CURRICULUM

FOR THE ACADEMIC YEAR 2025-2026

(22 Series)

DEPARTMENTOF

COMPUTER SCIENCE AND ENGINEERING

B.E.V AND VI SEMESTER

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING
(An autonomous college under VTU)
KALABURAGI

About the Department: The Computer Science and Engineering department was started in the year 1984 with an intake of 40 students for UG. The department has seen phenomenal growth and now the department has increased UG intake to 240 students and offering two Post Graduation programmes: PG (Computer Science and Engineering with an intake of 18 students) and PG(Computer Network and Engineering with an intake of 09 students). The department is offering research program under its recognized research center. Computer Science and Design course was started from 2021 with an intake of 60 students. The department is having state- of-the-art computing facilities with high speed internet facilities and laboratories. The department library provides useful resources like books and journals. The department has well qualified and experienced teaching faculty. The department has been conducting several faculty development programs and student training programs.

Vision of the Institution

To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

Mission of the Institution

- To provide a high quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.
- To explore, create and develop innovations in engineering and science through research and development activities.
- To provide beneficial service to the national and multinational industries and communities through educational, technical, and professional activities.

Vision of the Department

- To become a premier department in Computer education, research and to prepare highly competent IT professionals to serve industry and society at local and global levels.

Mission of the Department

- To impart high quality professional education to become a leader in Computer Scienceand Engineering.
- To achieve excellence in Research for contributing to the development of the society.
- To inculcate professional and ethical behaviour to serve the industry.

Program Educational Objectives (PEO):

PEO1:	To prepare graduates with core competencies in mathematical and engineering fundamentals to solve and analyze computer science and engineering problems
PEO2:	To adapt to evolving technologies and tools for serving the society
PEO3:	To perform as team leader, effective communicator and socially responsible computer professional in multidisciplinary fields following ethical values
PEO4:	To encourage students to pursue higher studies, engage in research and to become entrepreneurs

Program Outcomes:

01. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

02. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

03. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

04. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

05. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

06. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

07. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

08. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

09. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one,,s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO1:	Acquire competency in hardware and software working principles to analyze and solve computing problems.
PSO2:	Design quality software to develop scientific and business applications following Software Engineering practices.
PSO3:	Apply cutting edge technologies using modern tools to find novel solutions ethically to existing problems.

Department of Computer Science & Engineering
SCHEME OF TEACHING FOR V SEMESTER–22 SERIES

Sl. No	Course	Course Code	Course Title	Teaching Hours/Week				Examination				Credits
				Theory Lecture(L)	Tutorial (T)	Practical	Self-Study(S)	Duration in	CIE Marks	SEE Marks	Total Marks	
1	PCC	22CS51	Software Engineering and Testing	4	0	0	0	3	50	50	100	4
2	IPCC	22CS52	Computer Networks	3	0	2	0	3	50	50	100	4
3	PCC	22CS53	Artificial Intelligence and Machine Learning	4	0	0	0	3	50	50	100	4
4	PCCL	22CSL54	Artificial Intelligence and Machine Learning Lab	0	0	2	0	3	50	50	100	1
5	PEC	22CS55x	Professional Elective-I	3	0	0	0	3	50	50	100	3
6	PROJ	22CSMP56	Mini Project	0	0	4	0	0	50	0	50	2
7	AEC	22RMI57	Research Methodology and IPR	3	0	0	0	3	50	50	100	3
8	BSC	22ES58	Environmental Studies	2	0	0	0	3	50	50	100	2
9	NCMC	22NS59	National Service Scheme (NSS)	0	0	2	0	0	50	0	50	0
10		22PE59	Physical Education (PE)Sports &Athletics									
11		22YO59	Yoga									
			Total	19	0	10	0	21	450	350	800	23

Professional Elective-I

Sl. No	Course Code	Course Name
1.	22CS551	System software and Compiler Design
2.	22CS552	Design of IoT System
3.	22CS553	Multimedia Communication
4.	22CS554	Wireless & Mobile Computing

SCHEME OF TEACHING FOR VI SEMESTER–22 SERIES

Sl. No	Course	Course Code	Course Title	Teaching Hours/Week				Teaching Hours/Week				
				Theory Lecture(L)	Tutorial (T)	Practical	Self-Study (S)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	HSMS	22CS61	Entrepreneurship, Management and Finance	3	0	0	0	3	50	50	100	3
2	PCC	22CS62	Digital Image Processing	4	0	0	0	3	50	50	100	4
3	PEC	22CS63x	Professional Elective-II	3	0	0	0	3	50	50	100	3
4	OEC	22CSOE64x	Open Elective –I	3	0	0	0	3	50	50	100	3
5	PROJ	22CS65	Major Project Phase -I	0	0	4	0	3	50	0	50	2
6	PCCL	22CSL66	Digital Image Processing lab	0	0	2	0	3	50	50	100	1
7	AEC/SDC	22IKSAE67	Indian Knowledge Systems	1	0	0	0	2	50	50	100	1
8	NCMC	22NS68	National Service Scheme(NSS)	0	0	2	0	0	50	0	50	0
9		22PE68	Physical Education(PE)Sports &Athletics									
10		22YO68	Yoga									
			Total	**14**	**0**	**8**	**0**	**20**	**400**	**300**	**700**	**17**

Professional Elective-II

Sl. No	Course Code	Course Name
1.	22CS631	Cryptography and Information Security
2.	22CS632	System Simulation and Modelling
3.	22CS633	Network Management Systems
4.	22CS634	Natural Language Processing

Open Elective- I(Tentative)

Sl. No	Course Code	Course Name
1.	22CSOE641	Java Programming
2.	22CSOE642	Software Engineering and Testing Tools
3.	22CSOE643	Fundamentals of Operating System

Course Title: SOFTWARE ENGINEERING AND TESTING		
Subject Code : **22CS51**	Credits: 4	CIE:50
Number of Lecture Hours/Week((L:T:P)	**4:0:0 Hrs**	SEE:50
Total Number of Lecture Hours	52	SEE Hours: 03
Prerequisites: Any programming language		

Course objectives:

- Acquire knowledge of software development lifecycle
- Understand methodologies for designing the software
- Describe the development of efficient and cost effective software.
- Gain knowledge of Software Testing process.
- Perform various software testing and measurement.

MODULES	**Teaching Hours**
Module– I **Overview:** Introduction: FAQ's about software engineering, Professional and ethical responsibility. **Software Processes:** Software Processes: Models, Process iteration, Process activities, The Rational Unified Process, Computer-Aided Software Engineering. **Requirements:** Software Requirements: Functional and Non-functional requirements, User requirements, System requirements, Interface specification, and The software requirements document.	**11 Hrs**
Module-II **Software Design:** Architectural Design: Architectural design decisions, System organization, Modular decomposition styles, Control styles. **Object- Oriented design:** Objects and Object Classes, An Object-Oriented design process, Design evolution, Introduction to UML Diagram, Case study **Development:** Rapid Software Development: Agile methods, Extreme programming, Rapid application development, Software prototyping	**10 Hrs**
Module-III **Verification And Validation:** Verification and Validation: Planning, Software inspections, Automated static analysis, Verification and formal methods. **Management:** Managing People: Selecting staff, Motivating people, Managing people, The People Capability Maturity Model. Software Cost Estimation: Productivity, Estimation techniques.	**11 Hrs**
Module– IV **A Perspective on Testing, Examples**: Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Examples: Generalized pseudo code, The triangle problem, The Next Date function, The commission problem, The SATM (Simple Automatic Teller Machine) problem, The currency converter, Saturn windshield wiper. Boundary Value Testing: Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing, Guidelines for Boundary value Testing.	**10 Hrs**

Module– V	
Path Testing: DD paths, Test coverage metrics, Basis path testing, guidelines and observations. Define/Use testing, Slice-based testing, Guidelines and observations. **Levels of Testing**: Traditional view of testing levels, Alternative life-cycle models, The SATM system, Separating integration and system testing. Integration Testing: A closer look at the SATM system, Decomposition-based Integration, call graph-based Integration.	**10 Hrs**

Question paper pattern:

The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module**.**

TEXT BOOKS:

1. Software Engineering – Ian Somerville, 10th Edition, Pearson Education,2016.
2. Software Testing, A Craftsman's Approach - Paul C. Jorgensen:, 4th Edition, Auerbach Publications,2013.

REFERENCE BOOKS:

1. Software Engineering: A Practitioners Approach - Roger S. Pressman, 7th Edition, McGraw-Hill,2007.
2. Software Engineering Theory and Practice - Shari Lawrence Pfleeger, Joanne M.Atlee, 3rd Edition, Pearson Education,2006.
3. Software Engineering Principles and Practice - Waman S Jawadekar, Tata McGraw Hill, 2004.

Course outcomes:
On completion of the course, the student will have the ability to:

Course code	CO #	Course Outcome (CO)
22CS51	CO1	Describe software engineering process to account for quality issues and non-functional requirements.
	CO2	Translate specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
	CO3	Explain and develop, maintain and evaluate large-scale software systems, To produce efficient, reliable, robust and cost-effective software solutions
	CO4	Discuss the fundamental principles of Software Testing with lifecycle and essential functional test methods.
	CO5	Perform Basic test design and measurement techniques.

Course Title: COMPUTER NETWORKS		
Subject Code : **22CS52**	Credit : 4	CIE: 50
Number of Lecture Hours/Week(L:T:P)	**3:0:2 Hrs**	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
Prerequisites: Nil		

Course Objectives:

- Develop an understanding about architectural principles of computer networks , network devices and their functions.
- Gain knowledge about functions and services of OSI layers and TCP/IP protocol.
- Learn how internet works, understand working of routing protocols and study implementation issues in internetworking.
- Understand transport and application layer protocols.

MODULES	**Teaching Hours**
Module I **Introductory concepts & Physical Layer:** Discuss Network Hardware, Network Software, Reference Models, ARPANET, The Theoretical Basis for Data Communication, Guided Transmission Media, Wireless Transmission. 1. Experimental study of various network components and devices: a. Study different network cables: Prepare and test straight over and cross-over cabling using crimping tool. b. Install wired Network Interface card and allot IP address and check using PING command.	**08 Hrs**
Module II Discuss Data Link Layer & Medium Access Control Sub-layer: Data link layer design issues, Error detection & correction, Elementary data link protocols, Sliding window protocols, Example data link protocols, The channel allocation problem, Multiple access protocols. 1. Simulate sliding window protocol using C program. 2. Simulate go back N protocol using C program.	**08 Hrs**
Module III Discuss Medium Access Control Sub-layer: Ethernet, Wireless LANS, Broadband Wireless, Bluetooth, Data link layer switching. 1. Install and configure a LAN using Switch. 2. Install and configure a Wireless LAN using wireless NIC and Wireless Router. 3. Use CISCO packet tracer to a. Build a virtual Local Area Network using switch. b. Build a wireless LAN and test the network using PING. 4. Use Wireshark tool and examine Ethernet packets and ARP packets.	**08 Hrs**

Module IV Discuss the Network Layer: Network layer design issues, Routing Algorithms, Congestion control algorithms, Internetworking, The network layer in the internet. 1.Use CISCO packet tracer to : a) Install and configure network devices Routers. b) Connect two or three LAN's using router. Trace how routing happens via simulation, and study the working of router.	**08 Hrs**
Module V Discuss The Transport Layer and Application Layer protocols: The transport services. Elements of transport protocols, the internet transport protocols: UDP The internet transport protocols: TCP, Electronic mail, the world wide web. 1. Use Wireshark to: a. Examine UDP and TCP ports b. Use packet tracer to configure DHCP server, SMTP server and capture traffic and filter SMTP traffic on the basis of commonly used ports like 25, 587, 465. 2. Implement Client Server Program in C	**10 Hrs**

Question paper pattern:

The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module**.**

TEXT BOOKS:

1. Andrew S. Tanenbaum: Computer Networks, 5th Edition, Pearson,2010.
2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 5th Edition, Elsevier, 2010.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol suite, Sixth Edition, McGraw Hill,2022.
2. Kurose and Ross, Computer Networking: A Top- Down Approach, Pearson, Sixth Edition,2021
3. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education,2007.
4. Alberto Leon-Garcia and Indra Widjaja: Communication Networks -Fundamental Concepts and Key Architectures, 2nd Edition Tata McGraw-Hill,2004.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS52	**CO1**	Understand basic concepts, study OSI, TCP/IP model with functions of each layer and understand wired and wireless transmission fundamentals.
	CO2	Describe error detection, correction methods, data link layer functions and evaluate channel access mechanisms.
	CO3	Study and compare medium access protocols for wired and wireless LAN's
	CO4	Demonstrate routing layer functions, issues and routing protocols in Internet.
	CO5	Explore transport layer functions, issues and application layer protocols.

Course Title: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING		
Subject Code : **22CS53**	Credit :04	CIE: 50
Number of Lecture Hours/Week	**4:0:0 Hrs**	SEE: 50
Total Number of Lecture Hours	52	SEE Hours: 03
Prerequisites: Discrete Mathematics, Statistics.		

Course Objectives:

- To Apply a given AI technique to a given concrete problem
- To Implement non-trivial AI techniques in a relatively large system
- To understand uncertainty and Problem solving techniques.
- To understand various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent.
- Acquiring the fundamentals of machine learning
- Usage of various learning methods to develop an intelligent machine.

MODULES	**Teaching Hours**
Module I **Artificial Intelligence:** The AI Problems, The Underlying assumption, Introduction to AI Technique, The Level of the model, Criteria for success. **Problems, problem spaces, and search:** Defining, the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs. **Heuristic search techniques:** Generate-and-test, Hill climbing, Best-first search, Problem reduction.	**09 Hrs**
Module II **Knowledge representation issues:** Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, the frame problem. **Using predicate logic:** Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates, Resolution, Natural Deduction **Representing Knowledge Using Rules:** Procedural versus Declarative knowledge, Logic programming, forward versus backward reasoning, matching, control knowledge.	**08 Hrs**
Module III **Machine Learning:** Need , Machine Learning Explained , Machine Learning in Relation to Other Fields , Machine Learning and Artificial Intelligence, Machine Learning Data Science Data Mining and Data Analytics , Machine Learning and Statistics , Types of Machine Learning , Challenges, Process, Applications. **Understanding Data** : Types of Data , Data Storage and Representation, Big Data Analytics and Types of Analytics , Big Data Analysis Framework, Descriptive Statistics, Univariate Data Analysis and Visualization, Bivariate Data and Multivariate Data Multivariate Statistics ,	**08 Hrs**

Essential Mathematics for Multivariate Data, Overview of Hypothesis, Feature Engineering and Dimensionality Reduction Techniques.	
Module – IV **Learning Theory**: Introduction to Learning and its Types, Introduction to Computation Learning Theory, Design of a Learning System , Introduction to Concept Learning, Induction Biases, Modeling in Machine Learning, Learning Frameworks. **Similarity-based Learning**: Introduction to Similarity or Instance-based Learning , Nearest-Neighbor Learning , Weighted K-Nearest-Neighbor Algorithm, Nearest Centroid Classifier , Locally Weighted Regression (LWR) **Regression Analysis**: Introduction to Regression , Introduction to Linearity, Correlation, and Causation, Introduction to Linear Regression, Validation of Regression Methods, Multiple Linear Regression , Polynomial Regression , Logistic Regression, Ridge, Lasso, and Elastic Net Regression.	**09 Hrs**
Module –V **Decision Tree Learning:** Introduction to Decision Tree Learning Model**,** Decision Tree Induction Algorithms, Validating and Pruning of Decision Trees, **Bayesian Learning:** Introduction to Probability-based Learning, Fundamentals of Bayes Theorem ,Classification Using Bayes Model, Naïve Bayes Algorithm for Continuous Attributes, Other Popular Types of Naive Bayes Classifier, Bayesian Belief Network, **Support Vector Machines:** Introduction to Support Vector Machines , Optimal Hyperplane Functional and Geometric Margin, Hard Margin SVM as an Optimization Problem, Soft Margin Support Vector Machines, Introduction to Kernels and Non-Linear SVM, Kernel-based Non-Linear Classifier, Support Vector Regression. **Ensemble Learning:** Techniques, parallel Ensemble Models, incremental and Sequential ensemble models	**08 Hrs**
Question paper pattern: The question paper will have ten questions. There will be 2 questions from each module, covering all the topics from a module. The students will have to answer 5 full questions, selecting one full question from each module**.**	
TEXT BOOKS: 1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, 3rd Edition 2008 2. S. Sridhar and VijayLaxmi, "Machine Learning" Oxford Unversity Press first edition published 2021	

REFERENCE BOOKS:

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd.
2. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex Problem Solving", Pearson Education/ PHI.
3. Trevor ***"The Elements of Statistical Learning"***, 2nd edition, 2017, Springer series in statistics. Hastie, Robert Tibshirani, Jerome Friedman
4. Tom M. Mitchell, "***Machine Learning",*** Indian Edition Paperback 2017, McGraw Hill Education.
5. Ethem Alpaydın, "***Introduction to machine learning"***, Third Edition, PHI Learning Pvt. Ltd. 2015

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CS53	CO1	Discuss artificial intelligence techniques, problem and heuristic search algorithm
	CO2	Apply knowledge representation techniques and predicate Logic rules to solve reasoning programs.
	CO3	Describe fundamentals of machine learning ,understand and analyse data
	CO4	Apply supervised/ unsupervised learning for the given problem
	CO5	Applying Classification algorithms for solving Machine Learning Problems.

Course Title: ARTIFICIAL INTELLIGENCEAND MACHINE LEARNING LAB		
Subject Code : **22CSL54**	Credit :01	CIE: 50
Number of Lecture Hours/Week	**0:0:2 Hrs**	SEE: 50
		SEE Hours: 03

Prerequisites: Discrete Mathematics, Statistics, Java/Python Programming

Course Objectives:

- Learn implementation and applications of Artificial Intelligence Algorithms.
- Learn implementation and applications of Machine Learning Algorithms.
- Understand the usage of various datasets for implementing ML Algorithms.

PROGRAMS

1. Write a Program to Implement Tic-Tac-Toe game using Python.
2. Write a Program to Implement Water-Jug problem using Python.
3. Write a Program to implement 8-Puzzle problem using Python.
4. Write a Program to Implement AO* Algorithm using Python.
5. Predict the price of the Uber ride from a given pickup point to the agreed drop-off location. Perform following tasks: 1. Pre-process the dataset. 2. Identify outliers. 3. Check the correlation. 4. Implement linear regression and random forest regression models. 5. Evaluate the models and compare their respective scores like R2, RMSE, etc.
   Dataset link: https://www.kaggle.com/datasets/yasserh/uber-fares-dataset.
6. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file**.**
7. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
8. Write a program to demonstrate the working of the decision tree basedID3 algorithm.
9. Classify the email using the binary classification method. Email Spam detection has two states: a) Normal State – Not Spam, b) Abnormal State – Spam. Use K-Nearest Neighbors and Support Vector Machine for classification. Analyze their performance. Dataset link: The emails.csv dataset on the Kaggle https://www.kaggle.com/datasets/balaka18/email-spam-classification-dataset-csv
10. Given a bank customer, build a neural network-based classifier that can determine whether they will leave or not in the next 6 months. Dataset Description: The case study is from an open-source dataset from Kaggle. The dataset contains 10,000 sample points with 14 distinct features such as Customer Id, Credit Score, Geography, Gender, Age, Tenure, Balance, etc. Link to the Kaggle project: https://www.kaggle.com/barelydedicated/bank-customer-churn-modeling Perform following steps: 1. Read the dataset. 2. Distinguish the feature and target set and divide the data set into training and test sets. 3. Normalize the train and test data. 4. Initialize and build the model. Identify the points of improvement and implement the same. 5. Print the accuracy score and confusion matrix (5 points)
11. Implement Gradient Descent Algorithm to find the local minima of a function. For example, find the local minima of the function $y=(x+3)^2$ starting from the point x=2.
12. Implement K-Nearest Neighbors algorithm on diabetes.csv dataset.

Compute confusion matrix, accuracy, error rate, precision and recall on the given dataset. Dataset link: https://www.kaggle.com/datasets/abdallamahgoub/diabetes.

13. Implement K-Means clustering/ hierarchical clustering on sales_data_sample.csv dataset. Determine the number of clusters using the elbow method. Dataset link : https://www.kaggle.com/datasets/kyanyoga/sample-sales-data.

Question paper pattern: For SEE , two programs from the Exercise programs list will be asked.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CSL54	CO1	Apply and implement Artificial Intelligence based Problem solving Techniques.
	CO2	Implement Learning algorithms.
	CO3	Apply appropriate data sets to the Machine Learning algorithms.
	CO4	Perform Classification and clustering of Data using ML algorithms.
	CO5	Apply Machine Learning algorithms to solve real world problems.

COURSE TITLE: SYSTEM SOFTWARE AND COMPILER DESIGN		
Subject Code: **22CS551**	Credits:3	CIE:50
Number of Lecture Hours/Week(L:T:P)	3:0:0 Hrs	SEE:50
Total Number of Lecture Hours	42	SEE Hours:03
Prerequisite: Finite Automata and Formal Languages.		

Course Objectives:

- Understand the Process involved in constructing compilers.
- Understand various types of parsers, intermediate code generation, Target code generation, Optimization of target code.

Modules	Teaching Hours
Module I **Assemblers:** Basic Assembler Functions, Machine-Dependent Assembler Features, Machine-Independent Assembler Features, Assembler Design Options. **Loaders and Linkers:** Basic Loader Functions, machine- Dependent Loaders Features, Machine-Independent Loader Features, Loader Design Option.	**09 Hrs**
Module II **Introduction**: Language Processors, The Structure of a Compiler, The Science of Building a Compiler, Applications of Compiler Technology. **Simple Syntax directed Translator:** Syntax Definition, Syntax Directed Translation, A translator for simple Expressions, Symbol Tables, Intermediate code generation. **Lexical Analysis**: The Role of Lexical Analyzer, Input buffering, specification of tokens, reorganization of tokens, the lexical analyzer generator Lex.	**08 Hrs**
Module III **Syntax Analysis:** Introduction to Recursive-Descent, Top-Down parsing, Bottom-Up parsing, LL(1),Shift/Reduce , Operator Precedence, LR(0), SLR(1), LR(1), SLAR(1) and LALR(1) parsers, Parser generators-Yacc.	**08 Hrs**
Module IV **Syntax Directed Translation:** Syntax directed definitions, Evaluation orders for SDDs, Applications of syntax directed translation, Syntax directed Translations schemes. **Intermediate code generation:** Variants of syntax trees, three address code, pipes and declarations, translations of expression, Type checking, Control flow, Back patching, Switch statements, Intermediate code for processors.	**09 Hrs**
Module V **Code Generation :** Issues in the design of code generator, The target language, Address in the target code, Basic blocks and flow graphs, Optimization of basic blocks, A simple code generator, Peephole optimization, register allocation and assignment, Instructions selection by tree rewriting, Optimal code generation for expressions.	**08 Hrs**

The question paper will have ten questions.

There will be Two questions from each module, covering all the topics from a module.

The students will have to answer Five full questions , selecting one full question from each module**.**

TEXT BOOKS

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman: Compilers - Principles, Techniques and Tools, 2nd Edition, Pearson, 2007.
2. Leland L. Beck, D.Manjula : System Software "An Introduction to System Programming", 3rd Edition 2008

REFERENCE BOOKS:

1. Kenneth C Louden: Compiler Construction Principles & Practice, Cengage Learning, 1997
2. Andrew W Apple: Modern Compiler Implementation in C, Cambridge University Press, 1997
3. Charles N. Fischer, Richard J. leBlanc, Jr.: Crafting a Compiler with C, Pearson, 1991.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS551	CO1	Describe the Science of Building a Compiler, Specification and recognition of Tokens using Lexical Analyzer tool – Lex.
	CO2	Design and analyze of Top-Down, Bottom-up, LR, LALR parsers and usage of Yacc tool to build parsers.
	CO3	Design SDD, SDT schemes and describe techniques for intermediate code generation.
	CO4	Demonstrate techniques for simple and optimal machine code generators.
	CO5	Illustrate the basic functions of assemblers, Loaders and Linkers.

Course Title: **DESIGN OF IOT SYSTEM**		
Subject Code:**22CS552**	Credits:03	CIE:50
Number of Lecture Hours/Week (L:T:P)	3:0:0 Hrs	SEE:50
Total Number of Lecture Hours	42 Hrs	SEE Hours:03

Prerequisites: Microprocessors and Microcontrollers

Course Objectives:

- Understand basics of embedded systems and their design concepts
- Introduce IoT technology and its communication mechanisms
- Understand programming IoT development boards like Arduino and Raspberry pi
- Acquire the data with sensors and perform data analysis

MODULES	Teaching Hours
Module I Introduction to Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software in a System ,Examples of Embedded Systems ,Embedded System-on-chip (So) and Use of VLSI Circuit Design Technology, Complex Systems Design and Processors, Design Process in Embedded System, Formalization of System Design, Design Process and Design Examples, Classification of Embedded Systems, Skills required for an Embedded system designer.	**09 Hrs**
Module II IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind new Network Architectures, Comparing IoT Architectures ,A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.	**08 Hrs**
Module III **Smart Objects**: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies: IEEE802.15.4, IEE802.15.4g,IEE802.15.4eIP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP from6Low PANto7Lo.ApplicationLayerProtocols:GenericWeb Based protocols, COAP,MQTT protocol.	**09 Hrs**
Module IV Data and Analytic s for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytic Tools and Technology, Edge Streaming Analytic, Network Analytics. Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming.	**08 Hrs**
Module V **Raspberry Pi:** Introduction to Raspberry Pi, About the Raspberry Pi Board: Hardware Layout, Operating Systems on Raspberry Pi, Configuring Raspberry Pi, Programming Raspberry Pi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor.	**08 Hrs**

Question Paper Patterns

The question paper will have ten questions.

There will be Two questions from each module, covering all the topics from a module.

The students will have to answer Five full questions, selecting one full question from each module**.**

TEXT BOOKS:

1. Rajkamal, "Embedded System Architecture, Programming and Design", second edition Tata McGraw- Hill publishing company limited.2018 Reprint.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things",1st Edition, Pearson 2017.
3. https://www.tutorialspoint.com/java/index.htm
4. https://www.javapoint.com

REFERENCE BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
2. Raj Kamal, "Internet of Things: Architecture and DesignPrinciples",1stEdition,McGrawHill Education,2017.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS552	CO1	Describe embedded system and its classification.
	CO2	Illustrate the impact and challenges posed by IoT networks leading to new architectural models.
	CO3	Deployment of smart objects and the technologies to connect them to network and its protocols for efficient network communication.
	CO4	Describe the need for Data analytics and Security in IoT. Understand Arduino Board and programming and developing simple projects using Arduino UNO board.
	CO5	Explore Raspberry pi board and programming and develop simple projects using Raspberry pi and sensors.

Course Title: MUTIMEDIA COMMUNICATION		
Subject Code: **22CS553**	Credits:03	CIE:50
Number of Lecture Hours/Week(L:T:P)	3:0:0 Hrs	SEE:50
Total Number of Lecture Hours	42 Hrs	SEE Hours:03
Prerequisites: Knowledge of Networks and Data Structures		

Course Objectives:

- To understand concepts of multimedia data representation and its compression techniques.
- To gain knowledge of multimedia compression standards and its protocols for different Applications

MODULES	Teaching Hours
Module I Multimedia Communications: Introduction, multimedia information representation, multimedia networks, multimedia applications, media types, communication modes, network types, multipoint conferencing, network QoS, application QoS. Multimedia Information Representation: Introduction, digital principles, text, images, audio, video.	**09 Hrs**
Module II Text and image compression: Introduction, compression principles, text compression, image compression.	**08 Hrs**
Module III Audio and video compression: introduction, audio compression, DPCM, ADPCM, APC, LPC, video compression, video compression principles, H.261, H.263, MPEG, MPEG-1, MPEG-2, MPEG-4 and MPEG 7.	**08 Hrs**
Module IV Standards for multimedia communications: Introduction, Reference models, Standards relating to interpersonal communications, Standards relating to interactive applications over the internet, Standards for entertainment applications.	**08 Hrs**
Module V Multimedia Information Networks-1: Introduction, network performance Parameters, throughput, networking delay, delay variance, error rate, quality of service. QoS perspectives, QoS processing, multimedia transmission, requirements, transmission over WANs, Multimedia Transmission over LANs. ATM networks, Wireless LANs. Multimedia Transport Protocols and Management Protocols: RTP, RTCP, H.323, SIP, SDP, SAP.	**09 Hrs**

Question paper pattern:

The question paper will have ten questions.

There will be Two questions from each module, covering all the topics from a module.

The students will have to answer Five full questions, selecting one full question from each module**.**

TEXT BOOKS:

1. Fred Halsall, Multimedia Communications: Applications, Networks, Protocols and Standards, Pearson Education, Asia, Second Indian reprint 2010.
2. Nalin K. Sharda: Multimedia Information Networking, PHI, 2022. Digitized by Internet Archive
3. James F.Kurose, keith W. Ross, Computer Networking- A top Down Approach Featuring the internet, Pearson Education, 3rd Ed.

REFERENCE BOOKS:

1. Ralf Steinmetz, Klara Narstedt: Multimedia Fundamentals, Vol 1-Media Coding and Content Processing, Pearson Education, 2004.
2. Prabhat K. Andleigh, Kiran Thakrar, Multimedia Systems Design, PHI, 2004.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS553	CO1	Discuss multimedia data and analyse the working of multimedia, enabling technologies services and applications
	CO2	Apply compression techniques to text and image data
	CO3	Implement audio and video compression techniques and its Standards
	CO4	Explain standards related to interpersonal communications, interactive applications and entertainment applications
	CO5	Describe various multimedia information networks with its QoS parameters and analyse various multimedia transport and management protocols

Course Title: WIRELESS NETWORKS & MOBILE COMPUTING		
SubjectCode:**22CS554**	**Credits:3**	CIE:50
Number of Lecture Hours/Week	**3:0:0 Hrs**	SEE:50
Total Number of Lecture Hours	42	SEEHours:03

Prerequisites: Computer Networks

Course Objectives:

- To learn the basics of Wireless voice and data communications technologies.
- To study the working principles of wireless LAN and its standards.
- To build knowledge on various Mobile Computing algorithms.
- To build skills in working with Wireless application Protocols to develop mobile content applications

Modules	**Teaching Hours**
Module - I **Wireless Communication Fundamentals:** Introduction – Wireless transmission – Frequencies for radio transmission –Signals – Antennas Signal Propagation – Multiplexing – Modulations – Spread spectrum–MAC– SDMA–FDMA– TDMA–CDMA–Cellular Wireless Networks.	**09 Hrs**
Module– II **Telecommunication Networks :** Telecommunication systems–GSM– GPRS–DECT–UMTS–IMT-2000–SatelliteNetworks-Basics– Parameters and Configurations–Capacity Allocation–FAMA and DAMA–Broadcast Systems–DAB-DVB.	**09 Hrs**
Module–III **Wireless LAN :** Wireless LAN –IEEE 802.11-Architecture–services–MAC–Physical layer–IEEE802.11a802.11b standards– HIPERLAN–Blue Tooth.	**08 Hrs**
Module–IV **Mobile Network Layer :** Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR –Alternative Metrics	**08 Hrs**
Module – V **Transport and Application Layers:** Traditional TCP–Classical TCP improvements–WAP,WAP 2.0	**08 Hrs**

Question paper pattern:
The question paper will have ten questions.
There will be Two questions from each module, covering all the topics from a module.
The students will have to answer Five full questions , selecting one full question from each module**.**

TEXT BOOKS:

1.Jochen Schiller, “Mobile Communications”, PHI / Pearson Education, Second Edition,2008.

REFERENCE BOOKS:

1.Kaveh Pahlavan, Prasanth Krishnamoorthy,“ Principles of Wireless Networks”, PHI/ Pearson Education,2003.

2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, New York,2003.

3. Hazysztof Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2012.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CS554	**CO1**	Understand the concept of Wireless Communication Fundamentals.
	CO2	Demonstrate the concepts of wireless technologies.
	CO3	Illustrate Wireless Architecture and services.
	CO4	Demonstrate routing protocols .
	CO5	Describe Transmission control Protocol and Wireless Application Protocol

Course Title: **MINI-PROJECT**		
Subject Code:**22CSMP56**	Credit:2	CIE:50
Number of Practical Hours/Week(L:T:P)	0:0:4 Hrs	
Pre-requisite: Programming languages, Operating Systems		

Course Objectives:

- Acquire the ability to integrate different areas of knowledge and evaluate and formulate problem
- Acquire skills to communicate effectively and present their ideas and collaborate to work as a team.
- Understand the procedure of documentation and presentation of Mini-project

Guidelines for Mini project:

- Student is required to do an innovation with application of knowledge earned while undergoing various courses and laboratories in the course of study.
- Mini project is to be carried out individually or by a team of two to three students
- Student has to carry out literature survey to identify and formulate the problem.
- Student has to design and develop hardware or software model in any domain of Computer Science.
- Project Review & CIE evaluation will be done timely by a committee constituted by the department. The committee shall consist of respective guide and two faculty members.

At the end of the semester students has to prepare and submit a project report

Course outcomes:
On completion of the course, the student will have the ability to::

Course Code	CO#	Course Outcome(CO)
22CSMP56	CO1	Demonstrate skills to identify open ended problems.
	CO2	Identify the methods and software design strategy for the project work.
	CO3	Formulate and implement innovative ideas for social and environment with minimum resource utilization.
	CO4	Analyse the results with current state of art technology
	CO5	Develop technical report and prepare presentations.

Course Title : RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS		
Course Code	**22RMI57**	**Credits :3**
Course Type	**Theory**	**CIE Marks: 50**
Lecture Hours(L:T:P)	**2:2:0**	**SEE Marks :50**
Total Hours	**28**	**SEE Hours : 3**

Course Objectives: The objectives of the course is to enable students:

- To understand the knowledge on basics of research and its types.
- To learn the concept of defining research problem and Literature Review, Technical Reading.
- To learn the concept of attributions and citation and research design.
- Concepts, classification, need for protection, International regime of IPRs -WIPO,TRIPS, Patent - Meaning, Types, surrender, revocation, restoration, Infringement, Procedure for obtaining Patent and Patent Agents.
- Meaning, essential requirements, procedure for registration and Infringement of Industrial Designs, Copyright.

Modules	**Teaching Hours**
Module-I **Introduction:** Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship	**6 Hrs**
Module-II Defining the research problem - Selecting the problem. Necessity of defining the problem Techniques involved in defining the problem- Importance of literature review in defining a problem Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.	**6 Hrs**
Module-III Research design and methods - Research design - Basic principles. Need of research design Features of good design- Important concepts relating to research design – Observation and Facts Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.	**6 Hrs**

Module-IV Basic Concepts of Intellectual Property (IP), Classification of IP, Need for Protection of IP, International regime of IPRs - WIPO , TRIPS. Patents: Meaning of a Patent – Characteristics/ Features. Patentable and Non-Patentable Invention. Procedure for obtaining Patent. Surrender of Patent, revocation &restoration of Patents, Infringement of Patents and related remedies (penalties). Different prescribed forms used in Patent Act. Patent agents qualifications and disqualifications Case studies on patents - Case study of Neem patent, Curcuma(Turmeric)patent and Basmati rice patent, Apple inc. v Samsung electronics co.Ltd	**5 Hrs**
Module-V Industrial Design: Introduction to Industrial Designs. Essential requirements of Registration. Designs which are not registrable, who is entitled to seek Registration, Procedure for Registration of Designs Copy Right Meaning of Copy Right. Characteristics of Copyright. Who is Author, various rights of owner of Copyright. Procedure for registration. Term of copyright, Infringement of Copyright and Its remedies. Software Copyright. Case Study on paper of Mini Project write up.	**5 Hrs**

Question paper pattern:

- The question paper shall have five Module for100 marks;
- Each full question carries 20 marks.
- Two questions to be set in each module (total ten questions).
- The candidate will have to answer one full question from each module.

Note: There can be a maximum of 4 sub sections in each Question.

TEXT BOOKS:

1. Research Methodology: Methods and Techniques C.R.Kothari, Gaurav Garg New Age International 4th Edition,2018
2. Dipankar Deb Rajeeb Dey,Valentina E.Balas "Engineering Research Methodology",ISSN1868- 4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library, ISBN 978-981-13- 2946-3 ISBN 978-981-13-2947-0 (eBook), https://doi.org/10.1007/978-981-13-2947-0.3
3. Dr. M.K. Bhandari "Law relating to Intellectual property" January 2017 (Publisher By Central Law Publications). Dr. R Radha Krishna and Dr. S Balasubramanain "Text book of Intellectual Property Right". First edition, New Delhi 2008. Excel books.
4. P Narayan"TextbookofIntellectualPropertyRight".2017,Publisher: Eastern Law House

REFERENCE BOOKS:

1. David V.Thiel "Research Methods for Engineers"CambridgeUniversityPress,978-1-107-03488-4-
2. Nishith Desai Associates-Intellectual property law in India– Legal, Regulatory &Tax

Ebooks and online course materials:

- NPTEL: INTELLECTUAL PROPERTY by PROF.FEROZALI, Department of Humanities and Social Sciences IIT Madras https://nptel.ac.in/content/syllabus_pdf/109106137.pdf
- www.wipo.int
- www.ipindia.nic.in

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22RMI57	CO1	To know the meaning of engineering research.
	CO2	To know the defining of research problem and procedure of Literature Review.
	CO3	To know the Attributions and Citations and research design.
	CO4	Highlights the basic Concepts and types of IPRs and Patents
	CO5	Analyze and verify the procedure for Registration of Industrial Designs & Copyrights

Course Title: ENVIRONMENTAL STUDIES		
Subject Code: **22ES58**	Credit :02	CIE: 50
Number of Lecture Hours/Week	**2:0:0 Hrs**	SEE: 50
Total Number of Lecture Hours	28	SEE Hours: 03
Prerequisites: NIL.		

Course Objectives:

To creative environmental awareness among the students'

To gain knowledge on different types of pollution in the Environment.

Teaching- Learning process (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

- Apart from conventional lecture methods various types of innovative teaching techniques through videos and animation films may be adopted so that the delivered lesson can progress the students in theoretical applied and practical skills.
- Environmental awareness program on off campus
- Encourage Collaborative (Group learning) learning in the class seminars, surf prize test and quizzes may be arranged for students in respective subjects to develop skills

MODULES	**Teaching Hours**
Module I **Environment-**Definition, components, Ecosystem-Balanced Ecosystem, Structural and functional unit of Ecosystem, Human activities – Economic and Social Security	**05 Hrs**
Module II Human activities Effects on Environment-Industries, Housing, Agriculture, mining, Transportation, Natural Resources-Water Resources, forest, mineral resources, fluoride problems in Drinking water, water Induced diseases. Deforestation, sustainable mining.	**06 Hrs**
Module III Material cycles – Nitrogen, Sulphur, carbon cycle Environmental pollution – ground water pollution, noise pollution, soil pollution, Industrial and Municipal sludge. Air pollution, B.O medical waste E-wastes, Automobile pollution.	**06 Hrs**
Module – IV Global Environmental Concerns-Climate change and global warming effects, urbanization, ozone layer depletion, acid rain, current Environmental issues and important, population growth, Environmental toxicology, Biogas energy, solar energy.	**06 Hrs**

Module -V	**05 Hrs**
Objects of Environmental studies, Importance of women's Education, non-government organization (NGO), Green building or water treatment plant, G.I.S and Remote sensing, EIA (Environmental Impact Assessment), Role of Government for protection of Environmental	

REFERENCES:

1. Environmental Studies- Benny Joseph –Tata Megrawhill 2005
2. Environmental Studies-D L Manjunath, P M Dotrad, B.S.Raman
3. Environmental Studies-Geeta Naagbhushan

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22ES58	CO1	Understand the Environmental components balance eco systems
	CO2	Develop critical thinking and apply them to the analysis of a problems or question related to Environment
	CO3	Demonstrate Ecology knowledge of a complex relationship between biotic and a biotic components
	CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers phase when dealing with complex issue
	CO5	Understand latest developments in environmental pollution, Mitigation, Tools Concept and applications of G.I.S and Remote sensing.

Course Title : NATIONAL SERVICE SCHEME (NSS)		
Subject Code : 22NS59	**Credits :00**	**CIE: 50**
Number of Lecture Hours/Week(L:T:P)	**0:0:2 Hrs**	**SEE: 00**
Total Number of Lecture Hours	**28**	**SEE Hours: 00**

Prerequisites:

1. Students should have a service oriented mind set and social concern.
2. Students should have dedication to work at any remote place, anytime with available resources and proper time management for the other works.

Students should be ready to sacrifice some of the time and wishes to achieve service oriented targets on time

Course Objectives:

1. Understand the community in which they work
2. Identify the needs and problems of the community and involve them in problem-solving
3. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems
4. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony

Modules

1. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
2. Waste management– Public, Private and Govt organization, 5 R's.
3. Setting of the information imparting club for women leading to contribution in social and economic issues.
4. Water conservation techniques – Role of different stakeholders– Implementation.
5. Preparing an actionable business proposal for enhancing the village income and approach for implementation.
6. Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.
7. Developing Sustainable Water management system for rural areas and implementation approaches.
8. Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath,Make in India, Mudra scheme, Skill development programs etc.
9. Spreading public awareness under rural outreach programs.(minimum5 programs).
10. Social connect and responsibilities.
11. Plantation and adoption of plants. Know your plants.
12. Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).
13. Govt. school Rejuvenation and helping them to achieve good infrastructure

ONE NSS – CAMP @ College /University /State or Central Govt Level / NGO's / General Social Camps:

Students have to take up anyone activity on the above said topics and have to prepare content for awareness and technical contents for implementation of the projects and have to present strategies for Implementation of the same. Compulsorily students have to attend one camp.

CIE will be evaluated based on their presentation, approach and implementation strategies.

ASSESSMENT AND EVALUATION PATTERN		
WEIGHTAGE	**50%**	**50%**
	CIE	SEE
Presentation 1-Selectionoftopic-(phase 1)	**10**	*****
EXPERIENTIAL LEARNING Presentation 2(phase2)	**10**	*****
Case Study-based Teaching-Learning	**10**	• Implementation strategies of the project with report duly signed by the Dept's Coordinator, HoD & Principal. • At last It should be evaluated by the NSS Coordinator. • Finally consolidated report should be sent to the University.
Sector wise study & consolidation	**10**	
Video based seminar (4-5 minutes per student)	**10**	
TOTAL MARKSFORTHE COURSE	**50 MARKS**	**50 MARKS**
Suggested Learning Resource: 1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.		

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22NS59	CO1	Understand the importance of his / her responsibilities towards society.
	CO2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
	CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
	CO4	Implement government or self-driven projects effectively in the field.

Course Title : PHYSICAL EDUCATION AND SPORTS		
Subject Code : 22PE59	Credits :00	CIE: 50
Number of Lecture Hours/Week(L:T:P)	0:0:2 Hrs	SEE: 00
Total Number of Lecture Hours	28	SEE Hours: 00

SEMESTER	**COURSE**
III	Fitness Components Kabaddi/ Kho Kho
IV	Athletics Volleyball Throw ball / Chess
V	Athletics Football/Hockey
VI	Athletics Cricket/Base ball
VII	Athletics Netball/Basketball
VIII	Individual Games Handball/ Badminton

Notes:

- One Hour of Lecture is equal to 1 Credit
- One Hour of Tutorial is equal to 1 Credit (Except Languages)
- Two Hours of Practical is equal to 1 Credit
- SEE : Semester End Examination
- CIE : Continuous Internal Examination
- L+T+P : Lecture + Tutorial + Practical

SEMESTER	**COURSE TITLE**	**CONTENT**	**NO. HOURS**
V	**Athletics Track1** 10 &400 Mtrs Hurdles **Jumps-** High Jump **Throws-** Discuss Throw	**110 Mtrs and 400Mtrs:** Hurdling Technique :Lead leg Technique, Trail leg Technique ,Side Hurdling, Over the Hurdles Crouch start (its variations) use of Starting Block. Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing. **High jump:** Approach Run, Take-off, Bar Clearance (Straddle) and Landing. Discus **Throw:** Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).	Total 32 Hrs 2 Hrs/Week

	Foot Ball	**A. Fundamental Skills** 1. Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick. 2. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot. 3. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot. 4. Heading: In standing, running and jumping condition. 5. Throw-in: Standing throw-in and Running throw-in. 6. Feinting: With the lower limb and upper part of the body. 7. Tackling: Simple Tackling, Slide Tackling. 8. Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting. 9. Game practice with application of Rules and Regulations. **B. Rules and their interpretation and duties of officials.**	
	Hockey	**A. Fundamental Skills** 1.Passing: Short pass, Long pass , push pass, Scooping hit 2.Trapping. 3.Dribbling and Dozing. 4.Penalty stroke practice. 5.Penalty corner practice. 6.Tackling: Simple Tackling, Slide Tackling. 7.Goal Keeping, Ball clearance-kicking, and deflecting. 8.Game practice with application of Rules and Regulations. **B. Rules and their interpretation and duties of officials.**	

REFERENCES

1. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
3. Petipus, et al. Athlete's Guide to Career Planning, Human Kinetics.
4. Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi.
5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
7. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.

8. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
10. Dubey, H. C. Basketball, Discovery Publishing House, New Delhi.
11. Rachana Jain, Teach Yourself Basketball, Sports Publication.
12. Jack Nagle, Power Pattern Offences for Winning asketball, Parker Publishing Co., New York.
13. Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
14. Sally Kus, Coaching Volleyball Successfully, Human Kinetics.
15. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani. 16 Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
16. Test and Measurement (by Cleark and Cleark)
17. Evaluation in Physical Education (by Dr. Devendraya Kausal)
18. Methods of Physical Education (by Haridrash & Prof. Tirumalay Swamy)
19. Athletics (by Hardayal Singh)
20. Efficienting and Coaching (by Dr. Anand Nadigri)
21. Modern and Ancient History of Physical Education (by Dr. D. M. Jyothi)
22. Organization and Administration (by K. G. Nadigir or Vastrad)

Course Title : YOGA AND MEDITATION		
Subject Code : 22YO59	Credits :00	CIE: 50
Number of Lecture Hours/Week(L:T:P)	**0:0:2 Hrs**	SEE: 00
Total Number of Lecture Hours	28	SEE Hours: 00

SEMESTER	**CONTENTS**
V	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhati 5) Pranayama

Notes:

- One Hour of Lecture is equal to 1 Credit
- One Hour of Tutorial is equal to 1 Credit (Except Languages)
- Two Hours of Practical is equal to 1 Credit
- SEE : Semester End Examination
- CIE : Continuous Internal Examination
- L+T+P : Lecture + Tutorial + Practical

Syllabus for B.E VI Semester

Course Title: ENTREPRENEURSHIP, MANAGEMENT AND FINANCE		
Subject Code :**22HU61**	Credits:3	CIE:50
Number of Lecture Hours/Week(L:T:P)	**3:0:0Hrs**	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
Prerequisites: Nil		

Course Objectives:

- The Meaning, Functions, Characteristics, Types, Role and Barriers of Entrepreneurship,
- Government Support for Entrepreneurship
- Management–Meaning, nature, characteristics, scope, functions, role etc and Engineers social responsibility and ethics
- Preparation of Project and Source of Finance
- Fundamentals of Financial Accounting
- Personnel and Material Management, Inventory Control

MODULES	**Teaching Hours**
Module– I **Entrepreneur:** Meaning of Entrepreneur; Functions of an Entrepreneur; Characteristics of an entrepreneur, Types of Entrepreneur; Intrapreneurs – an emerging class ; Role of Entrepreneurs in economic development; Barriers to entrepreneurship, Government Support for Innovation and Entrepreneurship in India-Startup-India, Make-in- India, PMMY, AIM, STEP, BIRAC, Stand-up India, TREAD	**08 Hrs**
Module-II **Management:** Introduction – Meaning – nature and characteristics of Management, Scope and functional areas of management, Levels of Management, HenryFayol-14 Principles to Management, McKinsey‟s 7-SModel,Managementbyobjective(MBO)– Meaning, process of MBO, benefits and drawbacks of MBO	**09 Hrs**
Module-III **Preparation of Project and Source of Finance:** **Preparation of Project:** Meaning of project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; **Source of Finance:** Long Term Sources (Equity, Preference, Debt Capital, Debentures, loan from Financial Institutions etc) and Short Term Source (Loan from commercial banks, Trade Credit, Customer Advances etc)	**08 Hrs**
Module– IV **Fundamentals of Financial Accounting**: Definition, Scope and Functions of Accounting, Accounting Concepts and Conventions: Golden rules of Accounting ,Final Accounts-Trading And Profit and Loss Account, Balance sheet	**09 Hrs**

Module– V	
Personnel Management, Material Management and inventory Control: Personnel Management: Functions of Personnel Management, Recruitment, Selection and Training, Wages, Salary and Incentives. **Material Management and Inventory Control:** Meaning, Scope and Objects of Material Management. Inventory Control-Meaning and Functions of Inventory control; Economic Order Quantity(EOQ) and various stock level(Re-Order level, Minimum level, Maximum level, Average level and Danger level)	**08 Hrs**

Question Paper Pattern

The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module**.**

TEXT BOOKS

1. Financial Accounting-BSRAMAN-United Publishers Manglore, Maheswar SN & Maheswari S K-Vikas Publishing House. January 2018
2. Management & Entrepreneurship- K R Phaneesh- Sudha Publications January 2018 ,Prof Manjunatha & Amit kumar G–laxmi Publication,January2011.Veerbhadrappa Havina - Published by New Age International (P) Ltd., 2009.
3. PrinciplesofManagementFirstEdition(English,G.Murugesan),LaxmiPublications – New Delhi
4. Management by Objectives (Mbo) in Enterprises:21December2018 by Dr Wazir Ali Khan

REFERENCE BOOKS:

1. IndustrialOrganization&EngineeringEconomics-TRBanga&SCSharma-Khanna Publishers, Dehli.
2. NPTEL: ENTREPRENEURSHIP: PROF.CBHAKTAVATSALA RAO Department of Management Studies IITMadrashttps://nptel.ac.in/courses/110/106/110106141/
3. https://www.businessmanagementideas.com/notes/management-notes/notes-on-management- in-an-organization/4669
4. https://vskub.ac.in/wp-content/uploads/2020/04/Unit-5-ppmb.pdf

Course outcomes:
On completion of the course, the student will have the ability to:

Course code	CO #	Course Outcome (CO)
22HU61	CO1	Develop Entrepreneurship skills
	CO2	Apply the concepts of management and Management By Objective(MBO)
	CO3	Prepare project report & choose different Source of Finance.
	CO4	Apply Fundamentals of Financial Accounting and interpret the final accounts
	CO5	Apply personnel management skills, Material and inventory control techniques

COURSE TITLE: DIGITAL IMAGE PROCESSING		
Subject Code**:22CS62**	Credits:04	CIE:50
Number of Lecture Hours/Week(L:T:P)	**4:0:0Hrs**	SEE:50
Total Number of Lecture Hours	52	SEEHours:03

Prerequisites: Python

Course Objectives:

1. To understand the Image fundamental and mathematical representations necessary for image processing.
2. Understand the image enhancement techniques.
3. To understand image enhancement techniques and filtering techniques.
4. To adopt restoration and color image processing.
5. Analyze segmentation techniques and image description approaches.

MODULES	**Teaching Hours**
Module-I **Digital Image Fundamentals:** Introduction to Digital Image Processing, Examples of fields that use DIP, Fundamental Steps in Digital Image Processing, Image Sensing and Acquisition: image acquisition using a single sensing element, image acquisition using sensor strips, image acquisition using sensor arrays, a simple image formation model, Image Sampling and Quantization: basic concepts in sampling and quantization, representing digital images, Some Basic Relationships between Pixels.	**11Hrs**
Module-II **Image Enhancement in the Spatial Domain:** Basics of intensity transformations and spatial filtering, Some Basic Intensity Transformation Functions, Histogram Processing: Histogram equalization, and Matching, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.	**11 Hrs**
Module–III **Restoration:** A model of the image degradation/restoration process, Noise models, Restoration in the Presence of Noise Only using Spatial Filtering.	**10 Hrs**
Module–IV **Image Segmentation**: Fundamentals, point, line, edge detection: background, detection of isolated points, line detection, edge models: the image gradient and its properties, Thresholding: the basics of intensity thresholding, Applications of segmentation techniques to sample images.	**10Hrs**
Module–V **Color Image Processing and Image Representation:** Color Fundamentals, color Models, Pseudo color Image Processing, Basics of Full-color Image Processing, Boundary Descriptors, Regional Descriptors.	**10Hrs**

Question paper pattern:

The question paper will have ten questions.

There will be 2 questions from each module, covering all the topics from a module.

The students will have to answer 5 full questions, selecting one full question from each module**.**

TEXT BOOKS:

1. ***Gonzalez*** and. Richard E. Woods' ***Digital Image Processing***, Fourth Edition, Global Edition 2018.

REFERENCE BOOKS:

1. Digital Image Processing- S.Jayaraman, S. Esakkirajan, T. Veerakumar, TataMc Graw Hill 2014.
2. Digital Image Processing (with Matlab and Lab view),Vipul Singh, Elsiver. Filiplearning

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS62	CO1	Describe the fundamentals concepts of digital image processing
	CO2	Demonstrate the techniques for Image enhancement in Spatial and frequency domain.
	CO3	Analyze Images restoration for noise removal.
	CO4	Implement segmentation techniques and apply on real life problems
	CO5	Adopt color image processing and apply representation approaches on given images.

COURSE TITLE: CRYPTOGRAPHY AND INFORMATION SECURITY		
Subject Code:**22CS631**	Credits:03	CIE:50
Number of Lecture Hours/Week(L:T:P)	3:0:0 Hrs	SEE:50
Total Number of Lecture Hours	42 Hrs	SEEHours:03

Prerequisites: Mathematics.

Course Objectives:

- To Gain knowledge of secure network architecture
- Explain the mathematics and theory behind different cryptographic algorithms.

MODULES	**Teaching Hours**
Module-I **Introduction**: Security goals, Attacks, Services and Mechanism, Techniques. Mathematics of Cryptography: Integer arithmetic, Modular arithmetic. **Traditional Symmetric Key Ciphers:** Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers	**09Hrs**
Module-II **Mathematics of Cryptography**: Algebraic structures, GF(2^n) Fields. Introduction to modern Symmetric-Key Ciphers: Modern Block Ciphers, Modern Stream Ciphers. Data Encryption Standard(DES): Introduction, DES Structure, DES Analysis, Multiple DES, Security of DES	**09Hrs**
Module–III **Advanced Encryption Standard:** Introduction, Transformations, Key Expansion, Ciphers, Examples, Analysis of AES. Encipherment Using Modern Symmetric-Key Ciphers: Use of Modern Block Ciphers, Use of Stream Ciphers, Other issues. Mathematics of Asymmetric key Cryptography: Primes, Primality Testing, Chinese Remainder Theorem.	**08Hrs**
Module–IV **Asymmetric-Key Cryptography:** Introduction, RSA Cryptosystem, Rabin Cryptosystem, Elliptic Curve Cryptosystem. Message Integrity and Message Authentication: Message Integrity, Message Authentication. **Cryptographic Hash Functions:** Introduction, SHA-512.	**08Hrs**
Module–V **Digital Signature:** Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Schemes, Variations and Applications. Entity Authentication: Introduction, Passwords, Challenge-Response, Zero-Knowledge, Biometrics. Key Management: Symmetric-Key distribution, Kerberos, Symmetric-Key Agreement, Public- Key Distribution	**08Hrs**

Question paper pattern:

The question paper will have ten questions.

There will be 2 questions from each module, covering all the topics from module.

The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS :

1.Forouzan,B.A.―CryptographyandNetworkSecurity‖,TataMcGraw-Hill,2007

REFERENCES BOOKS :

1. William Stallings, "Cryptography and Network Security", Pearson Education,2006
2. Atul Kahate ―Cryptography and Network Security, Tata McGraw-Hill, 2008

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS631	CO1	Describe basic concepts of Cryptography and information security
	CO2	Apply algebraic structures to design encryption algorithms.
	CO3	Demonstrate AES algorithms and illustrate mathematical concepts behind design of asymmetric key cryptography and encipherment algorithms
	CO4	Demonstrate various algorithms for asymmetric key cryptography and Message authentication
	CO5	Describe digital signatures and entity authentication

Course Title: SYSTEM SIMULATION AND MODELLING		
Subject Code : 22CS632	Credits :3	CIE: 50
Number of Lecture Hours/Week	3:0:0 Hrs	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
Prerequisites: Engineering Mathematics, Probability Theory		
Course objectives: • To introduce simulation and modeling methods. • To highlight the use of simulation as a tool for various applications. • To solve real world problems using simulation		

Modules	**Teaching Hours**
Module-I **Introduction And General Principles:** When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of simulation; Areas of application; system and System environment; Components of a system; Discrete and continuous systems; Model of system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation study. Simulation examples; Simulation of queuing systems; Simulation of inventory systems; other examples of simulation. Concepts in Discrete-Event Simulation; The Event-Scheduling / Time –Advance Algorithm, World views, Manual simulation using Event scheduling.	**09 Hrs**
Module-II **Statistical and Queuing Models in Simulation:** Review of terminology and concepts; Useful statistical models; discrete distributions; Continuous distributions; Poisson process; Empirical distributions. Characteristics of queuing system; Queuing notation; Long-run measures of performance of queuing systems.	**08 Hrs**
Module-III **Random-Number, Random- Variate Generation:** Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random numbers.	**09 Hrs**
Module-IV **Input Modeling, Verification and Validation of Simulation Models, Optimization:** Data collection; Identifying the distribution with data; Parameter estimation; Goodness of fit tests; Fitting a non-stationary Poisson process; Selecting input models without data. Model building, verification and validation; Verification of simulation models; Calibration and validation of models. Optimization via simulation.	**08 Hrs**
Module-V **Output Analysis for A Single Model:** Types of simulation with respect to output analysis; stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations.	08 Hrs

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

1. Jerry Banks, John S. Carson II, Barry L Nelson, David M. Nicol, Discrete-Event System Simulation –4th Edition, Pearson Education, 2007

REFERENCE BOOKS:

1. Discrete-Event Simulation: A first course – Lawrence M. Leemis, Stephen K. Park, Pearson Education/Prentice-Hall India, 2006.
2. Simulation- Sheldon M. Ross, 4th edition, Elsevier, 2006.
3. Simulation Modeling and Analysis- Averill M. Law, 4th edition Tata McGraw-Hill, 2007.
4. System Simulation With Digital Computer – Nasingh Deo , Prentice- Hall of India
5. System Simulation- Geoffery Gordoan, Prentice- Hall of India

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CS632	CO1	Describe important elements of simulation and modeling, and develop simulation models for various Application.
	CO2	Apply statistical methods for problem solving and develop simulation of Queuing systems.
	CO3	Solve problems on random number and random variate generation and perform tests on random number.
	CO4	Explain Data generation strategies and the effectiveness of simulation results.
	CO5	Describe the output analysis of discrete-event simulation systems.

Course Title: NETWORK MANAGEMENT SYSTEMS		
Subject Code : 22CS633	Credits :3	CIE: 50
Number of Lecture Hours/Week	3:0:0 Hrs	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
Prerequisite: Computer Network		

Course Objectives

- Understand general concepts and architecture behind standards of network management
- Understand concepts and terminology with SNMP and TMN
- Get the knowledge of advanced information processing techniques.

MODULES	**Teaching Hours**
MODULE -I **Introduction:** Analogy of Telephone Network Management, Data and Telecommunication Network Distributed Computing Environments, TCPIIP-Based Networks: The Internet and Intranets, Communications. Protocols and Standards-. Communication Architectures, Protocol Layers and Services; Case Histories of Networking and Management - The Importance of topology, Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.	**09 Hrs**
MODULE -II **Basic Foundations:** Standards, Models and Language: Network Management Standards, Network Management Model, Organization Model, Information Model - Management Information Trees, Managed Object Perspectives, Communication Model; ASN.I-Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.l from ISO 8824; Encoding Structure; Macros, Functional Model. **SNMPVL Network Management-1**: Organization: Managed Network: The History of SNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, and System Overview.	**08 Hrs**
MODULE -III **SNMPVL Network Management-2:** Information, Communication and Functional Model: The Information Model: Introduction, The Structure of Management Information, Managed Objects, Management Information Base. The SNMP Communication Model - The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP MIB Group, Functional Model. SNMP Management- RMON: Remote Monitoring	**09 Hrs**
MODULE -IV **Broadband Network Management**: Broadband Access Networks and Technologies-Broadband Access Networks, Broadband access Technology; HFCT	**08 Hrs**

Technology-The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management – ADSL Network Management Elements, ADSL Configuration Management.	
MODULE -V **Network Management Applications:** Configuration Management- Network 1 Provisioning, Inventory Management, Network Topology, -Fault Management- Fault Detection, Fault Location and Isolation Techniques, Performance Management Performance Metrics, Data Monitoring; Problem Isolation, Performance Statistics; Event Correlation Techniques -Rule-Based Reasoning, Model-Based Reasoning, Case-Based Reasoning, Messages Transfer Security, Protection of Networks from' Virus Attacks, Accounting Management, Report Management, Policy-Based Management, Service Level Management.	**08 Hrs**

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

1. Network Management: Principles and Practice By: Mani Subramanian; Timothy A. Gonsalves, N. Usha Rani, Publisher: Pearson Education India, 2010.

REFERENCE BOOKS:

1. J. Richard Burke: Network management Concepts and Practices: a Hands-On Approach, PHI, 2008.
2. Network Management, MIBS and MPLS: Principles, Design and Implementation, Stephen B Morris, 1st Edition, Prentice Hall,2008

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CS633	**CO1**	Describe the basic concepts of communication protocols standards and architecture.
	CO2	Identify the network management standards and models.
	CO3	Describe the remote network management and ATM network concepts.
	CO4	Categorize the broadband access networks and technologies.
	CO5	Discuss the applications of network management.

COURSE TITLE: NATURAL LANGUAGE PROCESSING		
Subject Code**: 22CS634**	**Credits:3**	CIE:50
Number of Lecture Hours/Week(L:T:P)	**3:0:0Hrs**	SEE:50
Total Number of Lecture Hours: 42		SEE Hours:03 HRS

Prerequisites: Finite automata and Formal languages

Course Objectives:

1. To make students learn the fundamentals of NLP, and also to make them for understanding CFG, PCFG in NLP.
2. To know the role of semantics of sentences and pragmatic.
3. To understand the basic concepts of speech processing along with analysis and modeling.

MODULES	**Teaching Hours**
Module-I **Introduction:** Origins and challenges of Natural language processing – language modeling: grammar-based language models (lm), statistical language models regular expressions, finite-state automata – English morphology, transducers for lexicon and rules, tokenization, detecting and correcting spelling errors, minimum edit distance	**8 Hrs**
Module-II **Word Level Analysis**: Unsmoothed n-grams, evaluating n-grams, smoothing, interpolation and backoff – word classes, part-of-speech tagging, rule-based, stochastic and transformation-based tagging, issues in pos tagging – hidden Markov and maximum entropy models	**8 Hrs**
Module–III **Syntactic Analysis:** Context free grammars, grammar rules for English, treebanks, normal forms for grammar – dependency grammar – syntactic parsing, ambiguity, dynamic programming parsing – shallow parsing – probabilistic cfg, probabilistic Cocke-kasami-younger(CYK) , probabilistic lexicalized context free grammer(cfg)s – feature structures, unification of feature structures. Speech-Analysis, Speech Modeling	**8 Hrs**
Module–IV **Semantics And Pragmatics:** Requirements for representation, first-order logic, description logics – syntax-driven semantic analysis, semantic attachments – word senses, relations between senses, thematic roles, selectional restrictions – word sense disambiguation, wsd using supervised, dictionary & thesaurus, bootstrapping methods – word similarity using thesaurus and distributional methods.	**9 Hrs**
Module–V **Basic Concepts of Speech Processing:** Speech fundamentals: articulatory phonetics – production and classification of speech sounds; acoustic phonetics – acoustics of speech production; review of digital signal processing concepts; short-time Fourier transform, filter- bank and lpc methods.	**9 Hrs**

Question paper pattern:

The question paper will have ten questions.

There will be two questions from each module, covering all the topics from a module.

The students will have to answer five full questions, selecting one full question from each

module**.**

TEXT BOOKS:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, OReilly Media, 2009.
3. Lawrence Rabiner and Biing-Hwang Juang, "Fundamentals Of Speech Recognition", Pearson Education, 2003.
4. Daniel Jurafsky and James H Martin, "Speech And Language Processing – An Introduction To Natural Language Processing, Computational Linguistics, And Speech Recognition", Pearson Education, 2002

REFERENCE BOOKS:

1. Frederick Jelinek, "Statistical Methods of Speech Recognition", MIT Press, 1997.
2. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015
3. Richard M Reese, —Natural Language Processing with Java, OReilly Media, 2015.
4. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010. 5. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS634	CO1	To summarize the fundamentals of natural language processing
	CO2	Analyze the use of CFG and PCFG in NLP
	CO3	To justify the role of semantics of sentences and pragmatic
	CO4	Illustrate Speech Production and Related Parameters Of Speech.
	CO5	To design Computation and Use of Techniques Such as Short Time Fourier Transform, Linear Predictive Coefficients and Other Coefficients in The Analysis of Speech.

Course Title: JAVA PROGRAMMING		
Subject Code : **22CSOE641**	**Credit : 03**	CIE: 50
Number of Lecture Hours/Week	**3:0:0 Hrs**	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
Prerequisites: C programming		
Course Objectives: • Learn the Java Programming to develop applications • Understanding concepts of inheritance interfaces and Packages., • Study the concept of Exception Handling and Event Handling.		
MODULES		**Teaching Hours**
Module I **Java Programming fundamentals**– The Java Language, The Key attributes of Object-Oriented Programming, The Java Development Kit, Handling Syntax Errors, The Java Keywords, Identifiers in Java, The Java Class Libraries. **Introducing Data Types and Operators:** Importance of Data types**,** Java Primitive Types , Literals, A Closer Look at Variables, The Scope and Lifetime of Variables, Operators, Arithmetic Operators, Relational and Logical Operators, Short-Circuit Logical Operators, The Assignment Operator, Shorthand Assignments, Type Conversion in Assignments, Using a Cast, Operator Precedence, Expressions.		**9 Hrs**
Module II **Control Statements**-Java's Selection Statements, Iteration Statements, The For-Each Version of the for Loop, Jump Statements **More Data Types and Operators** – Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax. **String Handling**- The string constructors, string length, special sting operations, character extraction, string comparison, modifying a string		**08 Hrs**
Module III **Introducing Classes, Objects, and Methods**-Class Fundamentals, Objects creation, Reference Variables and Assignment, Methods, Returning from a Method, Returning a value, Using Parameters, Constructors, Parameterized Constructors, The new Operator Revisited, Garbage Collection and Finalizers, The this Keyword. **A Closer Look at Methods and Classes -** Controlling Access to Class Members, Pass Objects to Methods, Passing of Arguments Returning Objects, Method Overloading, Overloading Constructors, Recursion, Understanding Static, Introducing Nested and Inner Classes, Varargs		**08 Hrs**

Module IV **Inheritance**-: Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, using super to Call Superclass constructors, using super to Access Superclass Members, creating a Multilevel Hierarchy, When are Constructors Executed, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Using Abstract Classes, Using final, The Object Class. **Interfaces:** Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces, Final Thoughts on Interfaces.	**08 Hrs**
Module V **Packages: Packages:** Package Fundamentals, Packages and Member Access Importing Packages, Static Import. **Exception Handling: The** Exception Hierarchy, Exception Handling Fundamentals, The Consequences of an Uncaught Exception, Exceptions to handle errors, Multiple catch clauses, Catching subclass Exceptions, Nested try blocks, Throwing an Exception, A Closer look at Throwable, using finally, using throws, Java's Built-in Exception, New Exception features added by JDK 7, Creating Exception Subclasses. **Event Handling**- Two Event Handling Mechanisms. **The Delegation Event Model- Events:** Event Sources, Event Listeners.	**08 Hrs**

Question paper pattern:
The question paper will have ten questions.
There will be 2 questions from each module, covering all the topics from a module.
The students will have to answer 5 full questions, selecting one full question from each module**.**

TEXT BOOKS:

1. Java Fundamental: A comprehensive Introduction by Herbert schildt, Dale Skrien. Tata McGraw Hill Edition 2013
2. Herbert Schildt, The Complete Reference, JAVA 7th /9th Edition, Tata McGraw Hill,2013.
3. Java 6 Programming Black Book, Dreamtech Press.2012

REFERENCE BOOKS:

1. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.
2. Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015.

Course Code	CO #	Course Outcome (CO)
22CSOE641	CO1	Apply the concepts of programming and implement programs using Java Constructs.
	CO2	Demonstrate control statements, arrays and String operations.
	CO3	Create classes and demonstrate object oriented programming concepts
	CO4	Develop program using method overloading and inheritance.
	CO5	Demonstrate applications using interfaces and run-time errors through exception Handling.

Course Title: SOFTWARE ENGINEERING AND TESTING TOOLS		
Subject Code:**22CSOE642**	Credits:3	CIE:50
Number of Lecture Hours/Week((L:T:P)	**3:0:0 Hrs**	SEE:50
Total Number of Lecture Hours: 42		SEEHours:03
Prerequisites: Any programming language		

Course Objectives:

- Acquire knowledge of software development life cycle
- Understand methodologies for designing the software
- Describe the development of efficient and cost effective software.
- Gain knowledge of Software Testing process.
- Perform various software testing and measurement

MODULES	**Teaching Hours**
Module-I **Overview:** Introduction: FAQ's about software engineering, Professional and ethical responsibility. **Software Processes:** Software Processes: Models, Process iteration, Process activities, The Rational Unified Process, Computer-Aided Software Engineering. **Requirements:** Software Requirements: Functional and Non-functional requirements, User requirements, System requirement.	**9 Hrs**
Module-II **Software Design:** Architectural Design: Architectural design decisions, System organization, Modular decomposition styles, Control styles. **Object- Oriented design:** Objects and Object Classes, An Object-Oriented design process, Design evolution, Introduction to UML Diagram, Case study **Development:** Rapid Software Development: Agile methods, Extreme Programming.	**8 Hrs**
Module–III **Verification And Validation:** Verification and Validation: Planning Software inspections, Automated static analysis. **Management:** Managing People: Selecting staff, Motivating people, Managing people, The People Capability Maturity Model. Software Cost Estimation Productivity, Estimation techniques.	**8 Hrs**
Module–IV **A Perspective on Testing, Examples**: Basic definitions, Test cases, Insights from aVenn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Examples: Generalized pseudocode, The triangle problem, The Next Date function, The commission problem, The SATM(Simple Automatic Teller Machine)problem, The currency converter, Saturn windshield wiper. Boundary Value Testing: Boundary value analysis, Robustness testing.	**8 Hrs**
Module–V **Path Testing:** DD paths, Test coverage metrics, Basis path testing, guidelines and observations. Define/Use testing, Slice-based testing, **Levels of Testing**: Traditional view of testing levels, Alternative life-cycle	**08 Hrs**

models, The SATM system, Separating integration and system testing. Integration Testing: A closer look at the SATM system.	

Question paper pattern:

The question paper will have ten questions.

There will be two questions from each module, covering all the topics from a module.

The students will have to answer five full questions, selecting one full question from each module**.**

TEXT BOOKS:

1. Software Engineering–Ian Somerville, 10th Edition, PearsonEducation,2016.
2. Software Testing, A Craftsman's Approach -PaulC.Jorgensen:,4th Edition, Auer bach Publications,2013

REFERENCE BOOKS:

1. Software Engineering: A Practitioners Approach-Roger S. Pressman, 7th Edition, McGraw-Hill, 2007.
2. Software Engineering Theory and Practice-Shari Lawrence P fleeger, Joanne M. Atlee, 3rd Edition, Pearson Education,2006.
3. Software Engineering Principles and Practice-Waman S Jawadekar, Tata McGraw Hill,
4. 2004

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CSOE642	CO1	Describesoftwareengineeringprocesstoaccountforqualityissuesandnon-functional requirements.
	CO2	Translate specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
	CO3	Explain and develop, maintain and evaluate large-scale software systems, To produce efficient, reliable, robust and cost-effective software solutions
	CO4	Discuss the fundamental principles of Software Testing with life cycle and essential functional test methods.
	CO5	Perform Basic test design and measurement techniques.

COURSE TITLE: FUNDAMENTALS OF OPERATING SYSTEM		
Subject Code: 22CSOE643	**Credits:3**	CIE:50
Number of Lecture Hours/Week(L:T:P)	**3:0:0Hrs**	SEE:50
Total Number of Lecture Hours	**42**	SEE Hours:3
Prerequisites: Basics of Computer Architecture		

Course Objectives:

- Understand the fundamental concepts and design of operating systems.
- Learn process management, memory management, and file systems.
- Explore CPU scheduling, synchronization, and deadlock handling.

MODULES	Teaching Hours
Module-I **Introduction to Operating Systems:** Definition, Functions, Computer System Organization, Operating System Services and Operations, User and Kernel Modes, Virtualization Overview **Operating System Structures:** System Calls & APIs, OS Design and Implementation, OS Structures: Monolithic, Layered, Microkernel, Modular, System Boot and Kernel Initialization.	**8 hrs**
Module-II **Introduction to Processes**: Process Concept, Process Control Block (PCB), Process States and Transitions, Context Switching Basics **Advanced Process Management:** Process Scheduling Basics, Operations on Processes, Inter-Process Communication (IPC): Message Passing and Shared Memory. **CPU Scheduling**: Scheduling Criteria and Metrics (Turnaround, Waiting Time, etc.), Scheduling Algorithms: FCFS, SJF, Priority, Round Robin.	**9hrs**
Module–III **Process Synchronization:** Race Conditions and Critical Section Problem, Peterson's Solution. **Synchronization Primitives:** Mutex Locks and Spinlocks, Semaphores: Binary and Counting, Deadlocks from improper synchronization. **High-Level Synchronization:** Monitors, Condition Variables, Classical Problems: Bounded Buffer, Readers-Writers, Dining Philosophers, Sleeping Barber.	**8hrs**
Module–IV **Deadlock Concepts**: System Model, Deadlock Characterization (Four Necessary Conditions), Resource Allocation Graph (RAG). **Deadlock Handling Techniques:** Deadlock Prevention, Deadlock Avoidance: Safe State and Banker's Algorithm, Deadlock Detection and Recovery, Recovery Techniques (Process Termination, Resource Preemption).	**8hrs**
Module–V **Memory Management Strategies**: Contiguous Memory Allocation (Fixed/Variable Partitions), Paging: Basic Concepts, Page Table Structure, Segmentation. **Virtual Memory:** Demand Paging and Page Fault Handling, Copy-on-Write, Page Replacement Algorithms: FIFO, LRU, Optimal, Second-Chance, Thrashing and Working Set Model **File Systems:** File concepts: Attributes, operations, types; File system structure, Directory structure and allocation methods (contiguous, linked, indexed).	**9hrs**

Question paper pattern:
The question paper will have ten questions.
There will be two questions from each module, covering all the topics from a module.
The students will have to answer five full questions, selecting one full question from each module.

TEXT BOOKS:

1. **Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne**, *Operating System Concepts*, 10th Edition, Wiley, 2018

REFERENCE BOOKS:

1. **Andrew S. Tanenbaum and Herbert Bos**, Modern Operating Systems, 4th Edition, Pearson, 2015.
2. **William Stallings**, Operating Systems: Internals and Design Principles, 9th Edition, Pearson, 2018.
3. **D.M. Dhamdhere**, Operating Systems: A Concept-Based Approach, 2nd Edition, McGraw-Hill, 2006.
4. **Gary Nutt**, Operating Systems: A Modern Perspective, 2nd Edition, Addison-Wesley, 2000.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome (CO)
22CSOE643	CO1	Explain the fundamental concepts, services, and structures of modern operating systems, including kernel and user modes.
	CO2	Demonstrate understanding of process life cycle, context switching, inter-process communication, and CPU scheduling algorithms.
	CO3	Apply synchronization primitives like mutexes, semaphores, and monitors to solve classic synchronization problems and avoid race conditions.
	CO4	Analyze causes of deadlocks and apply prevention, avoidance, detection and recovery techniques.
	CO5	Evaluate memory management strategies such as paging, segmentation, and virtual memory along with file systems.

Course Title: MAJOR PROJECT PHASE –I		
Subject Code: **22CS65**	Credit:2	CIE:50
Number of Practical Hours/Week	**2Hrs**	SEE:
		SEEHours:03

Course Objectives:

- Identify real-world problems by performing the Literature survey
- Awareness of design and proposed methodologies and its analysis
- Design architectural Models and identity the functional & nonfunctional requirements by all team members
- Prepare quality technical report and present in a well-organized manner

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CS65	**CO1**	Apply basic engineering knowledge and identify the problem either individually or as a group
	CO2	Evaluate the knowledge of contemporary issues through literature survey and formulate the problems.
	CO3	Apply Engineering skills to solve problems of Engineering applications.
	CO4	Design the problem using software methodology.
	CO5	Prepare well organized report.

Course Title: DIGITAL IMAGE PROCESSING LAB		
SubjectCode:**22CSL66**	Credit:1	CIE:50
Number of Practical Hours/Week	**2Hrs**	SEE:50
		SEE Hours:03

Prerequisites: C, Python

Course Objectives:

1. Understand and explain Digital Image and its properties.
2. Apply Image processing arithmetic operations.
3. To Study the Image fundamental and mathematical transformations necessary for image processing.
4. Understand the image enhancement techniques, image restoration and segmentation techniques.

1. Find and list the properties of a Digital Image and demonstrate arithmetic operations (plus and Minus) on two images of same properties.
2. Demonstrate bit wise operations like, AND, OR, XOR on two images
3. Demonstrate image preprocessing by reducing noise using image blurring technique.
4. Demonstrate image rotation
5. Demonstrate image translation
6. Demonstrate edge detection of image
7. Demonstrate Morphological Image Processing
8. Apply histogram equalization for enhancing the given images.
9. Image segmentation by different thresholding technique
10. Image segmentation by Otsu's technique
11. Convert a RGB image to YCrCb, HSV and LAB formats and display converted image
12. Implement smoothing of images by averaging, Gaussian and mean filter for image restoration

Note: Programs provided in this manual are just for basic guidance and students may develop or extend programs with their own logic. Further, can display output images as a strip in a window (using matplot) or in individual windows.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	**CO#**	**Course Outcome(CO)**

22CSL66	**CO1**	Design experiments to demonstrate different image formats and different operations on image.
	CO2	Demonstrate the techniques for Image enhancement in Spatial domain
	CO3	Analyze Images restoration and Segmentation operations.
	CO4	Design experiments to demonstrate Image Smoothening Filters
	CO5	Design experiments to demonstrate Image Segmentation

COURSE CODE: INDIAN KNOWLEDGE SYSTEMS						
Credits :L:T:P	**:**	**1:0:0**		**CIE**	**:**	**50 Marks**
Total Hours	**:**	**15 L**		**SEE**	**:**	**50 Marks**
				SEE Duration	**:**	**02 Hours**

Course Learning Objectives: The students will be able to

1	To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
2	To make the students understand the traditional knowledge and analyze it and apply it To their day-to-day life.

Modules	
Module-I	**05Hrs**
Introduction to Indian Knowledge Systems(IKS): Overview, Vedic Corpus, Philosophy, Character scope and importance, traditional knowledge vis-à-vis indigenous knowledge, Traditional knowledge vs. western knowledge.	
Module–II	**05Hrs**
Traditional Knowledge in Humanities and Sciences: Linguistics, Number and Measurements - Mathematics, Chemistry, Physics, Art, Astronomy, Astrology, Crafts and Trade in India and Engineering and Technology.	
Module-III	**05Hrs**
Traditional Knowledge in Professional domain: Town planning and architecture-Construction, Health, wellness and Psychology-Medicine, Agriculture, Governance and public administration, United Nations Sustainable development goals.	

Course Outcomes: After completing the course, the students will be able to

CO1:	Provide an overview of the concept of the Indian Knowledge System and its importance.
CO2:	Appreciate the need and importance of protecting traditional knowledge.
CO3:	Recognize the relevance of Traditional knowledge in different domains.
CO4:	Establish the significance of Indian Knowledge systems in the contemporary world.

Reference Books

1	**Introduction to Indian Knowledge System-concepts and applications**, B Mahadevan, VinayakRajatBhat,NagendraPavanaRN,2022,PHILearningPrivateLtd,ISBN-978-93-91818-21-0
	Traditional Knowledge System in India, Amit Jha, 2009, Atlantic Publishers and Distributors (P)Ltd.,ISBN-13:978-8126912230,
2	**Knowledge Traditions and Practices of India**, KapilKapoor, Avadesh Kumar Singh,Vol.1, 2005, D K Print World(P) Ltd.,ISBN 81-246-0334,
	Suggested Web Links:
1.	**https://www.youtube.com/watch?v=LZP1StpYEPM**
2.	**http://nptel.ac.in/courses/121106003/**
3.	http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63(Centre of Excellence for Indian Knowledge System, IIT Kharagpur)

4.	https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5.	https://unctad.org/system/files/official-document/ditcted10_en.pdf
6.	http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf
7.	https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?gclid=EAIaIQobChMInp-Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwE

ASSESSMENT AND EVALUATION PATTERN		
WEIGHTAGE	**50%(CIE)**	**50%(SEE)**
QUIZZES		
Quiz-I Quiz-II	Each quiz is evaluated for 05 marks adding upto**10 Marks.**	*****
THEORY COURSE-(Bloom's Taxonomy Levels: Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating)		
Test–I Test–II	Each test will be conducted for 25 Marks adding upto 50 marks. Final test marks will be reduced To **20 Marks**	*****
EXPERIENTIALLEARNING	**20**	*****
Case Study-based Teaching-Learning	**--**	*****
Sector wise study & consolidation (viz., Engg. Semiconductor Design, Pharmaceutical, FMCG, Automobile, Aerospace and IT/ ITeS)	**--**	
Video based seminar(4-5minutes per student)	**--**	
Maximum Marks for the Theory	**---**	**50Marks**
Practical	**--**	**--**
Total Marks for the Course	**50**	**50**

Course Title : PHYSICAL EDUCATION AND SPORTS		
Subject Code : 22PE68	**Credits :00**	**CIE: 50**
Number of Lecture Hours/Week(L:T:P)	**0:0:2 Hrs**	**SEE: 00**
Total Number of Lecture Hours	**28**	**SEE Hours: 00**

SEMESTER	COURSE
V	Athletics / Football/Hockey
VI	Athletics / Cricket/Base ball
VII	Athletics / Netball/Basketball
VIII	Individual Games / Handball/ Badminton

Notes:
- One Hour of Lecture is equal to 1 Credit
- One Hour of Tutorial is equal to 1 Credit (Except Languages)
- Two Hours of Practical is equal to 1 Credit
- SEE: Semester End Examination
- CIE: Continuous Internal Examination
- L+T+P : Lecture + Tutorial + Practical

SEMESTER	COURSE TITLE	CONTENT	NO. HOURS
VI	CRICKET	**A. Fundamental Skills** 1. Batting - Forward Defense Stroke, Backward Defense Stroke, Off Drive, On Drive, Straight Drive, Cover Drive, SquareCut. 2. Bowling -Out-swing, In-swing, Off Break, Leg Break and Googly. 3. Fielding: Catching - The High Catch, The Skim Catch, The Close Catch and throwing at the stumps from different angles. Long Barrier and Throw, Short Throw, Long Throw, Throwing on the Turn. 4. Wicket Keeping B. Rules and their interpretation and duties of officials	Total 32Hrs 2 Hrs/ Week
	BASEBALL	A. Fundamental Skills Player Stances – walking, extending walking, L tance, cat stance Grip – standard grip, choke grip Batting – swing and bunt. Pitching Baseball : slider, fast pitch, curve ball, drop ball, rise ball, change up, knuckle ball, screw ball, Rules and their interpretation and duties of officials.	

	Athletics Combined Events Heptathlon & Decathlon Jumps- Pole Vault Throws -Hammer Throw	Combined Events: Heptathlon all the 7 events Decathlon: All 10 Events Pole Vault: Approach Run, Planting the Pole,Take-off, Bar Clearance and Landing. HammerThrow: Holding the Hammer, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).	

REFERENCES

1. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.
3. Petipus, et al. Athlete's Guide to Career Planning, Human Kinetics.
4. Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi.
5. Jain, R. Play and Learn Cricket, Khel Sahitya Kendra, New Delhi.
6. Vivek Thani, Coaching Cricket, Khel Sahitya Kendra, New Delhi.
7. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
8. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata
9. Naveen Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
10. Dubey, H. C. Basketball, Discovery Publishing House, New Delhi.
11. Rachana Jain, Teach Yourself Basketball, Sports Publication.
12. Jack Nagle, Power Pattern Offences for Winning asketball, Parker Publishing Co., NewYork.
13. Renu Jain, Play and Learn Basketball, Khel Sahitya Kendra, New Delhi.
14. Sally Kus, Coaching Volleyball Successfully, Human Kinetics.
15. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani. 16 Bandopadhyay, K.Sarir Siksha Parichay, Classic Publishers, Kolkata
16. Test and Measurement (by Cleark and Cleark)
17. Evaluation in Physical Education (by Dr. Devendraya Kausal)
18. Methods of Physical Education (by Haridrash & Prof. Tirumalay Swamy)
19. Athletics (by Hardayal Singh)
20. Efficienting and Coaching (by Dr. Anand Nadigri)
21. Modern and Ancient History of Physical Education (by Dr. D. M. Jyothi)
22. Organization and Administration (by K. G. Nadigir or Vastrad)

Course Title : YOGA AND MEDITATION		
Subject Code : 22YO59	**Credits :00**	**CIE: 50**
Number of Lecture Hours/Week(L:T:P)	**0:0:2 Hrs**	**SEE: 00**
Total Number of Lecture Hours	**28**	**SEE Hours: 00**

SEMESTER	**CONTENTS**
VI	1) Patanjali's Ashtanga Yoga 2) Suryanamaskara 3) Different types of Asanas a. Sitting b. Standing c. Prone line d. Supine line 4) Kapalbhati 5) Pranayama

Notes:
· One Hour of Lecture is equal to 1 Credit
· One Hour of Tutorial is equal to 1 Credit (Except Languages)
· Two Hours of Practical is equal to 1 Credit
· SEE : Semester End Examination
· CIE : Continuous Internal Examination
· L+T+P : Lecture + Tutorial + Practical

5th Semester	Ashtanga Yoga 3. Asana 4. Pranayama	Patanjali's Ashtanga Yoga its need and importance.	Total 32 hrs 2 hrs / week
	Suryanamaskara	Suryanamaskar 12 count 6 rounds	
	Different types of Asanas a. Sitting 1. Ardha Ushtrasana 2. Vakrasana b. Standing 1. Urdhva Hastothanasana 2. Hastapadasana c. Prone line 1. Padangushtha Dhanurasana d. Supine line 1. Sarvangasana 2. Chakraasana	Asana, Need, importance of Asana. Different types. Asana its meaning by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Revision of practice 50 strokes/min 3 rounds	
	Pranayama – 1. Surya Bhedana 2. Ujjayi	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	
6th Semester	Ashtanga Yoga 5. Pratyahara 6. Dharana	Patanjali's Ashtanga Yoga its need and importance.	Total 32 hrs 2 hrs / week
	Suryanamaskara	Revision of practice 12 count 8 rounds	
	Different types of Asanas a. Sitting 1. Aakarna Dhanurasana 2. Yogamudra in Padmasana b. Standing 1. Parivritta Trikonasana 2. Utkatasana c. Prone line 1. Poorna Bhujangasana / Rajakapotasana d. Supine line 1. Navasana/Noukasana 2. Pavanamuktasana	Asana, Need, importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Revision of practice 60 strokes/min 3 rounds	
	Pranayama – 1. Sheetali 2. Sheektari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	
7th Semester	Ashtanga Yoga 1. Dhyana (Meditation) 2. Samadhi	Patanjali's Ashtanga Yoga its need and importance.	Total 32 hrs 2 hrs / week
	Suryanamaskara	Revision of practice 12 count 10 rounds	
	Different types of Asanas a. Sitting 1. Vibhakta Paschimottanasana 2. Yogamudra in Vajrasana b. Standing 1. Parshvakonasana 2. Ekapadbaddhapadmottanasana c. Prone line balancing 1. Mayurasana d. Supine line 1. Sarvangasana 2. Setubandhasana 3. Shavasanaa (Relaxation poisture)	Asana, Need, importance of Asana. Different types, Asana by name, technique, precautionary measures and benefits of each asana	
	Kapalabhati	Revision of practice 80 strokes/min 3 rounds	