	SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P. (An Autonomous Institute Affiliated to RGPV Bhopal) DEPARTMENT OF IT

Semester/Year		III/II		Program		B.Tech – Artificial Intelligence and Data Science
Subject Category	DC	Subject Code:		AI 302	Subject Name	Artificial Intelligence

Maximum Marks Allotted							Total Marks	Contact Hours			Total Credits
Theory				Practical							
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:
- Basic Knowledge of algorithms, Discrete Mathematics

Course Objective:

1. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
2. Review of classical problem solving: search and forward and backward chaining.
3. Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem etc.

UNITs	Descriptions	Hrs.
I	Definitions – Foundation and History of AI, Evolution of AI - Applications of AI, Classification of AI Systems with respect to environment. Artificial Intelligence vs Machine learning, Tic - Tac – Toe problem. Intelligent Agent: Concept of Rationality, nature of environment, structure of agents.	8
II	Heuristic Search Techniques: Generate-and-Test; Hill Climbing; Properties of A* algorithm, Best first Search; Problem Reduction. Constraint Satisfaction problem: Interference in CSPs; Back, tracking search for CSPs; Local Search for CSPs; structure of CSP Problem. Beyond Classical, Search: Local search algorithms and optimization problem, local search in continuous spaces, searching with nondeterministic action and partial observation, online search agent and unknown environments.	8
III	Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic- Structured representation of knowledge	8
IV	Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques. Natural Language Processing Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing.Hopfield Network, Learning in Neural Networks, Application of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI and Symbolic AI.	8
V	Development Process, knowledge Acquisition. PROLOG Introduction, Syntax and Numeric Function, Basic List Manipulation, Functions, Predicates and Conditional, input, output and Local Variables, iteration and Recursion, Property Lists and Arrays, LISP and other AI Programming Languages.	8
Total Hours		40

Course Outcomes:

CO1: Describe various searching methods and reasoning in AI.
CO2: Uses of Knowledge Representation Techniques.
CO3: Analysis the concepts of reasoning and planning
CO4: Illustrate the concept of NLP and NN
CO5: Apply and evaluate AI Techniques using PROLOG and LISP

Text Book	

1.   Artificial Intelligence -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Universities Press.

Reference Books-

1.   Introduction to Prolog Programming By Carl Townsend.
2.   Programming with PROLOG —By Klocksin and Mellish.
3.   Artificial Intelligence (Fifth Edition) -By George F Luger, Pearson Education.
4.   Artificial Intelligence (Second Edition}-By Stuart Russell and Peter Norvig, Pearson Education.
5.   Artificial Intelligence Application Programming, Tim Jones, Wiley India
6.   Artificial Intelligence And Expert Systems - By D.W Patterson .

List/Links of e-learning resource

List and Links of e-learning resources:
● https://nptel.ac.in/courses/117103063/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PO12	PSO-1	PSO2
CO-1	3	3	2	3	1							2	3	
CO-2		3	3	2	3									
CO-3	2	3	3	3	2									
CO-4		2	3	3										
CO-5		3	2	3										

Suggestive list of experiments:
1. Write a program to solve 8 queens problem
2. Solve any problem using depth first search.
3. Solve any problem using best first search.
4. Solve 8-puzzle problem using best first search
5. Solve travelling salesman problem.
6. Write a program to solve the Monkey Banana problem

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Ramratan Ahirwal & Rashi Kumar
Subject handled by department	Department of IT

Semester/Year		III/II		Program		B.Tech – Artificial Intelligence and Data Science
Subject Category	DC	Subject Code:	AI 303	Subject Name		Object Oriented Programming with JAVA

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz					
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Fundamentals of programming Skills

Course Objective:

- Enable students to understand concepts and principles of object-oriented programming methodologies using JAVA as a vehicle.
- Also learn software development and problem solving using this JAVA technology.

UNITs	Descriptions	Hrs.
I	Introduction: Procedural Paradigms of programming, Object Oriented Paradigm for programming, Procedural vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP. OOP Concepts: Data Abstraction, Encapsulation, Inheritance and Polymorphism. Introduction of Java, Features of Java, Byte Code and Java Virtual Machine, Java Development Kit (JDK). Basics of objects and classes in Java, tokens, keywords, identifiers, variables, data types, and operators in java, Type casting, strict fp keyword.	8
II	Control Statements — If, else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue. Command Line Argument, Classes and Objects, Encapsulation, Tightly Encapsulated classes, Nested class, Inner class, and Anonymous inner class. Inbuilt classes: Object, String, String Buffer, Array, Vector. Wrapper classes. Data members, member Function, Data Hiding: Visibility modifiers in java.	8
III	Is-A relationship, Has-A relationship, Inheritance in Java, types of inheritance, Super and sub class, Method Signature. Overloading, Constructor Overloading, Method Overloading, this and static keyword, finalize () method, Casting objects, Instance of operator, Overriding, covariant return type. Super, final keyword, overloading vs. overriding. Static control flow, instance control flow.	8
IV	Abstraction: Abstract class, Interface in Java, differences between classes and interfaces. Defining an interface, implementing interface, applying interfaces, variables in interface, extending interfaces. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages. Coupling, Cohesion.	8
V	Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes. Multithreading: Concepts of Multithreading, differences between process and thread, thread life cycle, creating multiple threads using Thread class, Runnable interface. Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups. Introduction of java micro services.	8
Total Hours		40

Course Outcomes:

CO-1 Define classes, objects, members of a class and relationships among them needed for a specific program.
CO-2 Write the java application programs using OOPs principles.
CO-3 Write java application on constructors, overloading.
CO-4 Demonstrate package creating and accessing members of a packages.
CO-5 Understand and develop collection frame work and its application programs.

Text Book

1. Naughton & Schildt, "The Complete Reference Java 2", Tata McGraw Hill

2. E Balaguruswamy, "Programming in Java", TMH Publications		

Reference Books-

1. Deitel "Java-How to Program:" Pearson Education, Asia
2. Horstmann & Cornell, "Core Java 2" (Vol I & II), Sun Microsystems
3. Ivan Bayross, "java 2.0", BPB publications
4. Java Programming for the absolute beginners By Russell, PHI Learning
5. Java Programming by Hari Mohan Pandey, Pearson.

List/Links of e-learning resource

- https://archive.nptel.ac.in/courses/106/105/106105153/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_1	PO_{11}	PO_{12}	PSO1	PSO2
CO-1	1	1									3	3	3	2
CO-2	1		1	2							2	1	3	2
CO-3	2	1									2	2	1	2
CO-4	3	2	3	2	1			1	2		3		3	1
CO-5	3	3	2	1				2		2	2	3	1	1

Suggestive list of experiments:

1. Write a java program to find the Fibonacci series using recursive and non-recursive functions.
2. Write a java program to multiply two given matrices.
3. Write a java program for Method overloading and Constructor overloading.
4. Write a java program to display the employee details using Scanner class.
5. Write a java program that checks whether a given string is palindrome or not.
6. A. Write a java program to represent Abstract class with example.
B. Write a java program to implement Interface using extends keyword.
7. A. Write a java program to create inner classes.
B. Write a java program to create user defined package.
8. A. Write a java program for creating multiple catch blocks.
B. Write a java program for producer and consumer problem using Threads.
9. Write a Java program that implements a multi-thread application that has three threads.
10. A. Write a java program to display File class properties.
B. Write a java program to represent ArrayList class.
C. Write a Java program loads phone no, name from a text file using hashtable.
11. Write an applet program that displays a simple message.
12. A. Write a Java program computes factorial value using Applet.
B. Write a program for passing parameters using Applet.
13. A. Write a java program for handling Mouse events and Key events.
B. Write a java program for handling Key events.
14. Write a java program that connects to a database using JDBC.
15. A. Write a java program to connect to a database using JDBC and insert values into it.
B. Write a java program to connect to a database using JDBC and delete values from it.
16. Write a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * %operations. Add a text field to display the result

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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(An Autonomous Institute Affiliated to RGPV Bhopal)
DEPARTMENT OF IT

Semester/Year		III/II		Program		**B.Tech – Artificial Intelligence and Data Science**				
Subject Category	**DC**	**Subject Code:**		**AI-304**	**Subject Name**	**Operating System**				

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				**Practical**		**Total Marks**				
ES	**MS**	**Assignment**	**Quiz**	**ES**	**LW**	**Quiz**	**L**	**T**	**P**	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Computer Fundamentals

Course Objective:

To understand operating system architecture and functioning along with in-depth knowledge of internals and working of OS modules like process management, Storage management, file system, security and
Protection

UNITs	Descriptions	Hrs.
I	Overview-Introduction to Operating Systems, Evolution of Operating System mainframe, desktop, multiprocessor, Distributed, Network Operating System, and Clustered and Handheld System), Operating System Structure- Operating System Services and System Calls, System Programs. Types of Operating Systems: Batch Processing, Real-Time, Multitasking, and Multiprogramming, time-sharing system and Distributed Operating Systems, Objectives and functions of OS.	8
II	Process Management-Concept, Process Control Blocks (PCB), Process Scheduling. Scheduling Criteria, Scheduling Algorithms, and their Evaluation. Threads Overview and Multithreading .	8
III	Inter Processes Communication and Critical Section Problem and Solution-Semaphores and Monitors, Deadlock Characterization, Methods for Deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection and Recovery from Deadlock	8
IV	Storage Management-Memory Hierarchy, Concepts of memory management, MFT and MVT, logical and physical address space, swapping, contiguous and non-contiguous allocation, Paging and Segmentation Structure and Implementation of Page table, Virtual memory, Cache Memory Organization, Demand paging, Page replacement Algorithms. Thrashing, Demand segmentation.	8
V	File and Disk Management-File concepts, Access methods, Directory Structure, File Sharing and Protection, Free space management, Disk Scheduling, Efficiency, and Performance- A case study on Unix, Linux, and Windows.	8

Total Hours	40

Course Outcomes:

CO1:Explain the inherent mechanism involved in the functioning of an operating system. Differentiate and justify the need for various operating systems.

CO2:Analyse various scheduling techniques with their comparisons.

CO3:Analyse various synchronization techniques with their comparisons to derive the solution for the deadlock situation.

CO4: Describe the memory management system of an operating system. Analyse and compare various management schemes.

CO5: Describe and Analyze File and Disk Management Techniques.

Text Book

1. Peterson, J.L. & Silberschatz, A.: Operating System Concepts, Addison, Wesley-Reading.
2. Brinch, Hansen: Operating System Principles, Prentice Hall of India.

Reference Books-

1. Haberman, A.N.: Introduction to Operating System Design Galgotia Publication, New Delhi.
2. Tanenbaum, A.S.: Operating Systems.
3. Hansen, P.B.: Architecture of Concurrent Programs, PHI.
4. Shaw, A.C.: Logic Design of Operating Systems, PHI.

List/Links of e-learning resource

- https://archive.nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs10/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid-semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

Cos	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO 1	PSO 2
CO-1		2			2							2	1	2
CO-2	2	3		2	1						1	2	3	3
CO-3	2	3	3	2								2	2	2
CO-4	2	2		2								2	3	3
CO-5	2	2	2									2	3	3

Suggestive list of experiments:

1. Implementation of Basic Linux Commands.
2. Implementation of Process Related System Calls (Fork).
3. Write a program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF
4. Write a program to simulate the following CPU scheduling algorithms to find turnaround time and waiting time. a) Round Robin b) Priority
5. Write a C program to simulate page replacement algorithms) FIFO b) LRU c) OPTIMAL
6. Write a program to simulate Bankers algorithm for the purpose of deadlock avoidance.
7. Write a program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of CS & IT

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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DEPARTMENT OF IT

Semester/Year		III/II		Program		B.Tech – Artificial Intelligence and Data Science		
Subject Category	DC	Subject Code:		AI-305	Subject Name	Computer System Organization		

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
ES	MS	Assignment	Quiz	ES	LW	Quiz				
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Fundamental knowledge of digital electronics.

Course Objective:

- Understand the organization and architecture of computer systems and electronic computers.
- Study the assembly language program execution, instruction format, and instruction cycle.
- Design a simple computer using hardwired and microprogrammed control methods.
- Study the basic components of computer systems besides computer arithmetic.
- Understand input-output organization, memory organization and management, and pipelining

UNITs	Descriptions	Hrs.
I	Introduction: Function and structure of a computer, Functional components of a computer, Interconnection of components, Performance of a computer, Register Transfer language : Register Transfer, Bus and Memory Transfers, Three-Stare Bus Buffers, Memory Transfer, Arithmetic Microoperations Binary Adder, Binary Adder-Subtractor, Binary incrementor, Arithmetic Circuit, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit, List of Logic Microoperations, , Shift Micro operations, Arithmetic Logic Shift Unit	7
II	Control unit: Control memory, address sequencing, micro program example, Microinstruction Format, Symbolic Microinstructions, The Fetch Routine, Symbolic Micro program and design of the control unit, Microprogram Sequencer.	7
III	CPU design: Instruction cycle, data representation, memory reference instructions, input-output, and interrupt, addressing modes, data transfer and manipulation, program control. Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.	7
IV	Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory; Input or output organization: Input or output Interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access	7
V	Pipeline: Parallel processing, pipelining-arithmetic pipeline, instruction pipeline; Multiprocessors: Characteristics of multiprocessors, interconnection structures, inter-processor arbitration, inter-processor communication and synchronization.	7
Total Hours		35

Course Outcomes:

CO1: Understand the organization and levels of design in computer architecture.

CO2: Describe Register transfer languages, arithmetic micro-operations, logic micro-operations, shift micro-operations address sequencing, micro program example, and design of control unit

CO3: Understand the Instruction cycle, data representation, memory reference instructions, input-output, and interrupt, addressing modes, data transfer, and manipulation, program control. Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.

CO4: Knowledge about Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory Input or output Interface, asynchronous data transfer, modes of transfer, Priority interrupt, and direct memory access.

CO5: Explore the Parallel processing, pipelining-arithmetic pipeline, instruction pipeline Characteristics of multiprocessors, interconnection structures, inter-processor arbitration, inter-processor Communication, and synchronization.

Text Book

- M. Morris Mano, "Computer Systems Architecture", Pearson, 3rdEdition,2007.

Reference Books-

- John D. Carpinelli, "Computer Systems Organization and Architecture", Pearson, 1stEdition,2001.
- Patterson, Hennessy,"Computer Organization and Design: TheHardware/Software Interface", Morgan Kaufmann, 5 thEdition,2013

List/Links of e-learning resource

Modes of Evaluation and Rubric

- The evaluation modes consist of performance in two mid semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8	PO_9	PO_{1}	PO_{11}	PO_{12}	PSO 1	PSO 2
CO-1	1	1	2										1	2
CO-2	2	2	2										1	2
CO-3	2	1	2										1	2
CO-4	2	1	2											2
CO-5	2	2	1										1	2

Suggestive list of experiments:

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT

	SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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	DEPARTMENT OF IT

Semester/Year		III/II		Program		**B.Tech – Artificial Intelligence and Data Science**			
Subject Category	**DL**	**Subject Code:**		**AI- 306**	**Subject Name**	**Web Application Development**			

Maximum Marks Allotted							**Contact Hours**			**Total Credits**
Theory				**Practical**						
ES	**MS**	**Assignment**	**Quiz**	**ES**	**LW**	**Quiz**	**Total Marks**	**L**	**T**	**P**	
-	-	-	-	30	10	10	50	0	0	4	2

Prerequisites:

Basic knowledge of computers, its components and programming skills

Course Objective:

Understand Static and Dynamic Web Pages.

UNITs	Descriptions	Hrs.
I	WEBSITE BASICS, Web Essentials: Clients, Servers and Communication, The Internet, Basic Internet protocols, World wide web.	7
II	HTTP Request Message, HTTP Response Message, Web Clients,Web Servers, HTML5, Tables, Lists, Image, HTML5 control elements, Semantic elements, Drag and Drop, Audio , Video control	8
III	CSS3, Inline, embedded and external style sheets, Rule cascading, Inheritance, Backgrounds, Border Images, Colors Shadows, Text, Transformations, Transitions, Animations.	7
IV	Java Script: An introduction to JavaScript, JavaScript DOM Model-Date and Objects, function, Regular Expressions.	7
V	Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript. XML- Elements, attributes, parser, DOM, query.	7
Total Labs (practical's min)		36

Course Outcomes:

CO1: To understand and interpret the basic concepts of the Internet, tools.

CO2: To understand, analyse CSS components and apply them web page design tools like HTML, CSS.

CO3: To know and analyse client side scripting language concepts.

CO4: Design and Develop Internet applications with the help of Java script.

CO5: Understand the concept of exceptional handling

Text Book

1. Achyut Godbole, Atul Kahate & quot ; Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing", Third Edition, McGraw Hill Education.

2. Deitel, Deitel, Goldberg, & quot; Internet & World Wide Web How to Program & quot;, Third Edition, Pearson Education.

Reference Books-

1. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.

List/Links of e-learning resource

- https://archive.nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs10/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in two mid-semester Tests, Quiz/Assignments, term work, end semester practical examination.

CO-PO Mapping:

COs	PO$_1$	PO$_2$	PO$_3$	PO$_4$	PO$_5$	PO$_6$	PO$_7$	PO$_8$	PO$_9$	PO$_1$	PO$_{11}$	PO$_{12}$	PSO 1	PSO 2
CO1	2	1	2										1	1
CO2	2	1	2										1	1

CO3	**2**	**1**	**2**										**1**	**2**
CO4	**2**	**2**	**2**										**1**	**2**
CO5	**1**	**2**	**2**	**1**	**2**								**2**	**1**

Suggestive list of experiments:
1. Design a web page to display your CV.
2. Design a web page using HTML tags to take the input in a form and display it in another page/frame.
3. Design a web page to isolate a part of the text that might be formatted in a different direction from other text outside it
4. Create a Zebra Striping a Table and make an image rounded with CSS3.
5. Create speech bubble shape and Image cross effect with CSS3 transition.
6. Using HTML, CSS create a styled checkbox with animation on state change.
7. Using HTML, CSS create display an image overlay effect on hover.
8. Using HTML, CSS create a list with floating headings for each section.
9. Using HTML, CSS, JavaScript create a typewriter effect animation.
10. Using HTML, CSS create an animated underline effect when the user hovers over the text.
11. Write a JavaScript program to set paragraph background color.
12. Write a JavaScript function to add rows to a table.
13. Write a JavaScript function that accepts a row, column (to identify a particular cell) and a string to update the cell's content.
14. Write a JavaScript program to highlight the bold words of the following paragraph, on mouse over a certain link.
15. Write a JavaScript program to get the window width and height (any time the window is resized).

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Department of IT