and subqueries.
CO4. Develop various applications using various PL/SQL data object like Database cursors, Functions, Stored Procedures, Packages, and Triggers.

Week 1	Practice DDL and DML statements for creating a sample database without integrity constraints.
Week 2	Practice DDL and DML statements for refining a sample database including integrity constraints.
Week 3-6	Query the sample database using simple select statements retrieving: 1.Small-large number of attributes 2. Distinct output values 3. By Renaming attributes 4. Computed attributes 5. By using Simple-complex conditions (AND, OR, NOT) 6. By using Partial Matching operators (LIKE, %, _, *,?) 7. Sorted records 8. By checking for Nulls
Week 7	Query the sample database using built-in single row functions
Week 8	Implement PL/SQL named and unnamed blocks
Week 9	Implement PL/SQL Implicit and Explicit Cursors
Week 10	Implement PL/SQL pre-defined and user defined exceptions
Week 11	Implement PL/SQL stored procedures, functions and packages
Week 12	Implement PL/SQL database triggers

CO 263	Operating Systems Lab	L	P	C
		0	3	1.5

Course Objectives:

Students will gain practical experience with designing and implementing concepts of operating systems such as system calls, CPU scheduling, process management, memory management, filesystems and dead lock handling in a programming language.

Course Outcomes

CO1. Implement basicservices and functionalities of operating system using system calls.

CO2. Analyze and simulate CPU scheduling algorithms and classical problems of synchronization.

CO3. Implement memory management schemes, dead lock handling mechanisms And Page Replacement Algorithms.

CO4. Simulate file allocation and organization techniques.

LIST OF EXPERIMENTS

1. Simulate the CPUscheduling algorithms to find turnaround time and waiting time
   a) FCFS b) SJF c) Round Robin d) Priority
2. Simulate the following file allocation strategies.
   a) Sequential b) Indexed c) Linked
3. Simulate the MVT and MFT memory management techniques.
4. Simulate the following contiguous memory allocation techniques
   a) Worst-fit b) Best-fit c) First-fit
5. Simulate Bankers algorithm for the purpose of deadlock avoidance.
6. Simulatethefollowingdisk scheduling algorithms
   a) FCFS b) SCAN c) C-LOOK
7. Simulate page replacement algorithms
   a) FIFO b) LRU c) Optimal
8. Simulate producer-consumer problem using semaphores.
9. Simulate Reader's-Writer problem using semaphores.
10. Simulate the concept of Dining-Philosophers problem

COSL2	SCRIPTING LANGUAGES	L	P	C
		1	2	2

Course Objectives:

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

Course Outcomes:

CO1. Comprehend the differences between typical scripting languages and typical System and application programming languages.

CO2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.

CO3. Acquire programming skills in scripting language

UNIT - I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management withRUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Web servers, SOAP and web services

Ruby Tk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.

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

UNIT - II

Introduction to PERL and Scripting

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

UNIT - III

Advanced PERL

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

UNIT - IV

TCL

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO/CS/IT/CM/CD MC4	Ethics & Human Values	L	P	C
		2	0	-

Course Objectives:

1. To create awareness to specific set of morals, values and ethics the professional mustknow and abide by, including work ethics, integrity and commitment etc.
2. To realize the importance of moral autonomy, professional ideals and Ethical theories
3. To study safety/risk aspects, welfare of the public and about employee rights
4. Know about the global issues and code of ethics of professional bodies

Course Outcomes:

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

CO1. Understand how a prospective engineer should behave in his chosenfield and society.

CO2. Realize the importance of moral autonomy, professional ideals and Ethical theories.

CO3. Know about the safety/ risk, welfare of the public and employee rights

CO4.Gain exposure to global issues and codes of some professional bodies

Course Content:

UNIT I **CO1** **15 Periods**

Human Values: Morals, Values and Ethics - Integrity- Work Ethics- Service Learning - Civic Virtue Respect for Others - Living Peacefully - Caring - Sharing - Honesty - Courage - Valuing Time -Co-Operation - Commitment - Empathy - Self-Confidence – Stress Management- Character - Spirituality.

UNIT II **CO2** **15 Periods**

Engineering Ethics: Senses of Engineering Ethics- Variety of Moral Issues - Types of Inquiry - Moral Dilemmas - Moral Autonomy - Kohlberg's Theory - Gillian-s Theory - Consensus and Controversy.

Professions and Professionalism: The nature and characteristics of Professions, Professionalism, the foundation and norms of Professional ethics, the need for separate code of conduct for Professionals, Professional Rights, Theories about Right Action, Uses of Ethical Theories. Case studies like The Space Shuttle Challenger, Bhopal gas tragedy, Chernobyl disasteretc.

UNIT III **CO3** **15 Periods**

Engineering as Social Experimentation: Engineering as Experimentation - Engineers as Responsible Experimenters Safety.

Responsibilities and Rights: Safety and Risk - Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk. Collegiality and Loyalty - Respect for Authority –Collective Bargaining - Confidentiality - Conflicts of Interest - Occupational Crime - Employee Rights – Intellectual Property Rights (IPR) - Discrimination.

UNIT IV **CO4** **15 Periods**

Multinational Corporations - Environmental Ethics - Computer Ethics - Business ethics - Engineers as Managers - Consulting Engineers - Engineers as Expert Witnesses and Advisors - Codes of Ethics -Sample Code of Ethics Like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management Etc.,

Learning Resources:

Text Books:

1. Mike martin and Ronald Schinzinger, "Ethics in Engineering" McGraw-Hill, New York1996
2. Govindarajan M, Natarajan S, Senthil Kumar V.S., "Engineering Ethics", PHI, NewDelhi
3. Bayles.M. D, Professional ethics, California, Wards worth publishing company,1981
4. Koehn.D, The ground of Professional Ethics, Routledges, 1995

Reference Books:

1. Charles D, Fleddermann, "Engineering Ethics", Pearson / PHI, New Jersey 2004 (Indian Reprint)
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases" Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the conduct of business" Pearson, New Delhi, 2003.
4. Edmund G.Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2001.