



## Sharad Institute of Technology College of Engineering

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Department: Artificial Intelligence and Data Science Rev: Course Structure/01/NEP/2023-24

Class: S.Y. B.Tech.

Semester: IV

Sr No	Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
1	23AD2401	PCC	Principles of AI	2	-	-	2	10	10	30	50	100	2
2	23AD2402	PCC	Java Programming	2	-	-	2	10	10	30	50	100	2
3	23AD2403	PCC	Operating System	2	-	-	2	10	10	30	50	100	2
4	23AD2404	PCC	Java Programming Laboratory	-	-	2	2	15	15	-	20	50	1
5	23AD2405	PCC	Operating System Laboratory	-	-	2	2	15	15	-	20	50	1
6	23AD2406	VSEC	Application development I		-	4	4	25	25	-	20	70	2
7	23AD2407	EEM	Patents and IPR	1			1	25	25			50	1
8	23AD2408	CEP	Mini Project-III	-	-	2	2	25	25	-	-	50	1
9	23AD2409	AEC	Modern Indian Language	2	-		2	25	25	-	-	50	2
10	23ADMDX X	MDM	Multidisciplinary Minor	3			3	10	10	30	50	100	3
11	23OEAD22	OE	Open Elective II	3			3	10	10	30	50	100	3
12	23AD2409	VEC	Aptitude Skills-II	1	-	-	1	25	25	-	-	50	1
13	23AD2410	VEC	Language Skills-II	-	-	2	2	25	25	-	-	50	1
Total				16		12	28	230	230	150	310	920	22

\*Open Elective II: Introduction to AI

Note- Open Elective course will be offered to students of other programs and will not be offered to students of the same program.

### Multidisciplinary Minor-

Basket	Finance & Management	Health Sciences/ Science & Technology/Environment	Management & Entrepreneur Development
Course Code, Name	Introduction to AI for Finance & Management (23ADMDA2)	Applications of AI in health care (23ADMDB2)	Leadership and Team Effectiveness (23ADMDC2)



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23AD2401	PCC	Principles of AI	2-0-0	2Credits
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Teaching Scheme	Examination Scheme
Lecture:2 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Principles of Advanced AI, Python Programming.

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

CO1	Understand the Fundamentals of AI
CO2	Apply Problem Solving and Search Techniques
CO3	Develop Knowledge Representation and Reasoning Models
CO4	Model Reasoning Under Uncertainty
CO5	Demonstrate AI Applications in Robotics
CO6	Demonstrate Ethical Awareness in AI

**Course Contents:**

<b>Unit I:</b> Introduction to Artificial Intelligence Definition and Scope of AI, History of AI: Key milestones, Types of AI: Weak AI vs. Strong AI, Application areas of AI (Robotics, Natural Language Processing, Expert Systems, etc.), AI agents and their environments, AI techniques: Knowledge representation, Reasoning, and Learning	[4]
<b>Unit II:</b> Problem Solving and Search Algorithms Problem-solving as State Space Search, Uninformed Search Strategies: Breadth-First, Search, Depth-First Search, Informed Search Strategies: Heuristic Search, A* Algorithm, Game Playing: Minimax Algorithm, Alpha-Beta Pruning, Constraint satisfaction problems	[4]



  
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<b>Unit III: Knowledge Representation</b> Logic-based representation, Propositional logic and first-order logic (FOL), Inference in FOL, Ontologies and semantic networks, Frames, scripts, and conceptual graphs, Rule-based systems and Expert systems	[4]
<b>Unit IV: Reasoning and Decision Making</b> Logical reasoning and theorem proving, Uncertainty in AI-Probabilistic reasoning, Bayesian networks, Fuzzy logic Decision theory and utility theory, Markov decision processes (MDPs), Reinforcement learning basics	[4]
<b>Unit V: AI in Real-World Applications</b> AI in Healthcare: Diagnostics, predictive analytics, and personalized treatment. AI in Finance: Algorithmic trading, fraud detection, and risk assessment. AI in Manufacturing: Automation, quality control, and predictive maintenance. AI in Social Media and Marketing: Personalization, recommendation systems, and sentiment analysis.	[4]
<b>Unit VI: AI Ethics and Future Trends</b> Ethical Implications of AI: Bias in AI, AI and Privacy, AI in Warfare. Future of AI: Trends in AI research, AI in Autonomous Systems. AI Governance and Regulation: Ethical AI development frameworks.	[4]
<b>Text Books:</b> <ol style="list-style-type: none"><li>1. Russell, S and Norvig, P. 2015. Artificial Intelligence-A Modern Approach,3rd edition, PrenticeHall.</li><li>2. Poole, D and Mackworth, A. 2010. Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press</li><li>3. Tom Mitchell, Machine Learning_, McGraw Hill, 2015.</li><li>4. Peter Flach, _Machine Learning: The Art and Science of Algorithms that make sense of data_, Cambridge, 2014.</li></ol>	
<b>Reference Books:</b> <ol style="list-style-type: none"><li>1. Steger, Carsten, Markus Ulrich, Christian Wiedemann. Machine Vision Algorithms and Applications (2nd ed.). Wiley, 2018. ISBN 978-3-527-41365-2.</li><li>2. Mikell P Groover, Automation, Production System and Computer Integrated Manufacturing, Prentice Hall, Publications, 2016. ISBN 9789332549814</li><li>3. Bhattacharya S., Artificial Intelligence, Laxmi Publications, Ltd., 2008, ISBN9788131804896</li><li>4. Chopra Rajiv, Artificial Intelligence, S. Chand Publishing, 2012, ISBN9788121939485</li><li>5. Pawar P. J., Evolutionary Computations for Manufacturing, Studium Press, 2019, ISBN: 978-93-85046- 52-0</li><li>6. Jain N, Artificial Intelligence: making a system intelligent, 2018, ISBN: 9788126579945</li><li>7. Hal Daume III, _A course in Machine Learning_, Todo, 2015.</li><li>8. EthemAlpaydin, _Introduction to Machine Learning_, The MIT Press, 2004.</li><li>9. David MacKay, Information Theory, Inference and Learning Algorithms_, Cambridge, 2003</li></ol>	



  
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23AD2402	PCC	Java Programming	2-0-0	2Credits
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Teaching Scheme	Examination Scheme
Lecture:2 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Basics of Programming

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

CO1	Understand basics of java and IDE to run program
CO2	Develop control and loop statements in Java
CO3	Develop object-oriented programming concepts and packages of java.
CO4	Comprehend building blocks of OOPs language, inheritance and interfaces.
CO5	Develop exception handling program & multithreading programs.
CO6	Develop programs for handling I/O and file streams.

**Course Contents:**

<p><b>Unit I- Introduction to Java</b> Java features and java programming environment define class; create object and accessing members, java tokens, data types, constants. Variables, type casting etc. Operators, evaluation of expression, mathematical functions.</p>	[4]
<p><b>Unit II- Basics in java and</b> Decision &amp; Control Statements: Selection Statement (if, if...else, nested if-else, Ladder if-else, switch), Loops (while, do-while, for), Jump statements (break, continue, return &amp; exit), nested loop. Arrays and Strings – types of arrays, String classes and string buffers. Vectors, Wrapper classes.</p>	[4]
<p><b>Unit II- OOP Concepts and Packages</b> Defining classes, fields and methods, creating objects, accessing rules ,Nested- class, this keyword, static keyword, method overloading, final keyword, Constructors: Default constructors, Parameterized constructors, Copy constructors, Passing object as a parameter, constructor overloading.</p>	[5]



  
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<b>Unit IV- Inheritance, Interfaces</b> Basics of Inheritance, Types of inheritance: single, multiple, multilevel, hierarchical and hybrid inheritance, concepts of method overriding, Defining interface & implementing Abstract class and final class.	[5]
<b>Unit – V Exception Handling &amp; Multithreading</b> Types of errors, exceptions, try-catch statement, multiple catch blocks, throw and throws keywords, finally clause, uses of exceptions, user defined exceptions, Creating thread, extending Thread class, implementing Runnable interface, life cycle of a thread,	[3]
<b>Unit – VI Managing Input Output Files In Java</b> Introduction and concept of stream, stream classes, Byte stream classes, input stream classes, output stream classes. Examples of file handling: creation of files, reading and writing files.	[3]
<b>Text Books:</b> 1. <b>Programming With Java-</b> : Balagurusamy, E. 2nd ed TMH	
<b>Reference Books:-</b> 1. Ivor Horton, Beginning JAVA, WileyIndia. 2. "Java: The Complete Reference" by Herbert Schildt 3. JAVA Programming, Black Book, DreamtechPress	



  
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23AD2403	PCC	Operating System	2-0-0	2Credits
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Teaching Scheme	Examination Scheme
Lecture:2 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Basic Logic, Set, Graph related concepts

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

CO1	Explain the basic concept of operating system & their types.
CO2	Illustrate the flow of process with its states and IPC Models
CO3	Apply Scheduling algorithms to calculate turnaround time and average waiting time.
CO4	Illustrate the concept of deadlocks.
CO5	Illustrate concept of memory management policies.
CO6	Outline the concepts of Unix and Linux OS.

**Course Contents:**

<b>Unit I- Introduction:</b> Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems.	[03]
<b>Unit II- Process Management</b> Processes: Definition, Process states, Process Control Block, Threads – Concept of multithreads, Benefits of threads, Multithreading Models, Users and Kernel threads. Inter-process Communication-Introduction, Shared memory system and message passing system, Examples.	[05]



  
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<b>Unit III- CPU Scheduling and Algorithm</b> Process Scheduling: Definition , Scheduling objectives ,Types of Scheduler, Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) Scheduling algorithms: Preemptive and Non- preemptive,FCFS, SJF, RR, Priority Algorithm.	[04]
<b>Unit IV- Deadlocks:</b> Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery.	[04]
<b>Unit 5 Memory Management</b> Basic Memory Management: Definition , Logical and Physical address map , Memory allocation : Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction , Paging and Segmentation <b>Virtual Memory:</b> Basics of Virtual Memory, Page fault, Demand paging, Page Replacement policies: Optimal Page Replacement (OPT), First in First Out (FIFO), Least Recently Used(LRU)	[05]
<b>Unit VI Unix/Linux Operating System</b> Development of Unix/Linux, Role & Function of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration Case study: Linux, Windows Operating System	[03]
<b>Text Books</b> <ol style="list-style-type: none"><li>1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, ISBN-10: 0-13- 380591-3, ISBN-13: 978-0-13-380591-8, 8thEdition.</li><li>2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, WILEY, ISBN 978-1- 118-06333-0 , 9thEdition</li><li>3. Andrew S. Tanenbaum &amp; Herbert Bos, Modern Operating System, Pearson, ISBN-13: 9780133592221, 4th Edition.</li></ol>	
<b>Reference Books</b> <ol style="list-style-type: none"><li>1. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, ISBN-10: 0596009526,ISBN- 13:978-0596009526</li><li>2. Harvey M. Deitel, Operating Systems, Prentice Hall, ISBN-10: 0131828274, ISBN-13: 978-0131828278</li><li>3. Thomas W. Doepfner, Operating System in depth: Design and Programming, WILEY, ISBN: 978-0-471-68723-</li></ol>	



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23AD2404	PCC	Java Programming Laboratory	0-0-2	1Credits
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Teaching Scheme	Examination Scheme
Practical:2hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

**Pre-Requisites:** Basics of Programming

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

CO1	Understand basics of java and IDE to run program
CO2	Develop control and loop statements in Java
CO3	Develop object-oriented programming concepts and packages of java.
CO4	Comprehend building blocks of OOPs language, inheritance and interfaces.
CO5	Develop exception handling program & multithreading programs.
CO6	Develop programs for handling I/O and file streams.

**List of Experiment:**

1.	Setup a java programming development environment by using: i)Command prompt (class path and path setup) ii)Any IDE (like eclips)
2.	Implement simple program.
3.	Implement program to accept various data from user and perform different operation using operators.
4.	Program on control statement and looping.
5.	Programs on Array.
6.	Programs on String and String Buffer.
7.	Develop program for an implementation of wrapper class to convert object into primitive.
8.	Develop program for an implementation of wrapper class to convert primitive into objects.
9.	Develop program for an implementation of vectors in java.



  
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10.	Develop program which implements concept of overriding.
11.	Develop program which implements single and multilevel inheritance.
12.	Develop a program to import different classes in package
13.	Develop program for implementation of multithreading operations.
14.	Develop program for implementation of try, catch block.
15.	Develop a program to implementation of File stream classes

\*Any 10 Experiments.



  
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23AD2405	PCC	Operating System Laboratory	0-0-2	1Credits
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Teaching Scheme	Examination Scheme
Practical:2hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

**Pre-Requisites:** Basics of Programming

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

CO1	Explain the basic concept of operating system & their types.
CO2	Illustrate the flow of process with its states and different process scheduling policies.
CO3	Explain concepts of Mutual exclusion and IPC
CO4	Make use the concept of deadlocks
CO5	Illustrate concept of memory management policies.
CO6	Illustrate the concepts of Unix and Linux OS.

**List of Experiment:**

1.	Study of different Operating System.
2.	Hands on UNIX/LINUX commands.
3.	Shell programming for file handling.
4.	Shell script programming using the commands grep, awk and sed.
5.	Implementation of different scheduling algorithms.
6.	Write a program to implement Producer consumer problem
7.	Write a program to simulate Bankers Algorithm for the purpose of Deadlock avoidance.
8.	Implementation of various page replacement policies.
9.	Implementation of synchronization primitives-semaphores, locks and conditional variables.
10	Implementation of various memory allocation algorithms.



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23AD2405	VSEC	Application development I	0-0-4	2 Credits
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Teaching Scheme	Examination Scheme
Practical: 2hrs/week	CA I: 25 Marks CA II: 25 Marks End Semester Exam: 20 Marks

### Pre-Requisites:

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

CO1	Learn how to control an LED using Arduino
CO2	Measure temperature using the LM35 sensor and display the value on the Serial Monitor.
CO3	Learn how to control a servo motor using PWM
CO4	Measure temperature and humidity using the DHT11/DHT22 sensor
CO5	Use an infrared remote to control various components.
CO6	Measure the distance of an object using an ultrasonic sensor (HC-SR04).

### List of Experiment:

1.	Write a program to make the LED blink at regular intervals.
2.	Turn an LED on or off when the button is pressed.
3.	Read the temperature data from the sensor and print it via the Serial Monitor.
4.	Use the potentiometer to vary the brightness of an LED by reading the analog input.
5.	Turn an LED on or off based on the light intensity detected by the LDR.
6.	Write code to control the angle of a servo motor using different inputs (e.g., potentiometer).
7.	Use the ultrasonic sensor to measure distance and display the result on the Serial Monitor.
8.	Display temperature and humidity readings on the Serial Monitor.
9.	Sound an alarm when the button is pressed.
10.	Mix different colors by controlling the brightness of the Red, Green, and Blue channels.
11.	Write code to decode signals from the IR remote and use them to control an LED.
12.	Vary the motor speed using a potentiometer as input.
13.	Display sensor data or messages on the LCD.



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23AD2407	EEM	Patents and IPR	1-0-0	1Credits
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Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 25 Marks CA II: 25 Mark

### Pre-Requisites:

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

CO1	Understand that today's world is controlled by Computer, Information Technology; but tomorrow world will be ruled by ideas, concept, and creativity.
CO2	Understand research problem formulation & Analyze research related information and Follow research ethics
CO3	Correlate the results of any research article with other published results. Write a review article in the field of engineering.
CO4	After completing this course, students will have enough knowledge of patents and copyright for their unique research projects.
CO5	Throughout their research careers, the information obtained from this course will give important insights into the uniqueness of their concept based on a state-of-the art patent search. This gives an additional avenue for developing their ideas or breakthroughs.

### Course Contents:

<p><b>Unit I-Introduction to Research Methodology:</b> Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, Plagiarism, Research ethics</p>	[4]
<p><b>Unit II- Technical writing:</b> Effective technical writing, how to write a manuscript/ responses to reviewers comments, preparation of research article/ research report, Writing a Research Proposal - presentation and assessment by a review committee</p>	[4]
<p><b>Unit III-Introduction and the need for intellectual property right (IPR):</b> Types of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design Genetic Resources and Traditional Knowledge – Trade Secrets</p>	[4]



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<p><b>Unit IV- IPR in India and Abroad :</b> Genesis and development, IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967, the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994</p>	[4]
<p><b>Unit V- Patents:</b> Elements of Patentability: Novelty , Non Obviousness (Inventive Steps) Industrial Application - Non - Patentable Subject Matter – Registration. Procedure, Rights and Duties of Patentee, Assignment and license , Restoration of lapsed Patents, Surrender and Revocation of Patents Patent Infringement, Remedies &amp; Penalties – Patent Office and Appellate Board. Patent/Prior art search: Types and tools of patent search Patent drafting: Elements in patent drafting</p>	[4]
<p><b>Unit VI- Copyrights:</b> Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings, Registration Procedure, Term of protection, Ownership of copyright, Assignment and license of copyright Infringement, Remedies &amp; Penalties – Related Rights -Distinction between related rights and copyrights</p>	[4]
<p><b>Reference</b></p> <ol style="list-style-type: none"><li>1. Kothari, C. R. Research Methodology - Methods and Techniques, New Age International publishers, New Delhi, 2004.</li><li>2. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science &amp; engineering students", Juta &amp; Company, 1996.</li><li>3. B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.</li><li>4. P. Narayanan (Eastern Law House), Intellectual Property Law.</li><li>5. Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.</li><li>6. Neeraj, P., &amp;Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.</li><li>7. Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: Lexis Nexis.</li><li>8. Subramanian, N., &amp; Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from <a href="http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf">http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf</a></li><li>9. World Intellectual Property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from <a href="https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf">https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf</a></li><li>10. Journal of Intellectual Property Rights (JIPR): NISCAIR</li></ol>	



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23AD2408	CEP	Mini Project III	0-0-2	01 Credit
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Teaching Scheme	Examination Scheme
Practical: 2hrs/week	CA I: 25 Marks CA II: 25 Mark

**Pre-Requisites:** Mini Project, Mini Project II

**About Hackathon**

The project is a part of addressing societal and industrial needs. Hackathon is one of the platforms where students will solve real world challenges. This Course focuses on the selection of methods/engineering tools/analytical techniques for problem solving.

Through this course, students will gain the understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills and responsibility

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

CO1	Select the appropriate method for solving the problem
CO2	Make use of various engineering techniques and tools to give a solution
CO3	Justify the methods /tools used to develop the solution
CO4	Design / simulate the model/ project work
CO5	Describe the solution with help of a project report and presentation
CO6	Conclude the outcomes of project.

**Course Contents:**

<p><b>Week 1: Survey Design-1</b></p> <ul style="list-style-type: none"> <li>Ensure case study group students have made necessary communication and done a preparatory visit.</li> <li>Watch the lecture on survey design and study the notes.</li> <li>Prepare a questionnaire and try it out with your group members as mock.</li> </ul>	[2]
<p><b>Week 2: Survey Design-2</b></p> <ul style="list-style-type: none"> <li>Review survey questionnaire prepared by case study groups.</li> <li>Decide sampling strategy.</li> <li>Prepare a detailed schedule for fieldwork</li> </ul>	[2]
<p><b>Week 3: Fieldwork</b></p> <ul style="list-style-type: none"> <li>Data Collection: Collect quantitative data (e.g., statistics, usage metrics) and qualitative data (e.g., user stories, testimonials).</li> <li>Use data collection tools like questionnaires, observation checklists, and digital analytics.</li> <li>Ensure data accuracy and reliability through proper sampling and recording methods.</li> </ul>	[2]



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<b>Week 4: Trails and Experimentation-1</b> <ul style="list-style-type: none"><li>Initial Setup and Configuration</li><li>Concept Validation</li><li>Feasibility Testing</li></ul>	[2]
<b>Week 5: Trails and Experimentation-2</b> <ul style="list-style-type: none"><li>Prototyping</li><li>Functionality Testing</li></ul>	[2]
<b>Week 6: Trails and Experimentation-3</b> <ul style="list-style-type: none"><li>Bug Identification and Fixing</li><li>Integration Testing</li><li>Security Testing</li><li>75% Presentation has to be conducted by mentor/guide based on above activity.</li></ul>	[2]
<b>Week 7: Results</b> <ul style="list-style-type: none"><li>Coordinator has to check and verify below points in term of result:</li><li>Functional Performance</li><li>Accuracy and Precision</li><li>Efficiency</li><li>Safety</li></ul>	[2]
<b>Week 8: Validation</b> <ul style="list-style-type: none"><li>Coordinator has to check and verify below points in term of validation:</li><li>Testing and Verification</li><li>Compliance with Standards</li></ul>	[2]
<b>Week 9: Integration Testing</b> <ul style="list-style-type: none"><li>Validate that the hardware integrates seamlessly with other systems or components as intended</li><li>Perform compatibility tests with software, other hardware, and network systems.</li></ul>	[2]
<b>Week 10: Documentation and Reporting</b> <ul style="list-style-type: none"><li>Maintain comprehensive documentation of design, development, testing, and validation processes</li><li>Provide detailed reports on test results, issues found, and corrective actions taken.</li></ul>	[2]
<b>Week 11: Final Presentation</b> <ul style="list-style-type: none"><li>100% Presentation has to be conducted by mentor/guide based on above activity.</li><li>Prototype/Final Software solution is mandatory at the time of final presentation along with report</li></ul>	[2]
<b>Week 12: Exhibition</b> <ul style="list-style-type: none"><li>Mini project exhibition will be schedule with interdepartmental evaluation.</li></ul>	[2]



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23MILE01	AEC	Marathi	2-0-0	2 Credits
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Teaching Scheme	Examination Scheme
Lecture:2hrs/week	CA I: 25 Marks CA II: 25 Marks

**Pre-Requisites:** Nil

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

CO1	Develop the knowledge of local language/mother tongue and relate the same to daily life and social media.
CO2	Make use of rhetoric and verb to form sentences in Marathi Language
CO3	Identity Infinitive compounds in the given Marathi sentence.
CO4	Make use of Phrases and proverbs and form a sentence and Solve Prose Assessment/Summary Writing
CO5	Model a letter to appropriate end user in Marathi Language
CO6	Identity writing type of Marathi stanza and write appropriate writing.

**Course Contents:**

<b>अध्याय 01:भाषापरीचय</b> भाषा आणि व्यक्तिमत्वसहसंबंध, भाषा, जीवनव्यवहार आणि नवमाध्यमेवसमाजमाध्यमे, चिन्हव्यवस्था-विरामचिन्हे, संवादकौशल्य (तोंडीपरीक्षा), सर्वनाम-पुरुषात्मक, दर्शक, संबंधी, प्रश्नार्थक, सामान्य आत्मवाचक सर्वनाम, विशेषण-गुणविशेषण, संख्याविशेषण, सार्वनामीकविशेषण	[5]
<b>अध्याय 02:मराठीव्याकरण</b> नाम, सर्वनाम, विशेषणे, क्रियापद, क्रियाविशेषण अव्यय, शब्दयोगी अव्यय, उभयान्वयीअव्यय, केवलप्रयोगी अव्यय, विभक्तीवत्याचे प्रकार, काळ व प्रकार	[5]



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<p><b>अध्याय 03: अलंकारवक्रियापदे</b> अलंकार-शब्दलांकर- अनुप्रास, यमक, श्लेष उदाहरणे, अर्थालंकार-उपमा, उत्प्रेक्षा, व्यक्तिरेक, अपदुनती, रूपक, व्यक्तिरेक, अननव्य, अतिशयोक्ती उदाहरणे प्रयोग-कर्तरी, कर्मणी, भावे वाक्यप्रकार-केवलवाक्य, मिश्रवाक्य, संयुक्तवाक्य समास-अव्ययीभाव, तत्पुरुष, द्वंद्व, बह्वृही क्रियापदे- कर्तावकर्म, क्रियापदाचे प्रकार- अकर्मक, सकर्मक, उभयविध, संयुक्त, क्रियाविशेषण- कालवाचक, स्थळवाचक, रितीवाचक, संख्यावाचक, प्रश्नार्थक, निषेधार्थक</p>	[4]
<p><b>अध्याय 04: वाक्प्रचार व म्हणीवगद्य आकलन /सारांशलेखन</b> अर्थसांगून वाक्यात उपयोगकरणे (कमीतकमी ३० वाक्यप्रचार व म्हणी), गद्य आकलन- अपठितगद्य उतारावत्या वरील प्रश्न उत्तरे (कमीत कमी ०५ उतारेवत्यावरील प्रश्न उत्तरे),सारांश आकलन</p>	[5]
<p><b>अध्याय 05: लेखनप्रकार</b> पत्रलेखन व त्याचेप्रकार- निमंत्रण, आभार, अभिनंदन, मागणी, कोटुंबिक, विनंती, तक्रार संधी -स्वरसंधी, व्यंजनसंधी, विसर्गसंधी, वृत्तलेखन, जाहिरातलेखन, कथालेखन, अहवाललेखन, आवेदनपत्र, अभिप्रायलेखन</p>	[4]
<p><b>अध्याय 06: कल्पनाविस्तार व मुलखात</b> कल्पनाविस्तार, मुलाखतकौशल्ये, मुलाखतीचेवैशिष्ट्ये, मुलाखतीचेस्वरूप, मुलाखतघेतानाघ्यावयाचीकाळजी, मुलाखतदेतानाआवश्यकबाबीउदा.आत्मविश्वास, व्यक्तिमत्वविकास, भाषाकौशल्येइ.</p>	[4]
<p><b>Text Books:</b> 1. व्यावहारिकमराठी, डॉ.ल.रा.नसिराबादकर, फडकेप्रकाशन, कोल्हापूर. 2. व्यावहारिकमराठी, डॉ.लीलागोविलकर, डॉ.जयश्रीपाटणकर, स्नेहवर्धनप्रकाशन, पुणे 3. सुगममराठीव्याकरणलेखन, मो.रा. वाळंबे, नितीनप्रकाशनपुणे</p>	
<p><b>Reference Books:</b> 1. अनिवार्यमराठीव्याकरण, लेखनवआकलन, डॉ. प्रल्हादलुलेकर, केदारकाळवणे, Pearson पब्लिकेशन्स 2. मराठीवइंग्रजीअत्यावश्यकनिबंध, प्रा.विजयकुमारवेधपाठक, K'Sagarपब्लिकेशन्स उपयोजितलेखन, मराठी, प्राचीशेंडे, सावलीम्हात्रे, टार्गेटपब्लिकेशन्स</p>	



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23ADMDA2	MDM	Introduction to AI for Finance & Management	3-0-0	3Credits
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Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Fundamentals of Finance and Management

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

CO1	To identify the importance of Artificial Intelligence evolution
CO2	To understand the uninformed search algorithms
CO3	To understand the informed search algorithms
CO4	To understand the advanced search algorithms for solving problems
CO5	Structuring Artificial neural networks (ANN) for Financial Management
CO6	To design Financial Forecasting model using AI for management

**Course Contents:**

<b>Unit 1: Introduction to AI</b> History of AI before 90S, History of AI after 90S, The present state of AI, Definition of AI thinking Vs acting	[02]
<b>Unit 2: Uninformed searching algorithms</b> Depth First Search, Depth Limited Search, Iterative Deepening DFS, Breadth First Search, Cost First Search,	[06]
<b>Unit 3: Informed searching algorithms</b> Best First Search, A* Search, A0* Search	[03]
<b>Unit 4: Beyond Classical Search</b> Hill Climbing, Beam Search, Genetic Algorithm, N-Queens Problem	[04]
<b>Unit 5: Artificial neural networks (ANN)</b> Simple Neurons and Networks, The Backpropagation Network, Single-layer Neural Networks, Multi-layer Neural Network	[04]
<b>Unit 6: Financial Forecasting &amp; Management</b> Portfolio Management: Alpha & Sigma, Algorithmic trading, Banking chatbots and robo-advisors	[04]



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### Textbooks:-

1. Norvig, P.R. and Intelligence, S.A., 2002. A modern approach. *Prentice Hall Upper Saddle River, NJ, USA: Rani, M., Nayak, R., & Vyas, OP (2015). An ontology-based adaptive personalized e-learning system, assisted by software agents on cloud storage. Knowledge-Based Systems, 90*, pp.33-48.
2. Bartram, S.M., Branke, J. and Motahari, M., 2020. *Artificial intelligence in asset management*. CFA Institute Research Foundation.

### Reference Books:-

1. Dunis, C.L., 2016. *Artificial Intelligence in Financial Markets*. Palgrave Macmillan.
2. Russell, S.J. and Norvig, P. eds., 1995. *Prentice Hall series in artificial intelligence*. Englewood Cliffs, NJ:: Prentice Hall.



  
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23ADMDB2	MDM	Applications of AI in health care	3-0-0	3Credits
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Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Introduction to Healthcare System

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

CO1	Outline the importance of Artificial Intelligence and its evolution
CO2	Apply the uninformed and informed search algorithms.
CO3	Explain the Machine learning in Healthcare.
CO4	Explain the Deep Learning in Healthcare.
CO5	Summarize robotics knowledge in Healthcare.
CO6	Outline the IOT for Healthcare Systems.

**Course Contents:**

<b>Unit 1: Introduction to AI</b> History of AI before 90S, History of AI after 90S, Definition of AI, Goal of AI, Types of AI, Application of AI	[02]
<b>Unit 2: Uninformed and Informed searching algorithms</b> Depth First Search, Depth Limited Search, Iterative Deepening DFS, Breadth First Search, Best First Search, A* Search, A0* Search <b>Beyond Classical Search algorithms</b> Hill Climbing, Beam Search, Genetic Algorithm, N-Queens Problem	[06]
<b>Unit 3: Machine Learning in Healthcare</b> Introduction to Machine Learning. Supervised vs. Unsupervised learning. Regression, Classification, and Clustering techniques. Healthcare Applications of ML Algorithms. Disease prediction (e.g., diabetes, heart disease). Predicting patient outcomes (e.g., hospital readmission rates). Risk prediction and management.	[03]
<b>Unit 4: Deep Learning in Healthcare</b> Introduction to Neural Networks and Deep Learning. Architecture of Artificial Neural Networks (ANNs). Activation functions, Back propagation, and Optimization techniques. Applications of Deep Learning in Healthcare- <ul style="list-style-type: none"> <li>Image recognition: medical image classification (X-rays, CT scans, MRI).</li> <li>Time-series data for patient monitoring (e.g., ECG, heart rate).</li> <li>Early diagnosis and predictive modeling.</li> </ul>	[04]



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<b>Unit 5: Robotics in healthcare</b> History of robot in healthcare, Types Of Robots In Healthcare, Benefits Of Robotics In Healthcare, The Challenges of Robotics in Healthcare, Applications Of Robotics In Healthcare	[05]
<b>Unit 6: Internet of Things (IOT) in Healthcare Systems</b> The Internet of Healthcare Things (IoHT) Work, Factor affecting IoT Healthcare Application, Simple Healthcare System Architecture, Benefits of IoT in Healthcare, IoT challenges in Healthcare	[04]
<b>Text Books:</b> 1. Artificial Intelligence in Healthcare, 2. Applications of Artificial Intelligence in the Healthcare Sector	
<b>Reference Books:</b> 1. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach, Prentice Hall, Pearson 2. Lavika Goel, Artificial Intelligence: Concepts and Applications, Willey.	



  
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23ADMDC2	MDM	Leadership and Team Effectiveness	3-0-0	3Credits
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Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

**Pre-Requisites:** Leadership and Team Effectiveness

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

CO1	To provide a framework for the students to understand the importance of Leadership and team effectiveness in organizations.
CO2	To provide a framework for the students to understand the importance of team effectiveness in organizations.
CO3	To develop an understanding of the interpersonal processes and group dynamics.
CO4	To provide a theoretical understanding of leadership practices in organizations.
CO5	To provide an understanding of factors influencing teamwork and team leadership.
CO6	To evaluate the role of leadership in the development of an institution.

**Course Contents:**

<b>Unit 1:</b> Introduction to Leadership & Team Management, LMX Theory and Normative Decision Model.	[02]
<b>Unit 2:</b> Leadership Attributes; Personality Traits and Leadership; Personality Types and Leadership; Intelligence and Leadership; Emotional Intelligence and Leadership Power and Leadership, Role of Ethics and Values in Organizational Leadership.	[06]
<b>Unit 3:</b> Leadership Behaviour, Leadership Pipeline; Assessing Leadership Behaviors, Negotiation and Leadership; Leadership under a crisis situation.	[03]



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<b>Unit 4:</b> Motivation and Leadership; Introduction to Groups and Teams; Characteristics of Leader, Follower and Situation; Group Dynamics; Team Formation. Delegation and Empowerment; Leading teams: Enhancing teamwork within a group.	[04]
<b>Unit 5:</b> Understanding Team processes and Team Coaching; Team decision making and conflict management; Virtual teams; Managing Multicultural teams; Building great teams. Experiential Learning; Action Learning; Development Planning.	[05]
<b>Unit 6:</b> Building Effective Relationship with subordinates and peers; Fostering Followers satisfaction; The Art of Communication. Building High-Performance Teams: The Rocket Model; Building Credibility and Trust; Skills for Developing	[04]
<b>Text Books:</b> 1. Enhancing the lessons of experience by Hughes, R.L., Ginnett, R.C., &Curphy, G.J. (2019), 9th Edition, McGraw Hill Education, Chennai, India. 2. Yukl, G. (2013) Leadership in Organizations Pearson	
<b>Reference Books:</b> 1. Northouse, P.G. (2021). Leadership: Theory and Practice (9th ed.). Sage.	



  
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23OEAD22	OE	Open Elective II	3-0-0	3Credit
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Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

### Pre-Requisites:

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

CO1	Select appropriate artificial intelligence method/algorithm to handle various issues in advanced
CO2	Demonstrate various algorithms used in artificial intelligence
CO3	Apply artificial intelligence algorithms for machine learning
CO4	Illustrate basic concepts of Machine Learning Environment
CO5	Identify machine learning techniques suitable for a given problem.
CO6	Demonstrate applications of neural networks in AI .

### Course Contents:

<p><b>Unit 1- Introduction to Artificial Intelligence</b> Definition and Scope of AI, History and Evolution of AI, Key Concepts and Terminology: Artificial Intelligence, Machine Learning, Deep Learning, Neural Networks AI in Everyday Life- AI in Smartphones (Voice Assistants, Predictive Text), AI in Social Media (Recommendation Systems, Content Moderation), AI in E-commerce (Product Recommendations, Chatbots), AI in Entertainment (Netflix, Spotify Algorithms)</p>	[6]
<p><b>Unit 2- Introduction to Machine Learning and Deep Learning</b> What is Machine Learning?, Types of Machine Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning, Simple Algorithms: Decision Trees, Linear Regression, k-Nearest Neighbors (k-NN) What are Neural Networks?, The Basics of How Neural Networks Learn, Introduction to Deep Learning (Concepts Only) , Applications of Neural Networks (Image Recognition, Language Translation)</p>	[6]
<p><b>Unit 3: Search optimization and planning</b> <i>Problem space and search, Knowledge and rationality, Heuristic search –Informed (BSF,A*) &amp; uninformed search (DSF,BSF) strategies, Hill climbing, branch and bound, best first search Search and optimization (gradient descent).</i></p>	[6]



  
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<p><b>Unit 4- AI in Robotics, Ethics and Challenges in AI</b> The Role of AI in Robotics, Simple Applications of AI in Robots (Autonomous Robots, Drones), Future of AI in Robotics Ethical Considerations in AI: Bias in AI Algorithms, Privacy Concerns, AI in Decision Making Social and Economic Impacts of AI, AI and the Future of Work: Automation and Job Displacement</p>	[6]
<p><b>Unit 5- AI Tools, Platforms and The Future of AI</b> Overview of Popular AI Tools (e.g., TensorFlow, Keras), Introduction to AI Programming (Basic Exposure to Python for AI), Simple AI Experiments (Using Prebuilt AI Tools or Datasets), Emerging Trends in AI (AI in Healthcare, Autonomous Vehicles, etc.) The Potential and Limits of AI, AI and Human Collaboration</p>	[6]
<p><b>Unit 6- Understanding AI's Limitations</b> The Boundaries of What AI Can Do Today, Myths vs. Reality of AI Capabilities The Difference Between AI and Human Creativity, Can AI Truly "Think" or "Feel"? Simple Case Studies- Case Study 1: AI in Healthcare (e.g., Diagnosing Diseases with AI), Case Study 2: AI in Business (e.g., AI in Retail and Customer Service)</p>	[6]
<p><b>Text Books:</b></p> <ol style="list-style-type: none"><li>1. Russell, S and Norvig, P. 2015. Artificial Intelligence-A Modern Approach,3rd edition, PrenticeHall.</li><li>2. Poole, D and Mackworth, A. 2010. Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press</li><li>3. Tom Mitchell, Machine Learning, McGraw Hill, 2015.</li><li>4. Peter Flach, Machine Learning: The Art and Science of Algorithms that make sense of data, Cambridge, 2014.</li></ol>	
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"><li>1. Steger, Carsten, Markus Ulrich, Christian Wiedemann. Machine Vision Algorithms and Applications (2nd ed.). Wiley, 2018. ISBN 978-3-527-41365-2.</li><li>2. Mikell P Groover, Automation, Production System and Computer Integrated Manufacturing, Prentice Hall, Publications, 2016. ISBN 9789332549814</li><li>3. Bhattacharya S., Artificial Intelligence, Laxmi Publications, Ltd., 2008, ISBN9788131804896</li><li>4. Chopra Rajiv, Artificial Intelligence, S. Chand Publishing, 2012, ISBN9788121939485</li><li>5. Pawar P. J., Evolutionary Computations for Manufacturing, Studium Press, 2019, ISBN: 978-93-85046- 52-0</li><li>6. Jain N, Artificial Intelligence: making a system intelligent, 2018, ISBN: 9788126579945</li><li>7. Hal Daume III, A course in Machine Learning, Todo, 2015.</li><li>8. EthemAlpaydin, Introduction to Machine Learning, The MIT Press, 2004.</li><li>9. David MacKay, Information Theory, Inference and Learning Algorithms, Cambridge, 2003</li></ol>	



  
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23AD2409	VEC	Aptitude Skills- II	1-0-0	1Credit
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Teaching Scheme	Examination Scheme
Lecture: 1hr/week	CA I: 25 Marks CA II: 25 Marks

**Pre-Requisites:** Basic Mathematics

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

CO1	Apply sentence formation rules to spot the error
CO2	Solve the questions based on the types of tenses
CO3	Solve the questions based on Direct/Indirect Speech and Passive/active voice and Substitution and Elimination
CO4	Make use of Proverbs, Idioms and phrases in sentence construction and the vocabulary

**Course Contents:**

<b>Unit 1:</b> Structure and Types of Sentences, Conditional Sentences	[3]
<b>Unit 2:</b> Present tense, Past tense, Future tense, Use of Tenses in Sentence forming	[3]
<b>Unit 3:</b> Direct and Indirect Speech, Active and Passive Voice, Use of Modal verbs in Sentence Forming, Substitution and Elimination	[3]
<b>Unit 4:</b> Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence, Vocabulary Building in Various Situations	[3]
<b>Text Books :</b> 1. Raymond Murphy, Essential English Grammar with Answers, Murphy. 2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)	
<b>Reference Books:</b> 1. Rao and D,V,Prasada, Wren & Martin High School English Grammar and Composition 2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press; Second edition	



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23AD2410	VEC	Language Skill- II	0-0-2	1 Credit
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Teaching Scheme	Examination Scheme
Practical:2hrs/week	CA I: 25 Marks CA II: 25 Marks

**Pre-Requisites:** Language Skill I

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

CO1	Develop programs using Functions.
CO2	Make use of Structures & Union to develop programs in C language
CO3	Make use of Pointers to develop programs in C language
CO4	Develop programs to perform various operations on files using File Handling.

**Course Contents:**

Exp.No.	Name of Experiment	
1	Develop programs on using different built-in functions.	[2]
2	Develop programs on using function without argument and without return category.	[2]
3	Develop programs on using function with argument and without return category.	[2]
4	Develop programs on using function without argument and with return category.	[2]
5	Develop programs on using function with argument and with return category.	[2]
6	Develop programs using more than one used defined functions.	[2]
7	Develop programs on recursion.	[2]
8	Develop programs on Structure using various entities and size of structure.	[2]
9	Develop programs on array of structure.	[2]
10	Develop programs on structures and functions and compare structure and union.	[2]
11	Develop programs to display different data type of data and their addresses using pointer	[2]
12	Develop programs on pointer to array, pointer to structure, pointer to functions and pointer expressions.	[2]
13	Develop program to read, write and append data from a file.	[2]

**Text Books :**

1. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013)
2. C Programming Language 2nd Edition, Pearson Publication

**Reference Books:**

1. Programming in C Practical Approach by Ajay Mittal, Pearson
2. Let Us C, By Yashwat Kanetkar



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