Master of Science AI and Data Science

Two Year (Four Semesters) Course

The course of study of M.Sc. AI and Data Science shall extend over a period of **four semesters** spread over two years. On satisfactory completion of the course and after passing the examinations, a candidate will be awarded the Master of Science AI and Data Sciencedegree.

Every academic year shall be divided into two semesters. First semester starts from July and ends in December. Second semester starts from January and ends in June and so on. There shall be an examinationattheendofeachsemester.Theexaminationsshallconsistoftheorypapers,practical papers. Mediumofinstructionsandexaminationwillbe**English**only.

EligibilityforAdmission:

The admission of the students for M.Sc AI and Data Science I and III Semester will be taken for July to December session and II and IV Semester will be from January to June session.

A candidate who has qualified graduate degree with at least 50% marks (48% for SC/ST/OBC/SOBC category) of Rajasthan University or any other university recognized as equivalent shall be admitted to the first year of M.Sc AI and Data Science Course.

Semester	CourseDuration	ExaminationTime
I,III	JulytoDecember	December
II,IV	JanuarytoJune	June

Examination Scheme:

Each theory paper shall be of 100 marks (70 marks for written examination of 3 hrs duration and 30 marks for internal assessment).

Each practical paper shall be of 100 marks (60 for practical exam and 40 for internal assessment).

The basis for internal evaluation in theory shall be home assignment, internal test and regularities in the attendance.

The basis for internal assessment in the laboratory courses shall be timely submission of the lab. records,performance in the lab., internal tests etc.

Eachtheorypaperexaminationwillbeofthree-hourdurationandshallcarry70marks.Theory paper shall contain three parts.

a) Part-Awillcontain 12veryshort questionsof1markeach(studentwill attemptany 10).
b) PartBwillcontain4shortdescriptivetypesofquestionseachcarrying5marks,allare compulsory.
c) Part Cwill contain 4 long descriptive types of questions each carrying 10 marks, allquestions are compulsory with internal choice.

Each practical examination (Maximum marks 100) will be of four- hour duration on one day and carry 60 marks for exercise(s) assigned in the examination and Viva , and 40 marks for theInternal Assessment.

S.No.	QuestionPattern	Max.Marks (Theory)		Max.Marks (Practical)	
		ESE	CIA	ESE	CIA
1	PartA:12VeryShortQuestions (attempt any 10)	10 X1=10			
2	PartB:4ShortQuestionfromallUnits (Compulsory)	4 X5 =20			
3	PartC:4QuestionsfromeachUnit with Internal Choice	4 X10=40			
	SubTotal	70	30	60	40
		100		100	

Attendance:

Acandidateshallberequiredtoputinaminimumof75%attendanceatthelecturesand75% attendanceatthepractical'sseparatelyineach paper.

Examination Scheme:

Sr. No.	Paper	ESE	CIA	Total
1	Theory	70%	30%	100
2	Practical	60%	40%	100

NumberofUnitsinSyllabus:

Sr. No.	Stream	No. of Units
1	M.Sc. AI and Data Science	4

MaximumMarksfortheCourseandNumberofUnitsofEachsubject2Years/4 Semesters:

Sr. No	Stream	Semester	NumberofPapers per semester		Total Marks (Credits)of1 Semester	SubTotal	Grand Total
			Theory (Credits)	Practical (Credits)			
1	M. Sc. (AI &DS)						
		I ,II,III Sem	5 X100 (5 X4)	3 X100 (3 X4)	500 +300 = 800 (20 + 12 = 32)	800 X3 = 2400 (32 X3 = 96)	2400 (96)
		IVSem, Project	2 X100 (2 X4)	1 X200 (1 X8)	300+300 = 600 (8 +8 =16)	600 X1 =600 (16)	600 (16)
							3000 (112)

ProgrammeOutcomes

PO1: The program equips students with essential domains of computer science and AI and Data Science. It empowers them to apply core concepts in the development of domain-specific applications.

PO2: The program fosters critical thinking, cultivates problem-solving skills, encourages evaluative learning of various techniques, and deepens comprehension of problem essence.

PO3: The program educates students about the latest industry technologies. The continuous review of syllabi adds value to graduates, preparing them to address dynamic industry demands.

PO4:Theprograminstructsstudentsinapplyingadvancedtoolstoaddressreal-worldchallenges.

PO5: The program trains students in designing and conceptualizing software architecture, managing complex product development processes, and making informed decisions for project management selection.

PO6: Real-world projects expose students to challenging industry environments, making thememployable and industry-ready through hands-on project development training.

PO7: The program hones students' teamwork skills and nurtures their ability to lead project management teams

SemesterStructure:

M.Sc. AI and Data ScienceSemesterI

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	MSAIDS101	Programming Fundamentals	DSC	4	4			3	
2.	MSAIDS102	DatabaseManagement System	DSC	4	4			3	
3.	MSAIDS103	Data Communication and Networking	DSC	4	4			3	
4.	MSAIDS104	Computer Architecture	DSC	4	4			3	
5.	MSAIDS105	OperatingSystem	DSC	4	4			3	
6.	MSAIDS151	'C'ProgrammingLab	DSCP	4			6		2
7.	MSAIDS152	DBMSLab	DSCP	4			6		2
8.	MSAIDS153	OfficeManagementLab	DSCP	4			6		2

M.Sc. AI and Data Science Semester II

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	MSAIDS201	ObjectOriented Programming Concepts using java Programming	DSC	4	4			3	
2.	MSAIDS202	DataStructureand Algorithms	DSC	4	4			3	
3.	MSAIDS203	WebDesigningand development	DSC	4	4			3	
4.	MSAIDS204	Fundamental of AI, Machine learning and Data Science	DSC	4	4			3	
5.	MSAIDS205	Big data Analysis	DSC	4	4			3	
6.	MSAIDS251	JavaProgrammingLab	DSCP	4			6		2
7.	MSAIDS252	DataStructureLab	DSCP	4			6		2
8.	MSAIDS253	WebDesigningLab	DSCP	4			6		2

M.Sc. AI and Data Science SemesterIII

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	MSAIDS301	Data Science with R	DSC	4	4			3	
2.	MSAIDS302	PythonProgramming With AI and Data Science	DSC	4	4			3	
3.	MSAIDS303	Data Visualization Tools and Technique	DSC	4	4			3	
4.	MSAIDS304	Machine learning	DSC	4	4			3	
5.	MSAIDS305	Cloud computing	DSC	4	4			3	
6.	MSAIDS351	R Programming Lab	DSCP	4			6		2
7.	MSAIDS352	PythonLab	DSCP	4			6		2
8.	MSAIDS353	Machine learning Lab	DSCP	4			6		2

M.Sc. AI and Data Science SemesterIV

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	MSAIDS 401	**ElectivePaper-I** a) Data warehousing and data Mining b) Soft Computing	DSC	4	4			3	
2.	MSAIDS 402	**ElectivePaper-II** a) Natural language Processing b) Deep Learning	DSC	4	4			3	
3.	MSAIDS 451	Project(Project,Report, Viva) (12Weeks)	DSCP	8					2

M.Sc.AI and Data Science - FirstSemester

MSAIDS101:ProgrammingFundamentals

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks: 40*

QuestionPaperpatternforEndSemesterExam(ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B
will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit-I
ProblemSolvingwithComputers: Algorithms,and Flowcharts.
Basic Structure of C Programs: Creating, Compiling, Linking and Execution of a C program
Header Files, C Tokens (Keywords, Identifiers, Constants, and Special symbols), Data types, and
Variable declaration, Operators, Expressions, Managing Data Input and Output Operations. Decision
Making and Branching, Looping and Jumping Statements.

Unit-II
Arrays: Declaration, Definition, One and Two Dimensional Arrays, Character Arrays and Strings.
Functions: Definition, Need for Functions, Standard and User-Defined Functions, Function
Calls,Category of Functions, Recursion, Storage Class Specifiers

Unit-III
Structuresand Unions: Arrayof Structures,Nesting of Structures.
Pointers: Declaration,DefinitionandUseof Pointers, Differencebetween Pointersand Structures.

Unit-IV
File Management in C:Creating, Opening and Closing a File, I/O Operations on Files, Command
Line Arguments. Dynamic Memory Allocation, Pre-Processor.

Recommended Books:
1. Kerighan& RichietheC programminglanguage (PHI Publication)
2. ByronGottorfriedSchaum'soutlineofprogrammingwithC
3. E.BalaguruswamyProgramminginAnsi'C'(TataMcGrawHill)
4. Kanetkar"LetUsC",BPBPublications.(TataMcGrawHill)

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks: 40*

QuestionPaperpatternforEndSemesterExam(ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B
will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit-I
Introduction to Database Concepts: Database and Need for DBMS ,Characteristics of DBMS, Database Users, 3-tier architecture,(its advantages over 2- tier) Data Models, Views of data-schemes and instances, Independence, Data modeling using the Entity-Relationship approach, Entities, Relationships, Representation of entities, attributes, relationship set, Generalization , Aggregation.

Unit-II
Relational model: Overview of database models, Relational Model, Structure of relational database, different types of keys, Expressing M: N relation, relational algebra, Constraints.
Relational Database Design: Functional dependencies, Normalization Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF) Lossless joins and dependency preserving decomposition.

Unit-III
SQL: Introduction to SQL, SQL Data types and Literals, Types of SQL commands, SQL Operators and their procedures, Tables, Views and Indexes, queries and sub-queries, aggregate function, insert, delete and update operations, Joins, Unions, Intersections, Minus in SQL.
Query Processing: Query Processing Stages, Estimation of Query Processing Cost, Introduction to Transactions, States of Transactions, ACID Properties

Unit-IV
Concurrency Control: Concurrency Control, Lock Based Protocols, Two Phase Locking protocol, Timestamp-based Protocol, multiple granularity, Deadlock Handling, Deadlock Prevention,Deadlock Detection and Recovery.
Recovery: Failure classification, recovery concepts, database backup, recovery concepts based on deferred update and on immediate update. Shadow paging, check points, an overview of Distributed database and client-server Database

Recommended Books:
1. FundamentalofDatabaseSystemsby R.Elmasri,S.Navate;Benjamin Cummings
2. Introductiontodatabasesystems byC.J .Date
3. Databasesystemconcept by Korth
4. PrinciplesofDatabaseManagementbyJamesMartin
5. RelationaldatabasedesignforMicro computersApplicationbyPrenticeHall(Jackson)
6. DatabaseManagementSystemsbyBipin Desai

MSAIDS103:Data Communication and Networking

Unit-I
Data Communication Concepts: Introduction, Communication System, And Communicationmode, Data encoding: Analog and Digital data, digital and analog signal, Communication Channels, Synchronous and asynchronous transmission. Bandwidth concepts, channel capacity.
Introduction to Networking: Computer network, Characteristic & advantages of networking, types of network, LAN, MAN, WAN.

Unit-II
Transmission media & Network Topologies: Guided & Unguided media, Twisted pair, coaxial cable, Fiber optics, Radio. VHF and microwaves, Satellite link. Network topology, bus, star, ring, tree, mesh & hybrid topology. Advantages and disadvantages of these topology. Multiplexing Channels and Concept of multi channeling and modulation, pulse code modulation (PCM)Frequency Division multiplexing, Time Division multiplexing, CODECS.

Unit-III
Digital Data Communication Techniques: Asynchronous and Synchronous Transmission - Types of Errors, Error Detection and error Correction methodologies.
Network Standards: Introduction, Layered approach, OSI model functions & responsibilities of each layer.

Unit-IV
Internetworking: Principles of internetworking, Connectivity Devices, Switches, Bridges, Routers, Routing with bridges. Internet and e-mail protocols: SMTP, SLIP, POP, PPP, FTP, HTTP, Wi-Fi Network, Bluetooth, Broadband.

Recommended Books:
1. Introductionto Digitaland Data Communications,MichalAMiller, JAICO pub.
2. DataandComputerCommunication–WillamStaling,PHIpub.
3. DataCommunication&Network –Forouzan (TMH)
4. ComputerNetworks – A.Tanenbaum,(PHI pub.)
5. InternetworkingwithTCP/IPVol-I–Comer(PHIpub.)
6. DataCommunications anddistributed Networks-V.B,Black, (PrenticeHall pub.)

MSAIDS104:Computer Architecture

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B
will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit -I
Introduction to DigitalComputer:Overview ofthe DigitalComputer System(Processor, Memory, Input and Output Devices, Storage Devices, Representation of Data: Digital versus Analog, Digital number system (binary, octal, decimal and hexadecimal numbers,) conversion from one form to another, fractional numbers and signed numbers, 1'S, 2'S Complements, Fixed point and floating point representations, Boolean algebra (addition, subtraction, multiplication and division), Logic Gates(NOT,OR,AND,NAND,NOR,XOR,XNOR)typesCodes(ASCII,EBCDIC,Unicode)
Combinational Circuits(Multiplexer, Demultiplexer, coder, Encoder)Sequential Circuits(Flip flops, registers, Counters).

Unit-II
Anatomy of a Computer: Mother Board (Special reference to Intel 810 Chipset motherboard),CISC Micro Processors (Special reference to Pentium, AMD, Cyrix), RISC, types of RAM, Flash, Cache, types of memory modules (SIMM, DIMM), System clock, Bus (Data, Address, Control), Expansion slots (ISA, MCA, EISA, PCI, AGP).

Unit-III
I\O and Storage Devices: Input devices, Output devices, Printers (Dot-Matrix, Line, Label, Ink-Jet, Laser, Color Laser, thermal wax, dye sublimation, fiely, IRIS), Plotters (Pen, Ink-jet, electrostatic), Voice output], Storage devices I Storage types (Magnetic, Optical, Magneto-optical, Solid state), randomversussequentialaccess,formatting,tracksandsectors,speed,storagecapacity,FloppyDisk (5.25 inch, 3.5 inch; 2HD, zip, Superdisk, HiFD) Hard Disk (tracks, cylinders, sectors; Hard Drive Interfaces (IDE, EIDE, Fast SCSI, Fast/wide SCSI, Uitra SCSI; Hard Disk Cartridges, RAID), Optical Disks [pits and lands, CD-ROM, R, RW, DVD-ROM, R, RAM)], Magnetic tape (reels, streamers, DAT,DLT, stripe, Smart card), Modem (Fax/Data/Voice).

Unit-IV
Computer Memory Systems: Architecture of Digital Computer, Processor Design Principles, Control Unit Design: Conventional and Micro programmed, Input- Output System. Memory and I/O Organization: Interfacing with CPU; Main Memory, Auxiliary Memory, Cache Memories, Associative Memory and Virtual Memory. I/O Interfacing with CPU, Addressing Data Transfer Techniques.

Recommended Books:
1. ComputerArchitectureAndOrganization:McgrawHill,2ndEdition,JohnHyaes.
2. ComputerSystemArchitecture:PHI,3rdEdition,M.MorriesMano.
3. ComputerOrganizationAndDesign:PrenticeHallOfIndia,ChaudhariP.P.
4. PerspectiveInComputerArchitecture:PrenticeHallOfIndia,RaoP.V.S.
5. ComputerSystemArchitecture:PrenticeHall,TannenbaumA.
6. ParallelComputerArchitecture:AHardware/SoftwareApproachbyDavid Culler

MSAIDS105: Operating System

Max Marks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B
will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit-I
Introduction to Operating System: Types of software (System/Application), Translators (Assemblers/ Interpreters/ Compilers), Operating system as a resource manager, Operating system need and services, Classification and Evolution of OS, Hierarchical/Layered Organization of OS.

Unit-II
Process Management: Process concept, Process Control Block, Process Life cycle, Type of Scheduler, Scheduling criteria, multiple processor scheduling, scheduling Algorithm, FCFS, SJF, Priority and round robin scheduling, critical section, semaphores. Asynchronous parallel process, multithreading at system/user level, Inter process communication, Process Synchronization & Deadlock,Monitors, Deadlockprevention&avoidance, DeadlockDetectionanddeadlock Recovery.

Unit-III
Memory Management: Memory Management Techniques; Single partition allocation, multiple partition allocation, Swapping, paging and segmentation, segmented-paged memory management techniques; logical and physical address space; address mapping. Demand paging, Virtual memory, protection and address mapping hardware, page fault, Page replacement and page removal algorithms.

Unit-IV
Device Management and I/O Programming: Disk structure, disk scheduling, access method and storage capacity; sharable and non sharable devices and their management.
Information Management & File System: File organization and access methods, logical and physical filestructure; physical file systemrealized with device management function; file allocation methods, linked and index allocation, logical file implemented on physical file system. File protection and security, Directory structure, single level, two level, tree structure, Free Space Management, Allocation Methods.

Recommended Books:
1. JamesL.Peterson&A.Silberschatz:OperatingSystemConcepts;2ndEdn.,
   Addison Wesley, World Student Edition
2. AndrewS.Tenenbaum:ModernOperatingSystems;PrenticeHall,India
3. DietelH.M.:AnIntroductionToOperatingSystems;AddisonWesley,World
   Student Edition
4. SystemsProgramming &OperatingSystems,2ndEdn., TataMcGrawHill

MSAIDS151:'C'ProgrammingLab
Examination:Practical
Exercisesto be framedso asto coverthe topicsandtools coveredintheory paper.

MSAIDS152:DBMS Lab
Examination:Practical
Exercisesto beframed soas to coverthe topics andtools coveredintheory paper.

MSAIDS153:Office ManagementLab
Examination:Practical
Exercisesto beframed so astocoverthe topicsandtools coveredintheory paper.

M.Sc.AI and Data Science –Second Semester

MSAIDS201:ObjectOrientedProgramming ConceptsusingJava Programming

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks: 40*

QuestionPaperpatternforEndSemesterExam (ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B will contain 4 questions (1 from each unit) of 5 marks. Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit-I
Introduction: ObjectOrientedConcepts,IntroductiontoJava,FeaturesofJava,Javavirtual machine.
ProgrammingFundamentalsofJava: JavaTokens,Operators,Datatypes,ControlStructures, Array

Unit-II
ClassesandObjects: ObjectReferences,MethodOverloading,Constructors,Constructor Overloading, Inheritance. Static, Final, Abstract Keywords
PackagesandInterfaces: AccessSpecifiers,PackageCreation,Useofpackages,Basicsof Interfaces, Use of Interfaces
StringHandling: StringClass,Stringmethods.

Unit-III
ExceptionhandlinginJava: Exceptionclasses,Exceptionraising&handling,useofTry,Catch and finally, Throwing Exceptions, User Defined Exceptions.
Applets: Introduction toApplets, Appletlife cycle,CreatingApplets,AppletViewer
Graphics: Graphics Components, Color,Font,Drawing Objects

Unit-IV
ThreadinginJava: ConceptsofMulti-threading,ThreadLifeCycle,Threadclass,RunnableInterface, Thread Management in Java
JDBC: JDBC Drivers, Two Tier and Three Tier client server Architecture, Setting up a connectionto database, Creating and executing SQL statements

Reference Books:
1. C.Thomas Wu, AnIntroductiontoOOPwithJava, McGraw Hill.
2. Deiteland Deitel, Java,Howto Program,Pearson EducationAsia.
3. E.Balaguruswmy,Programming withJava,TataMcGrawHill.
4. Zukowski:Mastering Java2, BPB Publications.
5. HerbertScliildt, Java 2,Tata Mc GrawHill.

MSAIDS202: Data Structure and Algorithms

MaxMarks: 100(ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

MaxMarks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10). Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction, Types of Data Structures, Algorithm, Pseudocode, Characteristics of Algorithms, Algorithm Analysis, Algorithm Complexity – Space Complexity, Time Complexity, Abstract Data Types.
String Processing – Basic Terminology, Storing Strings, String Operations, Pattern Matching Algorithms.
Arrays: Representation in Memory, Operations - Insertion, Deletion, Searching – Linear Search, Binary Search, Sorting – Bubble Sort, Multidimensional Arrays, Pointers, Pointer Arrays.

Unit-II
Sorting: Internal and External Sorting Techniques, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Radix Sort.
Linked lists: Linked List Vs. Arrays, Representation in Memory, Types of linked List - Singly Linked list, Doubly Linked list, Circular Linked list, Doubly Circular Linked list., Operations on Singly Link List – Insertion, Deletion, Traverse, Searching.

Unit-III
Stacks: Array and Linked List representation of Stacks, Operations – Insertion, Deletion, Traverse, Application of Stack – Recursion, Polish Notation.
Queues: Array and linked list representation in Memory, Type of Queues – Simple Queue, Circular Queue, Priority Queue, Double Ended Queue. Operations on Simple and Circular Queue – Insertion, Deletion, Traverse. Applications of Queues.

Unit-IV
Trees: Basic Tree Concepts, Representation of Binary Tree in memory, Binary Tree Traversals, Binary Search Trees, Heapsort.
Graphs: Representations, sequential representation, Warshall's Algorithm, Linked Representation of graphs, Operations on Graph, Traversing Graph.

Reference Books:
1. S.Lioschutz: Data Structures, McGraw Hill International Edition.
2. A.V.Aho., J.E.Hopcroft, and J.D.Ullman, Data Structures and Algorithms, Pearson Education Asia.
3. A.Michael Berman: Data Structures via C++, Oxford University Press.
4. Sara Baase and Allen Van Gelder: Computer Algorithms, Pearson Education Asia.
5. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data structures with applications, TMH Publishing Co. Ltd.

.

MSAIDS203:Web Designing andDevelopment

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B
will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit-I
The Internet: History of the World Wide Web, Hardware and Software Trend, Web Server, Web Client.
Creating Web Pages: Introduction to HTML, Types of tags, Formatting Tags, Common Tags, Hyperlinking, Images, Image Maps, Marquee Tag, Horizontal Rules, Lists.

Unit-II
AdvanceConcepts ofHTML:HTMLTables,HTMLForms,Frames
Dynamic HTML: CSS : introduction, inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the box model, user style sheets, Filters and Transitions.

Unit-III
JavaScript: Introductiontoscripting language,ClientsideversusServersidescripting ,Advantages of Java Script, Features of Java Script, Keywords, Variables, Data Types, Constants, Comments,Java script control structures, Arrays, Array Library Methods, Java script Methods

Unit-IV
DOM:Introduction, Window,History,Navigator,Form,Frames,LocationObjects.
Event Handling in Java Script: Different types of events, key events, mouse events, loadingevents, Event Handlers,

Recommended Books:
1. M.L.Young: CompleteReferenceb:Internet;2nd Edition;Tata McGrawHill,2006.
2. ThomasA. Powel; WebDesign :C.R.; SecondEdition;TMH, 2009.
3. ThomasA. Powel; HTML& XHTML:C.R.; FourthEdition; TMH, 2008.
4. HarelyHahn:The Internet,TataMcGraw Hill.
5. G.Robertson: HandsonHTML, BPB Publications.
6. D.A.Tauber, B.Kienan: MicrosoftFromPage; BPB Publications.
7. PHPThe CompleteReference, StevenHolzer,TataMcGrawHill

MSAIDS204:Fundamental of AI , Machine Learning and Data Science

MaxMarks:100 (ESE: 70 CIA: 30)   Passing marks:40

QuestionPaperpatternforEndSemesterExam(ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B
will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwill contain 4 questions(1 from eachunitwith internalchoice) of10 marks.

Unit – I
Concept of intelligence, Artificial intelligence, definition turning test, areas of application.
Search techniques, state space, Production rules, problem characteristics. Production
systemcharacteristic, depth first, breadth first search methods.

Unit – II
Heuristic search method, generate and test, hill climbing, best first method, graph search,
AND OR search methods, constraint satisfaction, backtracking. Introduction to list and
string processing, concept of knowledge, Logic, prepositional and predicate calculus,
resolution.

Unit –III
Fundamentals of Machine Learning : Introduction to Machine Learning and its importance,
Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning, Basic
concepts: features, labels, training data, etc., Popular Machine Learning algorithms: Linear
Regression, Logistic Regression, Decision Trees, k-Nearest Neighbors, etc., Evaluation metrics
for Machine Learning models: accuracy, precision, recall, F1-score, etc.

Unit –IV
Introduction to Data Science : What is Data Science and why it is important?, Role of Data
Scientist and skills required, Data acquisition: sources of data, data formats, data cleaning, etc.,
Exploratory Data Analysis (EDA): statistical analysis, data visualization techniques,
Introduction to libraries/tools: NumPy, Pandas, Matplotlib, Seaborn, etc

Reference Books:
1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig
2. "Introduction to Machine Learning" by Ethem Alpaydin
3. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic
Thinking" by Foster Provost and Tom Fawcett

MSAIDS205: Big Data Analysis

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEnd SemesterExam(ESE)

Max Marks : 70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit-I
Understanding Big Data :Introduction, Need, convergence of key trends, structured data Vs. unstructured data, application, web analytics- big data and marketing, fraud and big data risk, big data and algorithmic trading, big data and its applications in healthcare, advertising etc. Mining Data Streams: - Introduction To Streams Concepts - Stream Data Model and Architecture - Stream Computing - Sampling Data in a Real Time Sentiment Analysis- Stock Market Predictions.

Unit-II
Big Data Technologies: Hadoop: Open source technologies, cloud and big data, Crowd Sourcing Analytics, inter and trans firewall analytics. Introduction to Hadoop: Introduction, Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes. Design of Hadoop distributed file system (HDFS), HDFS concepts - Java interface, data flow, Data Ingest with Flume and Sqoop. Hadoop I/O - data integrity, compression, serialization, Avro - file-based data structures.

Unit-III
Hadoop Related Tools: Introduction to Hbase: The Dawn of Big Data, the Problem with Relational Database Systems. Introduction to Cassandra: Introduction to Pig, Hive - data types and file formats - HiveQL data definition - HiveQL data manipulation - HiveQL queries. NOSQL Data Management: Introduction to NoSQL, aggregate data models, key-value and document data models, relationships, graph databases, schemaless databases,

Unit-IV
Predictive Analytics: Simple linear regression- Multiple linear regression- Interpretation 5 of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications. Map Reduce Applications: MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce - YARN, failures in classic Map-reduce and YARN, MapReduce Calculations.

Recommended Text / Reference Books:
1. Big Data, Black Book, DT Editorial Services, Dreamtech Press 2015
2. Professional NOSQL, Shashank Tiwari, Wrox, September 2011
3. Hadoop in Practice, Alex Homes, Dreamtech Press, 2015
4. HBase: The Definitive Guide, Lars George, O'Reilley, 2011.
5. Cassandra: The Definitive Guide, Eben Hewitt, O'Reilley, 2010.
6. Programming Pig, Alan Gates, O'Reilley, 2011.
7. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, P. J. Sadalage and M. Fowler, Pearson Education, Inc. 2012.
8. Programming Hive, E. Capriolo, D. Wampler, and J. Rutherglen, O'Reilley, 2012
9. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
10. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012

MSAIDS251:Java Programming Lab

Examination: Practical

Exercisesto beframed soas to coverthe topics andtools coveredintheory paper

MSAIDS252:DataStructure Lab

Examination:Practical

Exercisesto beframed soas to coverthe topics andtools coveredintheory paper

 MSAIDS**253:WebDesigningLab**

Examination:Practical

Exercisesto beframed soas to coverthe topics andtools coveredintheory paper

M.Sc.AI and Data Science - ThirdSemester

MSAIDS301: Data Science with R

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

Max Marks : 70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of 10 marks.

Unit-I

Introduction to Data Science: What is Data Science, Need for Data Science, Components of Data Science, Big data, Facets of data: Structured data, Unstructured data, Natural Language, Machinegenerated data, Graph-based or network data, Audio, image and video, Streaming data, The need for Business Analytics, Data Science Life Cycle, Applications of data science.

Unit-II

Data Science Process: Overview of data science process, setting the research goal, Retrieving data, Cleansing, integrating and transforming data, Exploratory data analysis, Data Modeling, Presentation and automation, Types of Analytics: Descriptive analytics, Diagnostic analytics, Predictive analytics, Prescriptive analytics.

Unit-III

Statistics: Basic terminologies, Population, Sample, Parameter, Estimate, Estimator, Sampling distribution, Standard Error, Properties of Good Estimator, Measures of Centers, Measures of Spread, Probability, Normal Distribution, Binary Distribution, Hypothesis Testing,Chi-Square Test, ANOVA.

Unit-IV

Data Science Tools and Algorithms: Basic Data Science languages- R, Python, Knowledge of Excel, SQL Database, Introduction to Weka, Regression Algorithms: How Regression Algorithm Work, Linear Regression, Logistic Regression, K-Nearest Neighbors Algorithm, K-means algorithm.

Recommended Books:

1. Samuel Burns, "Fundamentals of Data Science: Take the first Step to Become a Data Scientist", Amazon KDP Printing and Publishing, First Edition, 2019

2. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, "Introducing Data Science", Manning Publications, 2016

3. Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk From The Frontline", O'Reilly. 2014

MSAIDS302:Python with AI and Data Science

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam (ESE)

Max Marks : 70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

UNIT-I

Introduction to Python Programming : Introduction to Python: history, features, and advantages, Setting up Python development environment (IDEs, Jupyter Notebooks, etc.), Basic Python syntax: variables, data types, operators, control structures (if, else, loops), Functions and modules in Python, Handling exceptions in Python programs

UNIT-II

Python Libraries for Data Handling and Manipulation : Introduction to NumPy for numerical computing with Python, Working with arrays and matrices in NumPy, Introduction to Pandas for data manipulation and analysis, Data structures in Pandas: Series, DataFrame, Index, Data cleaning and preprocessing techniques using Pandas

UNIT-III

Advanced Data Visualization with Python : Interactive visualization with Plotly and Bokeh, Customizing visualizations with Matplotlib and Seaborn: advanced plotting techniques, themes, styles, 3D visualization with Matplotlib and Plotly, Dashboards and interactive applications using Dash, Introduction to geospatial data visualization with GeoPandas and Folium

UNIT-IV

Advanced Machine Learning Techniques : Ensemble learning methods: Random Forest, Gradient Boosting, AdaBoost, Kernel methods: Support Vector Machines (SVM), Kernel Ridge Regression, Unsupervised learning techniques: Clustering (K-Means, DBSCAN), Dimensionality Reduction (PCA, t-SNE), Semi-supervised and self-supervised learning, Anomaly detection algorithms

Reference Books:
1) "Python for Data Analysis" by Wes McKinney
2) "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron
3) "Pattern Recognition and Machine Learning" by Christopher M. Bishop
4) "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville

MSAIDS303:Data Visualization Tool and Technique

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks: 40*

QuestionPaperpatternforEndSemesterExam(ESE)

Max Marks : 70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

UNIT-I
Introduction to Data Visualization : Importance of Data Visualization Principles of Data Visualization Types of Data Visualization Data Representation Techniques Bar Charts and Histograms Line Charts and Area Charts Scatter Plots and Bubble Charts Pie Charts and Donut Charts.

UNIT-II
Data Visualization Tools : Introduction to Tableau, Introduction to Power BI and Python libraries (Matplotlib, Seaborn, **Plotly**) Introduction to R libraries (ggplot2, plotly (R))

UNIT-III
Interactive Data Visualization : Adding Interactivity to Visualizations, Tool-specific Interactivity Features, Best Practices for Interactive Visualizations

UNIT-IV
Design Principles : Color Theory in Data Visualization, Typography and Layout in Visualizations, Gestalt Principles in Visualization Design.

ReferenceBooks:
1. Data Points: Author: Nathan Yau, Publisher: Wiley, Year: 2013.
2. Information Dashboard Design: Author: Stephen Few, Publisher: O'Reilly Media, Year: 2013
3. The Visual Display of Quantitative Information: Author: Edward Tufte, Publisher: Graphics Press, Year: 2001.
4. Storytelling with Data: Author: Cole Nussbaumer Knaflic, Publisher: Wiley, Year: 2015

MaxMarks:100(ESE:70   CIA: 30)   *Passing marks:40*
QuestionPaperpatternforEndSemesterExam(ESE)

Max Marks :

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10marks.

Unit-I

Introduction :Machine Learning, Machine Learning Foundations-Overview, Applications, Types of Machine Learning, Basic Concepts in Machine Learning - Examples of Machine Learning. Perspectives/Issues in Machine Learning, Designing a learning system. Concept Learning: Introduction, a concept learning task, concept learning as search, Find-S algorithm, Version space and Candidate-Elimination algorithm,, Inductive bias

Unit-II

Supervised Learning :Introduction, Linear Models of Classification - Decision Trees, Naïve Bayes Classification, Linear Regression - Logistic Regression, Bayesian Logistic Regression, Probabilistic Models, Artificial Neural Network- perceptron, multilayer networks and back propagation algorithm, Ensemble Methods - Random Forest - Bagging - Boosting. Evaluating Hypothesis: estimating hypothesis accuracy, basics of sampling theory, comparing learning algorithms.

Unit-III

Unsupervised Learning :Clustering, K-Means Clustering, EM (Expectation Maximization). Mixtures of Gaussians, EM algorithm in General, The Curse of Dimensionality, Dimensionality Reduction, Factor Analysis, Principal Component Analysis, Probabilistic PCA, Independent Component Analysis. Challenges for Big Data Analytics.

Unit-IV

Instance based Learning-Nearest neighbor classification, k-nearest neighbor, locally weighted regression, lazy and eager learner Reinforcement Learning-Introduction, Elements of Reinforcement Learning, Difference between Reinforcement Learning and Supervised Learning, Applications of Reinforcement Learning, The Learning Task, Q learning, Nondeterministic rewards and actions, Temporal difference learning. Model based learning, Semi-Supervised Learning, Computational Learning Theory.

Recommended Text/ Reference Books:

1. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer 2006

2. EthemAlpaydin, "Introduction to Machine Learning", Prentice Hall of India, 2005

3. Joel Grus, "Data Science from Scratch- First Principles with Python", O'Reilly, 2015

4. Tom Mitchell, " Machine Learning", McGraw-Hill, 1997

5. Stephen MarsLand, "Machine Learning-An Algorithmic Perspective", CRC Press, 2009

6. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012

7. M. Gopal, "Applied MACHINE LEARNING", McGraw-Hill, 2018

8. Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language", Addison Wesley, 2010

MSAIDS305:Cloud Computing

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

Max Marks : 70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions(1fromeachunitwithinternalchoice)of10 marks.

Unit-I
Introduction of Cloud Computing: Nutshell of cloud computing, Enabling Technology, Vision, feature Characteristics and components of Cloud Computing. Challenges, Risks and Approaches of Migration into Cloud., Layer and Types of Clouds, Services models, Cloud Reference Model.

Unit-II
Cloud Computing Architecture: Data center Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Features of cloud programming, Parallel and distributed programming paradigms-MapReduce, Hadoop, High level Language for Cloud. Service Oriented Architecture - REST and Systems of Systems - Web Services - Publish Subscribe Model

Unit-III
Virtualization Technology: Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server, Desktop, Network, and Virtualization of data-center.

Unit-IV
Securing the Cloud: Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture. Legal issues in cloud Computing. Data Security in Cloud: Risk Mitigation, Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management Cloud Platforms in Industry: Amazon web services, Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds Cloud applications:
Protein structure prediction, Data Analysis, Satellite Image Processing, CRM and ERP, Social networking. Cloud Application- Scientific Application, Business Application.

Recommended Text / Reference Books:

1. Cloud Computing,Principle and Paradigms, Edited By RajkumarBuyya, JemesBroberg, Goscinski, Pub.-Wiley-2016
2. Kumar Saurabh, "Cloud Computing", Wiley Pub 2016 A.
3. Distributed and Cloud Computing, Kai Hawang, GeofreyC.Fox, Jack J. Dongarra Pub: Elservier, 2013
4. Krutz, Vines, "Cloud Security ", Wiley Pub,2010
5. Velte, "Cloud Computing- A Practical Approach",TMH Pub,2009
6. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing-A Business Perspective on Technology and Applications", Springer,2010

MSAIDS351:
Examination:**R Programming Lab**
Exercisesto be framedso as to coverthe topics andtoolscovered intheory paper.

MSAIDS352: PythonLab
Examination:Practical
Exercisesto beframed soas to coverthe topics andtools coveredintheory paper.

MSAIDS353: Machine LearningLab
Examination:Practical
Exercisesto beframed soas to coverthe topics andtools coveredintheory paper.

M.ScAI and Data Science –Fourth Semester

MSAIDS401(Elective 1):(a)DataWarehousing andData Mining

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

MaxMarks:70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10). Part-B
will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain 4questions(1 fromeachunitwithinternalchoice)of10 marks.

Unit –I
Introduction to Data Warehouse: Data warehouse uses, Data Warehouse Planning stages and Designingapproaches.DeliveryProcess-DataWarehouseDeliveryMethods. System Processes; data in Flow Process, Extract and load process, Clean and transformProcess, Backup and Archive process and Query Management Process. Process Architecture - Load manager, Warehouse manager, Query manager.

Unit –II
Database Schema: Star flake schema, Designing fact tables and dimension tables, Multi-dimension schemas. Horizontal and vertical partitioning, Hardware partitioning. Data Marts, Designing Data Marts. Metadata transformation and load Managers.
Hardware Architecture: Process, Server, Network and Client hardware. Contents of data warehousedatabase,Databasestructuresandlayoutandfilesystems.OLAPfunctionandtools, OLAP Servers, ROLAP, MOLAP.

Unit –III
Security: Security requirements, Backup strategies and disaster recovery, operations of Warehouse. Capacity Planning (Process Estimate load), Tuning the data warehouse (Aggregate performance, data load and queries). Testing data warehouse-Develop test plan Testing backup recovery, Testing operational environment, testing database, testing of the application. Data warehouse futures.

Unit –IV
Data Mining: Data mining concepts, business, technical and social context for data mining, data mining interface, data mining approaches, data mining methodologies, data preprocessing, data cleaning, data reduction, data transformation, technologies used for data mining, cluster analysis, portioning method.

RecommendedBooks :
1. Datamining& warehousing[conceptsand techniques]: Saumya Bajpai.
2. Dataminingconcepts&techniques:jiaweihan,michelinekamber,jian pei.
3. SamAnahory,DennisMurray,"DataWarehousing",PearsonEducation pub.
4. MichelA.Berry,Gordon S.Linoff,"Mastering DataMining",Wiley Publishing.
5. MallachG, FrednE, "DecisionSupport Systemand DataWarehouse Sustems", TMH
6. John Poole, Dan Chang, Dauglas Talbert,"Common Warehourse Metadata Developer's Guide", Wiley pub

MSAIDS401 Elective PaperI: (b) Soft Computing

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

Max Marks : 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT-I
Introduction to Soft Computing: Introduction of Hard and Soft Computing, Unique features of Soft computing, Components of Soft computing, Fuzzy Computing, Evolutionary Computation, Genetic Algorithm, Swarm Intelligence, Ant Colony Optimizations, Neural Network, Machine Learning Associative Memory, Adaptive Resonance Theory, Introduction to Deep Learning.

UNIT-II
Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion, Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Inference Systems, Mamdani Fuzzy Model. Sugeno Fuzzy Model, Fuzzy Controller, applications.

UNIT-III
Neural Networks: Introduction and Architecture: Neuron, Nerve structure and synapse, Artificial Neuron and its model, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Back propagation networks architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, back propagation algorithm, applications.

UNIT-IV
Genetic Algorithms: Basic concepts of GA, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications. Hybrid Systems: Integration of neural networks, fuzzy logic and genetic algorithms. GA Based Back Propagation Networks, Fuzzy Back Propagation Networks, Fuzzy Associative Memories, Simplified Fuzzy ARTMAP.

Recommended Text / Reference Books:

1. S. Rajasekaran and G.A.Vijaylakshmi Pai,"Neural Networks Fuzzy Logic, and Genetic Algorithms", Prentice Hall of India 2004.

2. K.H.Lee. First Course on Fuzzy Theory and Applications, Springer-Verlag.

MSAIDS402Elective Paper II:(a)Natural Language Processing

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

Max Marks : 70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions (1fromeachunitwith internalchoice)of10 marks.

UNIT-I
INTRODUCTION: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance 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.

UNIT-II
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 CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures.

UNIT-III
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.

UNIT-IV
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, FilterBank And LPC Methods.

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.

5. Frederick Jelinek, "Statistical Methods Of Speech Recognition", MIT Press, 1997.

6. 1. Breck Baldwin, ―Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.

7. Richard M Reese, ―Natural Language Processing with Java, OReilly Media, 2015.

MSAIDS**402ElectivePaperII:(b)Deep Learning**

MaxMarks:100(ESE: 70   CIA: 30)   *Passing marks:40*

QuestionPaperpatternforEndSemesterExam(ESE)

Max Marks : 70

Part-Awillcontain12veryshortquestionsof1markeach(attemptany10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-Cwillcontain4questions (1fromeachunitwith internalchoice)of10 marks.

UNIT-1
Introduction: What is a Neural Network?, The Human Brain, Models of a Neuron, Neural Networks Viewed As Directed Graphs, Feedback, Network Architectures, Rosenblatt‟s Perceptron: Introduction, Perceptron, The Perceptron Convergence Theorem, Relation Between the Perceptron and Bayes Classifier for a Gaussian Environment.

UNIT-II
Multilayer Perceptrons: Introduction, Batch Learning and On-Line Learning, The Back-Propagation Algorithm, XOR Problem, Heuristics for Making the Back- Propagation Algorithm Perform Better, Back Propagation and Differentiation.

UNIT-III
Regularization for Deep Learning: Parameter Norm Penalties - L2 Parameter Regularization, Dataset Augmentation, Semi-Supervised Learning. Optimization for Training Deep Models: Challenges in Neural Network Optimization – Ill Conditioning, Local Minima, Plateaus, Saddle Points and Other Flat Regions.

UNIT-IV
Convolution neural networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Convolutional Networks and the History of Deep Learning.

Text Book:
1. Simon Haykin, Neural networks and Learning Machines, Third Edition, Pearson, 2016
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.
   https://www.deeplearningbook.org/lecture_slides.html

MSAIDS451:Project(Project,Report,Viva)

Two typed and duly bound copies of project report shall be submitted at least 3 weeks beforecommencement of the Theory/Practical examination which ever commences earlier.

General instructions about preparation of training report

1. The Power Point Presentation has to be prepared for the project report.
2. The PowerPoint Presentation will be around 10-15mins, and then question answers. So prepare the number of slides accordingly.
3. The binding for reports will be spiral binding.
4. The format for the reports should be adhered with exactly.
5. The Coding of the Project should not be included in the report.
6. Contents of Index page should include the following parts:
   a. Project Requirements.
   b. Feasibility Study.
   c. Detailed Designing:
   d. List of Figures.
   e. List of DFD.
   f. List of ER-Diagram.
   g. List of Tables.
   i. Testing.
   j. Future Scope.

Page Format of Project Report should be as follows.
Paper: A4
Font: Times New Roman, Bookman Old Style
        Chapter Heading: 16pt, Subheading: 14pt.
Running Matter: 12 pt
All topics will be numbered accordingly. Paragraph
Gap: 6 Pt Maximum
Line Gap: 1.5
Margins: Left 1.5, Right, Top and Bottom 1 inch

Please Note: Project report of live project in the given format has to be prepared in 3 sets. These reports should have CD containing the soft copy and PowerPoint Presentation of Project report.

Formatof FrontPage ofProject Report.

Project Report

SubmittedtotheS.S.JainSubodhP.G.(Autonomous)College,

University of Rajasthan, Jaipur

Logoof college   **UORlogo**

inPartialfulfillmentoftherequirementforthedegreeof

MASTEROFSCIENCEAI and Data Science

Submittedby
(yourname)

Name of Internal Guide   **Name of Training Incharge (fromthecompany,whereyou have undergone training)**

MScAI and Data Science)

(AcademicSession)

(monthofdepositionandyear)

Formatof LiveTrainingCertificateon companyletter head

CERTIFICATE

Thisistocertifythat"**yourname,S/D/O------------------- "**is/wasundertrainingfrom……(startdate)

to….(enddate)inmysupervisionforpartialfulfillmentoftherequirementfortheawardofthe Degree of

Master of Science (Information Technology).

Duringthisperiodhe/shehasworkedon…….(descriptionoftraining)projectas ----------------.
Iwishforhis/hergood future.

Date: **NameofTraining Incharge**

Designation