SCHEME OF INSTRUCTION
MASTER OF COMPUTER APPLICATIONS (MCA)
SEMESTER- IV

SNo	Course Code	Course Title	Hours/ Week		Scheme of Examination			No of Credits
					Max Marks		Duration (hrs)	
			L	P	CIE	SEE	SEE	Cr
	THEORY		L	P	CIE	SEE	SEE	Cr
1	PEC**	**Professional Elective –III**	3	-	30	70	3	3
2	PEC**	**Professional Elective –IV**	3	-	30	70	3	3
3	OE**	**Open Elective**	2	-	30	70	3	2
	PRACTICALS							
4	Proj401	Project Work	-	24	50	100	3	12
		Total	8	24	140	310	-	20

Professional Electives

Course Code-PEC**	Professional Elective – III
PEC411	Block Chain Technologies
PEC412	Big Data Analytics
PEC413	Cloud Computing
PEC413	Deep Learning

Course Code-PEC**	Professional Elective – IV
PEC421	Distributed Database Systems
PEC422	Digital Forensics
PEC423	Optimization Techniques
PEC424	Enterprise Architecture

Course Code-OE**	Open Elective
OE 411	Professional Ethics
OE 412	Constitution of India
OE 413	Disaster Management
OE 414	Organization Behaviour
OE 415	Intellectual Property & Cyber Law
OE 416	Environmental Science

PEC411   **Block Chain Technologies**
                                             Credits : 3
Instruction3L hrs per week   Duration of SEE3 hours
        CIE30 marks   SEE70 marks

Course Objectives
1. Learn the basic concept of Cryptographic Hash Functions, Hash Pointers
2. Study Elliptic Curve Digital Signature Algorithm.
3. A technical overview of decentralized digital currencies like Bitcoin, as well as their broader economic, legal and financial context.
4. To get an insight into the working of the Bitcoin network Wallet
5. Comprehend Bitcoin mining and distributed consensus for reliability.

Course Outcomes
1. Learn the basics of hash functions
2. Learn the importance of digital signature
3. Understand the structure of a blockchain.
4. Learn different ways of storing Bitcoin keys, security measures.
5. Learn how Bitcoin relies on mining.

UNIT – I
Introduction to Cryptography: Cryptographic Hash Functions, SHA- 256, Hash Pointers and Data Structures, Merkle tree.

UNIT – II
Digital Signatures: Elliptic Curve Digital Signature Algorithm (ECDSA), Public Keys as identities, A Simple Cryptocurrency.

UNIT – III
Centralization vs Decentralization, Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work.
Mechanics of Bitcoin: Bitcoin Transactions, Bitcoin Scripts, Applications of Bitcoin Scripts, Bitcoin Blocks, The Bitcoin Network.

UNIT – IV
Storage and Usage of Bitcoins: Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets.

UNIT – V
Bitcoin Mining: The Task of Bitcoin miners, Mining Hardware, Mining pools, Mining incentives and strategies.
Bitcoin and Anonymity: Anonymity Basics, Mixing, Zerocoin and Zerocash.
Applications of Block Chain Technologies.

Suggested Reading

1. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Princeton Press, 2016.
2. Mastering Bitcoin: Programming the Open Blockchain by Andreas M. Antonopoulos Shroff, O'Reilly; 2nd Edition, 2017.

PEC412   **Big Data Analytics**

Credits : 3

Instruction   3L hrs per week   Duration of SEE   3 hours

CIE   30 marks   SEE   70 marks

Course Objectives

1. Understand big data fundamentals
2. Understand Learn hadoop ecosystem
3. Understand mapreduce and hbase fundamentals
4. Understand database concepts related to big data
5. Understand NoSQL fundamentals

Course Outcomes

1. Learn how to handle big data
2. Learn hadoop ecosystem
3. Learn mapreduce and hbase fundamentals
4. Learn database concepts related to big data
5. Learn NoSQL fundamentals

UNIT– I

Getting an overview of Big Data:Introduction to Big Data, Structuring Big Data, Types of Data,Elementsof BigData,BigData Analytics, AdvantagesofBigData Analytics.
Introducing Technologies for Handling Big Data: Distributed and Parallel Computing for   Big Data,CloudComputingandBigData,FeaturesofCloudComputing,CloudDeploymentModels, CloudServicesfor BigData, Cloud Providers in BigDataMarket.

UNIT– II

UnderstandingHadoopEcosystem: IntroducingHadoop,HDFSandMapReduce,Hadoopfunctions,HadoopEcosystem.
HadoopDistributedFileSystem-
HDFSArchitecture,ConceptofBlocksinHDFSArchitecture,Namenodesand Datanodes,Features ofHDFS.MapReduce.
Introducing HBase- HBase Architecture, Regions, Storing Big Data with HBase, Combining HBase andHDFS,Features of HBase,Hive,Pigand PigLatin,Sqoop, ZooKeeper,Flume, Oozie.

UNIT-III

Understanding MapReduce Fundamentals and HBase: The MapReduceFramework ,Exploring
thefeaturesofMapReduce,WorkingofMapReduce,TechniquestooptimizeMapReduceJobs,Hardware/Network Topology, Synchronization, File system, Uses of MapReduce, Role of HBase in BigDataProcessing-Characteristics ofHBase.
Understanding Big Data Technology Foundations: Exploring the Big Data Stack, Data Sources Layer,Ingestion Layer, Storage Layer, Physical Infrastructure Layer, Platform Management Layer, SecurityLayer,MonitoringLayer, Visualization Layer.

UNIT– IV

Storing Data in Databases and Data Warehouses:RDBMS and Big Data, Issues with RelationalModel,Non–
RelationalDatabase,IssueswithNonRelationalDatabase,PolyglotPersistence,IntegratingBig DatawithTraditional Data Warehouse, BigDataAnalysis andData Warehouse.

UNIT–V

NoSQL Data Management: Introduction to NoSQL, Characteristics of NoSQL, History of NoSQL,Types of NoSQL Data Models-Key Value Data Model, Column Oriented Data Model, Document DataModel,Graph Databases,Schema-Less Databases,MaterializedViews,CAPTheorem.

SuggestedReading

1. BIGDATA, BlackBookTM, DreamTechPress, 2016Edition.
2. Seema Acharya, SubhasniChellappan , "BIG DATA and ANALYTICS",Wiley publications,2016
3. NathanMarzandJamesWarren,"BIGDATA-PrinciplesandBestPracticesofScalableReal-TimeSystems", 2010

PEC413   **Cloud Computing**
                                                 Credits : 3

Instruction   3L hrs per week   Duration of SEE   3 hours
         CIE   30 marks   SEE   70 marks

CourseObjectives

1. Learn the cloud computing services including resource virtualization
2. Study the scaling, planning and file system and storage
3. Understand database technology and security issues
4. Comprehend portability issues and programming model case study
5. Learn the enterprise architecture and its related information

CourseOutcomes

1. Elaborate the cloud computing services and resource virtualization
2. Explain the scaling, planning and file system and storage
3. Describe the database technology and security issues
4. Elucidate portability issues and programming model case study
5. Discuss the enterprise architecture and its related information

Unit-I

Introduction,Benefitsandchallenges,Cloudcomputingservices,ResourceVirtualization,Resourcepoolingsharing and provisioning, Case study of Iaas, Paas and Saas

Unit-II

ScalingintheCloud,CapacityPlanning,LoadBalancing,FileSystemandStorage, Containers

Unit-III

Multi-tenantSoftware,DatainCloud,DatabaseTechnology,ContentDeliveryNetwork,SecurityReferenceModel , SecurityIssues, Privacyand ComplianceIssues

Unit-IV

Portabilityand InteroperabilityIssues,CloudManagementandaProgrammingModelCaseStudy,Popular Cloud Services

Unit-V

EnterprisearchitectureandSOA,EnterpriseSoftware,EnterpriseCustomApplications,Workflow and Business Processes, Enterprise Analytics and Search, Enterprise CloudComputingEcosystem.

SuggestedReading

1. CloudComputing-Sandeep Bhowmik, Cambridge UniversityPress, 2017.
2. EnterpriseCloudComputing-Technology,Architecture,ApplicationsbyGautamShroff,Cambridge UniversityPress, 2016.
3. Kai Hwang, Geoffrey C.Fox, Jack J.Dongarra, "Distributed and Cloud Computing FromParallelProcessing to theInternet of Things", Elsevier,2012.

PEC414 **Deep Learning**
Credits : 3

Instruction   3L hrs per week   Duration of SEE   3 hours
CIE   30 marks   SEE   70 marks

Course Objectives
1. Learn deep learning basics and optimization algorithms
2. Understand deep learning computation, CNNs and modersn CNNs
3. Study recurrent neural networks and its modern versions
4. Learn computer vision
5. Comprehend GANs

Course Outcomes
1. Learn deep learning basics and optimization algorithms
2. Understand deep learning computation, CNNs and modersn CNNs
3. Study recurrent neural networks and its modern versions
4. Learn computer vision
5. Comprehend GANs

Unit I
Introduction – A motivating example, the key components – data, models, and algorithms, kinds of machine learning, the road to deep learning, success stories, Linear regression, multilayer perceptrons, model selection, underfitting and overfitting, weight decay, dropout, forward propagation, backward propagation and computational graphs, numerical stability and initialization, considering the environment, predicting house prices on Kaggle

Optimization algorithms – optimization and deep learning, convexity, gradient descent, momentum, adagrad, RMSProp, Adadelta, Adam, learning rate scheduling

Unit II
Deep learning computation – layers and blocks, parameter management, deferred initialization, custom layers, file I/O, GPUs

Convolutional neural networks – from dense layers to convolutions, convolutions for images, padding and stride, multiple input and output channels, pooling, convolutional neural networks(LeNet)

Modern Convolutional neural networks – deep Convolutional neural networks(AlexNet), Networks using blocks(VGG), Networks with parallel concatenations(GoogleNet), batch normalization, residual networks(ResNet), densely connected networks(DenseNet)

Unit III
Recurrent neural networks – sequence models, text processing, language models and the dataset, recurrent neural networks, back propagation through time

Modern Recurrent neural networks – gated recurrent units(GRU), long short term memory(LSTM), deep recurrent neural networks, bidirectional recurrent neural networks, machine translation and the dataset, encoder-decoder architecture, sequence to sequence

Attention mechanisms – attention mechanism, sequence to sequence with attention mechanism, transformer

Unit IV

Computer vision – Image augmentation fine tuning, object detection and bounding boxes, anchor boxes, multiscale object detection, the object detection dataset, single shot multibox detection(SSD), region based CNNs(R-CNNs), semantic segmentation and the dataset, transposed convolution, fully convolutional networks(FCN), neural style transfer, image classification(CIFAR-10) on kaggle, dog breed identification (Imagenet dogs) on kaggle

Unit V

Generative adversarial networks – Generative adversarial networks, deep convolutional generative adversarial networks

Tools for deep learning – using jupyter, using amazon sagemaker, using AWS EC2 instances, using google colab, selecting servers and GPUs

Suggested Reading

1. Ian goodfellow, Yoshuabengio, Aaron courville, "Deep learning"
   Zhang, Aston, et al. "Dive into deep learning." arXiv preprint arXiv:2106.11342 (2021).

PE 624CS

DISTRIBUTED DATABASES SYSTEMS
(Professional Elective-II)

Instruction: 3L hrs per week
CIE: 30 Marks
Credits: 3

Duration of SEE: 3 hours
SEE: 70 Marks

Course Objectives:

The aim of the course is to
- Enhance the previous knowledge of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, and showing the need for distributed database technology to tackle deficiencies of the centralized database systems;
- Introduce basic principles and implementation techniques of distributed database systems,
- Expose active and emerging research issues in distributed database systems and application development,
- Apply theory to practice by building and delivering a distributed database query engine, subject to remote Web service calls.

Course Outcomes:

After the completion of the course, the students are expected to
1. Get familiar with the currently available models, technologies for and approaches to building distributed database systems and services;
2. Have developed practical skills in the use of these models and approaches to be able to select and apply the appropriate methods for a particular case;
3. Be aware of the current research directions in the field and their possible outcomes;
4. Be able to carry out research on a relevant topic, identify primary references, analyze them, and come up with meaningful conclusions
5. Be able to apply learned skills to solving practical database related tasks.

UNIT- I

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object-Based and Semistructured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators, History of Database Systems.
Relational Model: Structure of Relational Databases, Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra Operations, Null Values, Modification of the Database.

UNIT-II
Query Processing: Overview, Measures of query cost, Selection operation, sorting, Join operation, other operations, Evaluation of Expressions.
Query Optimization: Overview, Transformation of Relational expressions, Estimating statistics of expression results, Choice of evaluation plans, Materialized views.

UNIT-III
Parallel Systems: Speedup and Scaleup, Interconnection Networks, Parallel Database Architectures.
Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Interoperation Parallelism, Intraoperation Parallelism, Design of Parallel Systems.

UNIT-IV

Distributed Databases: Reference architecture for DDB, Types of Data Fragmentation, Distribution Transparency for Read-only applications, Distribution Transparency for Update applications, Distributed Database Access Primitives, Integrity Constraints in DDB.

Distributed Database Design: A frame work for Distributed Database Design, The design of Database fragmentation, The allocation of fragmentation.

UNIT-V

Translation of Global Queries to Fragment Queries: Equivalence transformations for queries, Transforming global queries into fragment queries, Distributed grouping and aggregate function evaluation, Parametric queries.

Optimization of Access Strategies: Access Control Models, Database Security, A framework for query optimization, Join queries, General queries.

Suggested Reading:

1. Silberschatz A, Korth HF, Sudarshan S, *Database System Concepts*, McGraw-Hill International Edition, 5th Edition, 2006.

2. Ceri S, Pelagatti G, *Distributed Databases: Principles and Systems*, McGraw-Hill International Edition, 1984.

PEC422   **Digital Forensics**
                                    Credits : 3

Instruction   3L hrs per week   Duration of SEE   3 hours
        CIE   30 marks   SEE   70 marks

Course Objectives
1. Understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
2. Understand how to examine computing investigations
3. Understand data acquisition
4. Understand processing crimes
5. Understand forensics tools

Course Outcomes
1. Know how to apply forensic analysis tools to recover important evidence for identifying computer crime.
2. To be well-trained as next-generation computer crime investigators.
3. Learn data acquisition
4. Learn processing crimes
5. Learn forensics tools

Unit -I

Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues.

Unit- II

Understanding Computing Investigations – Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations.

Unit-III

Data acquisition- understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools.

Unit-IV

Processing crimes and incident scenes, securing a computer incident or crime, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case.

Unit-V

Current computer forensics tools- software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool.

Suggested Readings

1. Warren G. Kruse II and Jay G Heiser, "Computer Forensics: Incident Response Essentials", Addison Wesley, 2002
2. Nelson, B, Phillips, A, Enfinger, F, Stuart, C., "Guide to Computer Forensics and Investigations, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5.
3. Vacca, J, *Computer Forensics, Computer Crime Scene Investigation*, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

Optimization Techniques

PEC423

Credits : 3

Instruction	3L hrs per week	Duration of SEE	3 hours
CIE	30 marks	SEE	70 marks

Course Objectives
1. Understand the optimization basics
2. Understand optimization using calculus
3. Understand dynamic programming and its applications
4. Understand integer programming
5. Understand advanced optimization techniques

Course Outcomes
1. Learn the optimization basics
2. Learn optimization using calculus
3. Learn dynamic programming and its applications
4. Learn integer programming
5. Learn advanced optimization techniques

Unit I
Introduction and Basic Concepts
Historical Development; Engineering applications of Optimization; Art of Modeling Objective function; Constraints and Constraint surface; Formulation of design problems as Optimization techniques –classical and advanced techniques

Unit II
Optimization using Calculus
Stationary points; Functions of single and two variables; Global Optimum Convexity and concavity of functions of one and two variables Optimization of function of one variable and multiple variables; Gradient vectors; Examples Optimization of function of multiple variables subject to equality constraints; Lagrangian function Optimization of function of multiple variables subject to equality constraints; Hessian matrix formulation; Eigen values Kuhn-Tucker Conditions; Examples

Unit III
Dynamic Programming
Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of
Optimality Recursive equations –Forward and backward recursions; Computational procedure in dynamic programming (DP) Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP

Unit IV

Dynamic Programming Applications
Problem formulation and application in Design of continuous beam and Optimal geometric layout of a truss Water allocation as a sequential process Capacity expansion and Reservoir operation

Integer Programming
Integer linear programming; Concept of cutting plane method Mixed integer programming; Solution algorithms;Examples

Unit V
Advanced Topics in Optimization
Piecewise linear approximation of a nonlinear function Multi objective optimization –Weighted and constrained methods; Multi level optimization Direct and indirect search
Methods Evolutionary algorithms for optimization and search
Applications in civil engineering

Suggested Reading
1. S.S. Rao, "Engineering Optimization: Theory and Practice", New Age International P)Ltd., New Delhi, 2000.
2. G. Hadley, "Linear programming", Narosa Publishing House, New Delhi, 1990.
3. H.A. Taha, "Operations Research: An Introduction", 5th Edition, Macmillan, New York, 1992.
4. K. Deb, "Optimization for Engineering Design-Algorithms and Examples", Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.

K. Srinivasa Raju and D. Nagesh Kumar, "Multicriterion Analysis in Engineering and Management", PHI Learning Pvt. Ltd., New Delhi, India, ISBN 978-81-203-3976-7, pp.288, 2010.

PEC424   **Enterprise Architecture**

Credits : 3

Instruction	3L hrs per week	Duration of SEE	3 hours
CIE	30 marks	SEE	70 marks

Course Objectives

1. Learn the fundamentals of EA
2. Study the business architecture
3. Understand the organizational structure of EA
4. Comprehend enterprise engineering
5. Gain insights into cloud computing opportunities for EA

Course Outcomes

1. Learn the fundamentals of EA
2. Study the business architecture
3. Understand the organizational structure of EA
4. Comprehend enterprise engineering
5. Gain insights into cloud computing opportunities for EA

Unit I

Introduction to EA -System analysis, general system theory, definitions and objectives of considerations, Properties of EA, system approach to EA development, principle definitions

Unit II

Business architecture, definition and features, BSC – balanced score card basics and its reflection in EA, Strategic governance, Event Causality effects in EA under scope of BSC

Unit III

Organizational structure of EA and basic models, Information and technology architecture basics, Introduction to EA structuring and modeling, Business architecture (inc. business process modeling, IBM Component business model), Information architecture, Technology architecture and integration between the layers model

Unit IV

Introduction to enterprise engineering (EE), Enterprise transformations (waterfall and agile), EAP, EA methodologies: PRISM, ARIS Framework, Zachmann Framework , FEAF, DODAF and TOGAF, Introduction to Service orientation in Enterprise Engineering (SOA, SoEA), Technological infrastructure for Big Data handling in EA

Unit-V

Cloud Computing Opportunities for EA, Flexible (agile) business and information architectures (SoEA).
Introduction to Spark, Spark Data Frames, SQL, Datasets through worked examples.
Spark's low level APIs, RDDS, execution of SQL & Data Frames.
How Spark Runs on a Cluster.
Structured Streaming, Spark's Stream – Processing Engine.

Suggested Reading

1. Designing Enterprise Architecture Frameworks: Integrating Business Processes with IT Infrastructure by N Zarvić, R Wieringa. Apple Academic Press (19 April 2016), 360 p. URL: https://doi.org/10.1201/b16417
2. Neubauer M., Stary CH., S-BPM in the Production Industry. Stakeholder approach, Springer Open, 2017. URL: https://www.springer.com/gp/book/9783319484655
3. A systematic literature review on Enterprise Architecture Implementation Methodologies by Babak D., Mohd N. Elsevier (June 2015), p. 1-20. URL: https://doi.org/10.1016/j.infsof.2015.01.012
5. Spark : The Definite Guide – Bill Chambers, MateiZaharia, 2018.

OE431   **Professional Ethics**
                                           Credits : 2

Instruction   2L hrs per week   Duration of SEE   3 hours
        CIE   30 marks   SEE   70 marks

Course Objectives
1. Learn the developments of legal profession in India
2. Study the seven lamps of advocacy
3. Understand disciplinary proceedings
4. Comprehend the accountancy for lawyers
5. Gain insights into safety and risk

Course Outcomes
1. Explain the developments of legal profession in India
2. Describe the seven lamps of advocacy
3. Elaborate disciplinary proceedings
4. Elucidate the accountancy for lawyers
5. Discuss insights into safety and risk

UNIT-I
Development of Legal Profession in India — Advocates Act, 1961 — Right to Practice — a right or privilege? -- Constitutional guarantee under Article 19(1) (g) and its scope — Enrolment and Practice — Regulation governing enrolment and practice — Practice of Law — Solicitors firm — Elements of Advocacy.

UNIT-II
Seven lamps of advocacy — Advocates duties towards public, clients, court, and other advocates and legal aid ; Bar Council Code of Ethics.

UNIT-III
Disciplinary proceedings --- Professional misconduct — Disqualifications — Functions of Bar Council of India/State Bar Councils in dealing with the disciplinary proceedings — Disciplinary Committees -- Powers and functions - Disqualification and removal from rolls.

UNIT-IV
Accountancy for Lawyers - Nature and functions of accounting — Important branches of accounting — Accounting and Law – Bar - Bench Relations.

UNIT- V
Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Suggested Readings

1. Myneni S.R, Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation, Asia
2. Gupta S.P, Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation, Asia Law House, Hyderabad.
3. Kailash Rai, Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation, Allahabad Law Agency.
4. Siroh, Professional Ethics, Central Law Publications, Allahabad.
5. Ramachandra Jha, Selected Judgements on Professional Ethics, Bar Council of India Trust.

OE432   **Constitution of India**
                                       Credits : 2

Instruction   2L hrs per week   Duration of SEE   3 hours
         CIE   30 marks   SEE   70 marks

Course Objectives
1. Learn the basics of the constitution
2. Understand the structure of the union government
3. Comprehend the state government structure
4. Gain insights into local administration
5. Study about the election commission

Course Outcomes
1. Explain the basics of the constitution
2. Elucidate the structure of the union government
3. Elaborate the state government structure
4. Describe the local administration
5. Discuss the election commission

Unit 1 – The Constitution - Introduction
• The History of the Making of the Indian Constitution
• Preamble and the Basic Structure, and its interpretation
• Fundamental Rights and Duties and their interpretation
• State Policy Principles

Unit 2 – Union Government
• Structure of the Indian Union
• President – Role and Power
• Prime Minister and Council of Ministers
• Lok Sabha and Rajya Sabha

Unit 3 – State Government
• Governor – Role and Power
• Chief Minister and Council of Ministers
• State Secretariat

Unit 4 – Local Administration
• District Administration
• Municipal Corporation
• Zila Panchayat

Unit 5 – Election Commission
• Role and Functioning
• Chief Election Commissioner
• State Election Commission

Suggested Readings

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008
2. The Constitution of India B.L. FadiaSahityaBhawan; New edition (2017)
3. Introduction to the Constitution of India DD BasuLexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites

1. https://www.constitution.org/cons/india/const.html
2. http://www.legislative.gov.in/constitution-of-india
3. https://www.sci.gov.in/constitution
4. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/

OE433   **Disaster Management**

Credits : 2

Instruction   2L hrs per week   Duration of SEE   3 hours

CIE   30 marks   SEE   70 marks

Course Objectives
1. To learn about various types of natural and man-made disasters.
2. To know pre- and post-disaster management for some of the disasters.
3. To know about various information and organisations in disaster management in India.
4. To get exposed to technological tools and their role in disaster management.

Course Outcomes
After competing this course, student will be
1. Acquainted with basic information on various types of disasters
2. Knowing the precautions and awareness regarding various disasters
3. Decide first action to be taken under various disasters
4. Familiarised with organisation in India which are dealing with disasters
5. Able to select IT tools to help in disaster management

Unit – I: Understanding Disaster
Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity, Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters
Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit- III: Disaster Management Cycle and Framework
Disaster Management Cycle – Paradigm Shift in Disaster Management.
Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Stretegy, Hyogo Framework of Action.

Unit– IV: Disaster Management in India
Disaster Profile of India – Mega Disasters of India and Lessons Learnt.
Disaster Management Act 2005 – Institutional and Financial Mechanism,
National Policy on Disaster Management, National Guidelines and Plans on Disaster Management;
Role of Government (local, state and national),Non-Government and Inter Governmental Agencies

Unit– V: Applications of Science and Technology for Disaster Management
Geo-informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters
S&T Institutions for Disaster Management in India

Suggested Readings
1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

OE434 **Organization Behaviour**
Credits : 2

Instruction	2L hrs per week	Duration of SEE	3 hours
CIE	30 marks	SEE	70 marks

Course Objectives
1. Learn management process and functions
2. Study decision making and negotiations
3. Comprehend psychological contract
4. Understand models of organization behaviour
5. Gain insights into organization design

Course Outcomes
1. Explain management process and functions
2. Discuss decision making and negotiations
3. Describe psychological contract
4. Elaborate models of organization behaviour
5. Elucidate the organization design

UNIT I

Management Process and Functions, Scientific and Modern Management, 3D Model of Managerial Behavior - MBO - MBWA - Line and Staff - The Peter's Principle - Parkinson's Law - Approaches to Organization Structure-Management - Classical, Human Relations, Systems and Contingency Approaches, Hawthorne's Experiments - Human Engineering.

UNIT II

Decision Making and Negotiations: Approaches to Decision making - Rational, Behavioral, Practical, and Personal Approaches - Open and Closed Models of Decision Making, Types and steps in planning, Authority, Responsibility, Centralization, Decentralization and Recentralization, Bureaucracy.

UNIT III

Psychological contract - Personality Traits, Big 5 personality traits, MBTI inventory, the Process of Perception - Perceptual distortions and errors, Kelly's personal construct Theory, Motivation-Content Theories: Maslow, Alderfer, Herzberg, McCleland. Process Theories: Vroom, Potter and Lawler, Equity Theory - Goal Theory - Attribution Theory.

UNIT IV

Models of Organization Behavior - Autocratic, Custodial, Supportive, Collegial and System Models, Transactional Analysis, Johari Window. Group Dynamics: Typology of Groups - Conflicts in groups - The nature, of conflict - Reactions to conflict - A model of conflict. Trait and Behavioral Approaches to Leadership, Managerial Grid, Path-Goal Theory, Vroom's Decision Tree Approach to Leadership - Hersey and Blanchard Model.

UNIT V

Organization Design, Organization culture and organization climate, Stress Management and Counseling, Management of change and organization development. Communication - Emerging aspects of OB.

Suggested Readings
1. Harold Koontz and Heinz Weihrich, Essentials of Management, 9th Edition, McGraw Hill Education, 2015.
2. Curtis W. Cook and Phillip L. Hunsaker, Management and Organizational Behavior, 3rd Edition, McGraw-Hill,2010.

OE435   **Intellectual Property and Cyber Law**
Credits : 2

Instruction   2L hrs per week   Duration of SEE   3 hours
CIE   30 marks   SEE   70 marks

Course Objectives
1. Learn the fundamentals of intellectual property
2. Study the basics of international instruments of IPR
3. Understand the laws concerning copyright in India
4. Comprehend the IP in trademarks
5. Gain insights into the concept of patent

Course Outcomes
1. Explain the fundamentals of intellectual property
2. Elaborate the basics of international instruments of IPR
3. Describe the laws concerning copyright in India
4. Discuss the IP in trademarks
5. Explain the concept of patent

UNIT-I
Meaning, Nature, Classification and protection of Intellectual Property, The main forms of Intellectual Property, Copyright, Trademarks, Patents, Designs (Industrial and Layout), Geographical Indications Plant Varieties Protection and Biotechnology

UNIT-II
Introduction to the leading International instruments concerning Intellectual Property Rights, The Berne Convention, Universal Copyright Convention, The Paris Union, Patent Cooperation Treaty, The World Intellectual Property Organization (WIPO) and the UNEESCO, International Trade Agreements concerning IPR, WTO, TRIPS.

UNIT-III
Select aspects of the Law of Copyright in India The Copy Right Act,1957 Historical evolution, Meaning of copyright, Copyright in literary, dramatic and musical works, computer programmes and cinematograph films, Neighbouring rights, Rights of performers and broadcasters, etc., Ownership and Assignment of copyright, Author's special rights, Notion of infringement, Criteria of infringement Infringement of copyright in films, literary and dramatic works, Authorities under the Act, Remedies for infringement of copyright.

UNIT-IV
Intellectual Property in Trademarks and the rationale of their protection - The Trade Marks Act. 1999 —Definition of Trademarks — Distinction between Trademark and Property Mark - Registration — Passing off — Infringement of Trademark — Criteria of Infringement — Remedies. The Designs

Act, 2000 -- Definition and characteristics of Design — Law in India — Protection and rights of design holders -- Copyright in design — Registration — Remedies for infringement.

UNIT-V

Patents — Concept of Patent — Historical overview of the Patents Law in India — Patentable Inventions —Kinds of Patents — Procedure for obtaining patent — The Patents Act, 1970 — Rights and obligations of a patentee — Term of patent protection — Use and exercise of rights — Exclusive Marketing Rights — Right to Secrecy — The notion of 'abuse' of patent rights — Infringement of patent rights and remedies available.

Suggested Readings
1. P. Narayanan, Patent Law, Eastern Law House, 1995.
2. Roy Chowdhary, S.K. & Other, Law of Trademark, Copyrights, Patents and Designs, Kamal Law House, 1999.
3. Dr. G.B. Reddy, Intellectual Property Rights and the Law ,5th Edition, Gogia Law Agency, 2005.

OE436   **Environmental Science**

Credits : 2

Instruction   2L hrs per week   Duration of SEE   3 hours

        CIE   30 marks   SEE   70 marks

Course Objectives
1. Learn the scope and importance of environmental studies
2. Study about the environment and natural resources
3. Understand the environmental pollution
4. Comprehend the regional and sectoral issues concerning environment
5. Gain insights into social issues and the environment

Course Outcomes
1. Explain the scope and importance of environmental studies
2. Elaborate the environment and natural resources
3. Describe the environmental pollution
4. Discuss the regional and sectoral issues concerning environment
5. Explain the social issues and the environment

UNIT-I

Environmental Studies: Introduction - Definition, Scope and Importance - Basic principle of ecosystem functioning - Concept of ecosystem, structure and functioning of ecosystem, introduction and characteristic features, structures and functions, different ecosystems.

Biodiversity and its conservation: Introduction - Bio-geographical classification of India. Value of biodiversity - consumptive and predictive use, social, ethical and optional values. Biodiversity - Global, National and local levels. Hot spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - Conservation of biodiversity - In-situ and Ex-situ conservant.

UNIT-II

Environmental and Natural Resources: Forest resources - Use and over-exploitation, Deforestation, Timber extraction, Mining and dams - their effects on forests and tribal' people. Water resources - Use and over-utilization of surface and ground water, floods, droughts, conflicts over water, dams - effects of extracting and using mineral resources. Food resources - World food problems - change caused by agricultural and overgrazing, effects of modern agricultural fertilizer pesticide problems, water logging and salinity.

Environmental Valuation: Welfare measure and environmental values, definition and classification of environmental values, valuation methods. Environmental Economics: Economic approach to environmental preservation and conservation, property rights and externalities, management of natural resources.

UNIT-III

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution.

Environmental Problems in India: Effects of human activities on the quality of life, Water and River, Ground water, Wasteland reclamation.

UNIT-IV
Regional and Sectoral Issues: Urbanization, Agro-forestry, Dry lands, Goods and services, Mountain development, River basin water resources management. sustainable tourism, and Costal zone management. Environment and Development: The economy and environment interaction, State of the Environment - Economics of development; Preservation and conservation.
Sustainability: Theory and Practice, Equitable use of resources for sustainable life styles - Role of an individual in prevention of pollution.
Human Population and the Environment: Population growth and environment - Human Rights.

UNIT-V
Social Issues and the Environment: Sustainable Development - Resettlement and rehabilitation of people and its problems and concerns.
Environmental ethics: Issues and possible solutions-Consumerism and waste products - Public awareness. Sustainable resources management. Design of Environmental Policy -- Direct regulation by Government - Command and control instrumentation.

Suggested Readings
1. B. Sudhakara Reddy, T. Sivaji Rao, U. Tataji& K. Purushottam Reddy, An Introduction to Environmental Studies, Maruti Publications.
2. C.Manohar Chary and P.Jayaram Reddy, Principles of Environmental Studies, B.S. Publications, Hyderabad.
3. Y.Anjaneyulu, Introduction to Environmental Science, B.S. Publications, Hyderabad.

Proj401   **Project Work**
                               Credits : 12

Instruction   24hrs per week   Duration of SEE   3 hours
         CIE   50 marks   SEE   100 marks

Project hasto be carried out by each student individually in a periodof 15 weeks of duration.Students should submit a synopsis at the end of 2nd week in consultation with theProject Guide. The synopsis should consist of definition of the problem, scope of theproblem and plan of action. After completion of eight weeks students are required topresent a Project Seminar on the topic covering the aspects of analysis, design andimplementationof theproject work.

At the end of the semester the students are required to presentthemselves for   aUniversityViva-voceexamination.EvaluationguidelinesfortheawardofSEEmarksarementioned in theRules and Regulationsbook.

 A committee consisting of two faculty members of the respective college along withaguidewill evaluatetheproject andaward CIE marks.

Eachstudentwillberequiredto:

1. Submitone page of synopsis on the project work for display on notice board.
2. Givea20 minutes presentation followedby10 minutes discussion.
3. Submitatechnicalwrite-upontheproject.

At least two teachers will be associated with the Project Seminar to evaluate studentsfor the award of CIE marks which will be on the basis of performance in all the 3itemsstated above.

Theprojectseminarpresentationshouldincludethefollowingcomponentsofthe project:

*   Problemdefinitionandspecification.
*   Literaturesurvey,familiaritywithresearchjournals.
*   Broadknowledgeofavailabletechniques tosolve aparticularproblem.
*   Planningofthework,preparation ofbar (activity) charts, Presentationboth oralandwritten.

Course Objectives:
The aim of the course is to

- Enhance the previous knowledge of database systems by deepening the understanding of thetheoretical and practical aspects of the database technologies, and showing the need for distributed database technology to tackle deficiencies of the centralized database systems; Introduce basic principles and implementation techniques of distributed database systems
- Expose active and emerging research issues in distributed database systems and application
- development, Apply theory to practice by building and delivering a distributed database query engine,
- • subject to remote Web service calls. Course Outcomes: After the completion of the course, the students are expected to 1. Get familiar with the currently available models, technologies for and approaches to building distributed database systems and services; 2. Have developed practical skills in the use of these models and approaches to be able to select and apply the appropriate methods for a particular case; 3. Be aware of the current research directions in the field and their possible outcomes; 4. Be able to carry out research on a relevant topic, identify primary references, analyze them, and come up with meaningful conclusions 5. Be able to apply learned skills to solving practical database related tasks.