HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)

(Affiliated to Osmania University)

Nallakunta, Hyderabad, Telangana

BOARD OF STUDIES

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

B. Sc. (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) I/II/III Years

WITH EFFECT FROM

ACADEMIC YEAR 2024 - 25

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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Department of Computer Science
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(AUTONOMOUS & NAAC REACCREDITED)
Nallakunta, Hyderabad-44.

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PROFESSOR
Department of Computer Science & Engineering
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2.
3. Osmania University
Hyderabad-500 007.

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Arts, Commerce & Science
Nallakunta, Hyderabad-44

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
AGENDA OF THE MEETING

1 Welcome address by the chair.

2 Previous Meeting Details.

3 Details of choice-based credit system.

4 Discussion and Distribution of Common Core Syllabus for all the Semester.

5 Marks allotted for internal and end semester exams.

6 Discussion on Pattern and model paper of Semester Exam and internal exam for all the Semester.

7 Discussion on Practical exam model paper for all the Semester.

8 Panel of Examiners

9 Any other matter

10 Vote of thanks

Chairperson

Department of Computer Science
Hindi Mahavidyalaya
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
BOARD OF STUDIES
Academic Year – 2024-2025
Minutes of BOS Meeting

by circulation

CHAIRMAN
Board of Studies in CSE (A)
Dept. of Computer Science & Engg.
College of Engg., O.U. Hyderabad.

BOS meeting of the Department of Computer science was held on ..... The following members were present.

Prof. K. Shyamala	-	Ex-Officio member-BOS
Prof.P.V.Sudha	-	Subject Expert, O.U
Smt B.Ramani	-	Member of BOS
Mr.Aravind.Sharma	-	Member of BOS
Dr. Raghunadh Acharya	-	Member of BOS
Mr.Avinash Pal Lidlaan	-	Member of BOS

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University
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Hindi Mahavidyalaya
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Nallakunta, Hyderabad-44.

4.1 Welcome address by the chair

The chair welcomed the University Nominee, Chairperson BOS, O.U. Department of Computer Science and Member of B.O.S

4.2 Previous Meeting details

The CBCS system has been introduced by Osmania University from 2020-21. The theory and practical syllabus of I, II & III years of B.Sc., question paper pattern for theory and practical, internal assessment pattern, practical examination scheme and panel of examiners were discussed and approved by all the BOS Members in previous BOS meeting.

4.3 Details of choice-based credit system.

Members were informed that TSCHE has referred that from the academic year 2020-21 autonomous institutions have to follow CBCS i.e. From the Academic Year 2020-21 Osmania University has instructed all the Degree colleges including Autonomous Degree colleges to follow CBCS under which after passing the exam student will get the Grade in the Result. B.Sc. I YEAR SEM I & II- AND II-YEAR SEM III & IV 4 credits are given for the theory and 1 credit for practical in each semester and III YEAR in V and VI semester 3 credits are given for theory paper and 1 credit is given for practical in each semester.

4.4 Discussion and Distribution of Common Core Syllabus for semester I, II and III.

1. Members were informed by the chair that Department of Computer Science, Hindi Mahavidyalaya is following common core syllabus prescribed by Osmania University B.Sc. III YEARS in all the semesters.
2. The syllabus comprises of 4 units.
3. Syllabus copy for all the semesters is enclosed.
4. Syllabus was approved by the Members of BOS.

4.5 Marks allotted for Internal and end Semester exams.

1. Internal assessment is of 30 marks and 5 marks assignment ,5 marks seminar where students have to answer 20 MCQs in 25 minutes. Each question carries 1 mark. In each Semester two internal assessments of 20 Marks will be conducted and an average of both the internal assessments will be added in the marks of theory exam.
2. Theory Question paper is of 70 marks.
3. Total allotted marks are 100 for each theory paper DSC/DSE (A&B).

The distribution of marks was approved by the Members of BOS.

4.6 Discussion on Pattern and Model Paper of Semester exam and Model Paper of Internal Exam

1. It was informed by the department that in each Semester Two Internal exams will be conducted for 20 marks. The internal assessment will have three sections.

Section – A 20 Multiple choice questions each carries 1 marks (20*1 =20M),
Section – B Assignment – 5 Marks
Section – C Seminar – 5 Marks

Average marks of these two internal exams will be taken.

2. Semester exam will be conducted as per the Almanac which will be provided by the exam branch. Internal exam duration will be 25 Min and Semester exam duration will be of 2½ hrs.

3. Model Question paper for all the Semesters was discussed. Theory paper for each Semester will have 2 sections.

i) Section A contains 8 short Questions. The student must answer six questions.
Each Question carries 3 Marks (6X3=18 Marks)
ii) Section B contains 4 Essay type Questions with internal choice. Each Question carries 13 Marks (4X13=52 Marks)
ii) Section B contains 2 Essay type Questions with internal choice. Each Question carries 15 Marks (2X10=20 Marks)

- Pattern of Model Theory Question Papers for DSC Paper III and Paper IV are enclosed.
- Pattern of Model Theory Question Papers for DSC was approved by Member of BOS

4. It was informed by the department that in each semester one internal exam will be conducted for AECC of 15 marks. The internal assessment will have two sections
   i) Section A 10 mcqs each carries 1 mark(10*1=10m)
   ii)section B Assignment/seminar- 5 marks

5. Model question paper of AECC for Semester I and semester II was discussed.Theory paper for each AECC will have 2 sections
   i)Section A contains 4 short Questions.The student has to answer THREE questions.Each question carries 5marks(3*5=15marks)
   ii) Section B contains 2 Essay type Questions with internal choice.Each question carries 10marks(2*10=20marks)

6. It was informed by the department that in each semester one internal exam will be conducted for SEC of 15 marks. The internal assessment will have two sections
   i) Section A 10 mcqs each carries 1mark(10*1=10m)
   ii)section B Assignment/seminar-5marks

7. Model question paper of SEC for Semester III and semester IV was discussed.Theory paper for each SEC will have 2 sections
   i)Section A contains 4 short Questions.The student has to answer THREE questions.Each question carries 5marks(3*5=15marks)
   ii) Section B contains 2 Essay type Questions with internal choice.Each question carries 10marks(2*10=20marks)

4.7 Discussion on Practical Exam Model paper.

It was decided in BOS meeting that 50 Marks Practical Exam of 2 hrs will be held in each Semester's and 1 credit will be given for Practical in each Semester.

- Pattern of Model Practical Question Papers for each Paper are enclosed.
- Pattern of Model Practical Question Papers was approved by Members of BOS

4.8 Panel of Examiners

The panel of examiners was approved by the members.

- List is enclosed.

4.9 Any other matter.

4.10 Vote of Thanks

Meeting concluded with the Vote of Thanks by Mr. Avinash Pal Lidlaan

Chairperson **University Nominee** **Members** **Principal**

Department of Computer Science
Hindi Mahavidyalaya
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3

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
Academic Year – 2024-2025
B.Sc. (Artificial Intelligence and Machine Learning) with Mathematics Combination CBCS PATTERN IN SEMESTER SYSTEM-2022-2023

Course Title (B.Sc – AI & ML)	Hours/Week		Credits	Marks
	Theory	Practical		
Semester –I				
Fundamentals of InformationTechnology	4	3	4+1	100
Certification Course: Chat GPT Basic and Professional, Gen AI	2	--	–	–
Semester –II				
Object oriented programming with python	4	3	4+1	100
Fundamentals of Computers (AECC)	2		2	50
Certification Course: R and R Studio	2	--	–	–
Semester –III				
Communication skills/Professional skills (SEC-I)	2		2	50
Mini Project (SEC II)	2		2	50
Operating systems with linux	4	3	4+1	100
Certification Course: Advanced R and R Studio	2	--	–	–
Semester –IV				
Leadership and management skills/universal human values (SEC III)	2		2	50
Mini Project (SEC IV)	2		2	50
Data Analytics	4	3	4+1	100
Certification Course: Social Media Analytics	2	--	–	–
Semester –V				
A. Natural Language Processing	4	3	4+1	100
B. Artificial Intelligence	4	3	4+1	100
Advanced Artificial Intelligence and Machine Learning **(GE)**	4		4	100
Certification Course: Industry Insights & Applications	2	--	–	–
Semester –VI				
A. Deep Learning	4	3	4+1	100
B. Machine Learning	4	3	4+1	100
Major Project	4		4	100
Certification Course: Cloud Storage and Computing	2	--	–	–

Total:- 30

Chairperson — University Nominee — Members — Principal

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Academic Year – 2024-2025

B.Sc. (Artificial Intelligence and Machine Learning)

with Mathematics & Statistics Combination CBCS PATTERN IN SEMESTER SYSTEM-2022-2023

Course Title (B.Sc – AI & ML) Mathematical papers	Hours/Week		Credits	Marks
	Theory	Tutorial		
Semester –I				
Differential & Integral Calculus	5	1	4+1	100
Semester –II				
Differential Equations	5	1	4+1	100
Semester –III				
Communication skills/Professional skills **(SEC-I)**	2		2	50
(A) Theory of Equations (OR) **(B)** Logic & Sets **(SEC II)**	2		2	50
Real Analysis	5	1	4+1	100
Semester –IV				
Leadership and management skills/universal human values **(SEC III)**	2		2	50
(A) Number Theory (OR) **(B)** Vector Calculus **(SEC IV)**	2		2	50
Algebra	5	1	4+1	100
Semester –V				
Linear Algebra	5	1	4+1	100
(A) Basic Mathematics (OR) **(B)** Mathematics for Economics & Finance **(GE)**	4		4	100
Semester –VI				
A. Numerical Analysis	5	1	4+1	100
B. Integral Transforms	5	1	4+1	100
C. Analytical Solid Geometry	5	1	4+1	100
Major Project (Mathematical Modelling)	4		4	100

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with Mathematics & Statistics Combination CBCS PATTERN IN SEMESTER SYSTEM-2022-2023

Course Title (B.Sc – AI & ML) Statistics papers	Hours/Week		Credits	Marks
	Theory	Practical		
Semester –I				
Descriptive Statistics and Probability	4	3	4+1	100
Semester –II				
Probability Distributions	4	3	4+1	100
Semester –III				
Communication skills/Professional skills (SEC-I)	2		2	50
Data Collection, Presentation and Interpretation (SEC II)	2		2	50
Statistical Methods and Theory of Estimation	4	3	4+1	100
Semester –IV				
Leadership and management skills/universal human values (SEC III)	2		2	50
Data Scaling Techniques and Report writing (SEC IV)	2		2	50
Statistical Inference	4	3	4+1	100
Semester –V				
Applied statistics I	3	2	3+1	75T + 25P
A. Statistical Quality Control and Reliability	3	2	3+1	75T + 25P
B. Bio-Statistics - I	3	2	3+1	75T + 25P
C. Actuarial Statistics - I	3	2	3+1	75T + 25P
Basic Statistics-1 **(GE)**	4		4	100
Semester –VI				
Applied statistics II	3	2	3+1	75T + 25P
A. Operations Research	3	2	3+1	75T + 25P
B. Bio-Statistics - II	3	2	3+1	75T + 25P
C. Actuarial Statistics - II	3	2	3+1	75T + 25P
Major Project	4		4	100

The Objectives of Bachelors of Artificial Intelligence & Machine Learning:

ANY STUDENT COMPLETING THE THREE-YEAR PROGRAM WILL BE EXPECTED TO HAVE: -

1. Good understanding of the uses of AI & ML.
2. Acquire the Machine learning knowledge viz., modelling a situation as Artificial Intelligence etc.,
3. Develop basic models for a given situation which will provide the solution.
4. Think and work in the research lines.
5. Get into premier institutions for Higher Studies.

Take – Aways of the Course.

1. Artificial Intelligence based Applications
2. Working Knowledge in Machine learning, Python, R & R - Studio
3. Ability to develop applications to different businesses using AI & ML
4. Bigdata, Cloud Computing
5. To undertake the Projects.
6. Ability to write a research paper.

CERTIFICATION COURSES

Semester	Theory/Practical	Paper Title	Instruction Hrs/Week	Continuous Evaluation IA and Assign.	Total Marks	Credits
I	**Certification Course**	**Chat GPT Basic and Professional ,Gen AI**	**2**	**I:15 + E:35**	50	-
II	**Certification Course**	**R and R Studio**	**2**	**I:15 + E:35**	50	-
III	**Certification Course**	**Advanced R and R Studio**	**2**	**I:15 + E:35**	50	-
IV	**Certification Course**	**Social Media Analytics**	**2**	**I:15 + E:35**	50	-
V	**Certification Course**	**Industry Insights & Applications**	**2**	**I:15 + E:35**	50	-
VI	**Certification Course**	**Cloud Storage and Computing**	**2**	**I:15 + E:35**	50	-

I: Internal exam E: External exam

SEMESTER WISE ADDON COURSES

Semester – I

Chat GPT Basic and Professional, Gen AI **(10 Hrs)**

Generative Artificial Intelligence (AI) and Chat Generative Pre-training Transformer (ChatGPT).

Objectives ... To acquaint the participants with ChatGPT and Gen AI

- Introduction to Generative AI and ChatGPT
- Using ChatGPT for content creation
- Using ChatGPT for data analysis and automation
- Ethical and Responsible usage of ChatGPT

Semester – II

R and R Studio **(10 Hrs)**

Objectives ... To acquaint the participants giving an understanding of data types and creating tables and graphs.

- Data Types in R
- Data Manipulation using R.
- Data Visualization using R.

Semester – III

Advanced R and R Studio **(10 Hrs)**

Objectives ... To acquaint the participants giving an understanding and hands on experience to advanced content of R and R – Studio.

- Data Engineering
- Functions
- Correlations and Regression
- Machine Learning

Semester – IV

Social Media Analytics **(10 Hrs)**

Objectives … To acquaint the participants on need for Social Media information and tools to comprehend the social media data.

- Need for Social Media Analytics
- Text Mining
- Web Scrapping
- Sentiment and Behaviour Analytics

Semester – V

Industry Insights & Applications **(10 Hrs)**

Objectives … To acquaint the participants on Different Industries and use of AI & ML in Business.

- Insights in to different Industries Banking & Insurance , Telecom , Retail
- Hierarchy in Companies
- Applications and Solutions

Semester – VI

Cloud Storage and Computing

Objectives … To acquaint the participants on Cloud and related.

- **Introduction to Cloud Storage and Cloud Computing**
- **Features of Cloud storage system**
- **Advantages and disadvantages of cloud**
- **Insights into AWS Project.**

The project should be taking a scenario of an industry and collect the data and provide a solution to the business situation making use of the tools of AI and ML.
The preferred industries are telecom, banking , health care , retail.
The project can as well be any real life or real time situation.
Project must be taken up by a team of maximum of Three members.

Note
Every student must take up all the certificate courses and must get a minimum 50 %.
A certificate from HMV and Industry will be awarded to the student.
Certification courses are for Non-Credit.
Each certification must include a Project.

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Academic Year – 2024-2025

B.Sc. (Artificial Intelligence and Machine Learning) with Mathematics Combination

CBCS PATTERN IN SEMESTER SYSTEM-2022-2023

Ist YEAR SEMESTER –I					Semester end exams		Continuous internal evaluation		TOTAL	Practical 2hrs
Code	Course title	Course type	HPW	Credits	Duration in hrs	Marks	Exam duration	Marks		
	Fundamentals of Information Technology	DSC-3C	4T+3P	4+1=5	2½	70	25MIN	30	100	50

Ist YEAR SEMESTER –II					Semester end exams		Continuous internal evaluation		TOTAL	Practical 2hrs
Code	Course title	Course type	HPW	Credits	Duration in hrs	Marks	Exam duration	Marks		
	Object oriented programming with python	DSC-3C	4T+3P	4+1=5	2½	70	25MIN	30	100	50
	Fundamentals of Computers (AECC)	AECC - II	2T	2	1½	35	15MIN	15	50	-

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CBCS PATTERN IN SEMESTER SYSTEM-2022-2023

IInd YEAR SEMESTER –III					Semester end exams		Continuous internal evaluation		TOTAL	Practical 2hrs
Code	Course title	Course type	HPW	Credits	Duration in hrs	Marks	Exam duration	Marks		
	Operating systems with linux	DSC-3C	4T+3P	4+1=5	2½	70	25MIN	30	100	50
	Mini Project (SEC - II)	SEC - II	2T	2	1½	35	15MIN	15	50	-

IInd YEAR SEMESTER –IV					Semester end exams		Continuous internal evaluation		TOTAL	Practical 2hrs
Code	Course title	Course type	HPW	Credits	Duration in hrs	Marks	Exam duration	Marks		
	Data Analytics	DSC-3C	4T+3P	4+1=5	2½	70	25MIN	30	100	50
	Mini Project (SEC - IV)	SEC - IV	2T	2	1½	35	15MIN	15	50	-

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B.Sc. (Artificial Intelligence and Machine Learning) with Mathematics Combination

CBCS PATTERN IN SEMESTER SYSTEM-2022-2023

IIIrd YEAR SEMESTER –V					Semester end exams		Continuous internal evaluation		TOTAL	Practical 2hrs
Code	Course title	Course type	HPW	Credits	Duration in hrs	Marks	Exam duration	Marks		
	A. Natural Language Processing B. Artificial Intelligence	DSC-3C	4T+3P	4+1=5	2½	70	25MIN	30	100	50
	Advanced Artificial Intelligence and Machine Learning	GE	4T	4	2½	70	25MIN	30	100	-

IIIrd YEAR SEMESTER –VI					Semester end exams		Continuous internal evaluation		TOTAL	Practical 2hrs
Code	Course title	Course type	HPW	Credits	Duration in hrs	Marks	Exam duration	Marks		
	A. Deep Learning B. Machine Learning	DSC-3C	4T+3P	4+1=5	2½	70	25MIN	30	100	50
	Major Project		4T	4	-	60	15MIN	15	100	25

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B.Sc. (Artificial Intelligence and Machine Learning) – I YEAR SEMESTER- I

Paper-I: Fundamentals of Information Technology

HPW- 4T+2P **Credits – 4** **Marks – 70 + 30**

Objectives:

1. **To deal with the basic concepts of computers.**
2. **To discuss about the computer hardware, its components and basic computerarchitecture.**
3. **To understand the basic computer software including the operating system and its concepts.**
4. **To introduce the software development process**
5. **To introduce the basic concept of programming**

Outcomes:

Students should be able to

1. Identify the components of a computer and their functions.
2. Understand the concept of networking, LAN, Internet, and working of www.
3. Understand the notion of problem-solving using computer by programming.
4. Understand the notion of Software Project and the Process of software development.

Unit-I

Data and Information: Introduction, Types of Data, Simple Model of a Computer, Data Processing Using a Computer, Desktop Computer [Reference 1]

Acquisition of Numbers and Textual Data: Introduction, Input Units, Internal Representation of Numeric Data, Representation of Characters in Computers, Error-Detecting Codes [Reference 1]

Unit-II

Data Storage: Introduction, Storage Cell, Physical Devices Used as Storage Cells, Random Access Memory, Read Only Memory, Secondary Storage, Compact Disk Read Only Memory (CDROM), Archival Store [Reference 1]

Central Processing Unit: Introduction, Structure of a Central Processing Unit, Specifications of a CPU, Interconnection of CPU with Memory and I/O Units, Embedded Processors [Reference 1]

Unit-III

Computer Networks: Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming Computers Connected to Internet, Future of Internet Technology [Reference 1]

Input Output Devices: Introduction, Keyboard, Video Display Devices, Touch Screen Display, E-Ink Display, Printers, Audio Output [Reference 1]

Computer Software: Introduction, Operating System, Programming Languages, Classification of Programming Languages, Classification of Programming Languages Based on Applications [Reference 1]

Unit-IV

The Software Problem: Cost, Schedule, and Quality, Scale and Change [Reference 2]**Software Processes**: Process and Project, Component Software Processes, Software Development Process Models [Reference 2]
Programming Principles and Guidelines: Structured Programming, Information Hiding,Some Programming Practices, Coding Standards [Reference 2]

References

1. V Rajaraman. Introduction to Information Technology, 3rd Edition, PHI LearningPrivate Limited, 2018
2. Pankaj Jalote. Concise Introduction toSoftware Engineering, Springer, 2011

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B.Sc. (Artificial Intelligence and Machine Learning) – – I YEAR SEMESTER- I

Practical-I: Fundamentals of Information Technology (Lab)

HPW- 2P **Credits- 1** **Marks - 50**

Objective

The main objective of this laboratory is to familiarize the students with the basic hardwareand software in computers.

Exercises

1. Assembly and disassembly of a system box and identifying various parts inside thesystem box to recognize various parts of a typical computer system
2. Assembly and disassembly of peripheral devices- keyboard and mouse and study oftheir interface cables, connectors and ports.
3. Installation of Operating Systems-Windows and Linux
4. Disk defragmentation using system tool.
5. Procedure of disk partition and its operation (Shrinking, Extending, Delete, Format).
6. Installing and uninstalling of device drivers using control panel.
7. Working practice on windows operating system and Linux operating system: creatingfile, folder. Copying, moving, deleting file, folder
8. User Account creation and its feature on Windows Operating System and Changingresolution, color, appearances, and Changing System Date and Time.
9. Installation and using various wireless input devices (Keyboard/Mouse/Scanners etc.,)under Windows/Linux.
10. Study of various types of memory chips and various types of hard disk drives, partition and formatting of hard disk.
11. Installation of scanner, modem and network cards in Windows/Linux.
12. Assembly and disassembly of printer, installing a printer, taking test page, and usingprinter under Windows/Linux.
13. Installation of application software's – Office Automation, Anti-Virus.
14. Demonstrate the usage of Word and Power point in Windows and Linux
15. Configure Internet connection, Email Account creation, reading, writing and sendingemails with attachment.

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B.Sc. (Artificial Intelligence and Machine Learning) – I YEAR SEMESTER- I

AECC-II: Fundamentals of Computers

HPW-2T **Credits-2** **Marks - 50**

Objectives:

1. **To deal with the basic concepts of computers.**
2. **To discuss about the computer hardware, its components and basic computer architecture.**
3. **To understand the basic computer logic gates concept.**
4. **To introduce the software development process.**
5. **To introduce the basic concept of system hardware.**

Outcomes:

Students should be able to

1. Identify the components of a computer and their functions.
2. Understand the concept of networking, LAN, Internet, and working of www.
3. Understand the notion of problem-solving using computer by programming.
4. Understand the notion of computer software process and its features.

Unit-I

Introduction to Computers: what is a computer, characteristics of Computers, Generations of Computers, Classifications of Computers, Basic Computer organization, Applications of Computers. Input and Output Devices: Input devices, Output devices, Softcopy devices, hard copy devices. Computer Memory and Processors: Introduction, Memory Hierarchy, Processor, Registers, Cache memory, primary memory, secondary storage devices, magnetic tapes, floppy disks, hard disks, optical drives, USB flash drivers, Memory cards, Mass storage devices, Basic processors architecture.

Unit-II

Number System and Computer Codes: Binary number system, working with binary numbers, octal number system, hexadecimal number system, working with fractions, signed number representation in binary form, BCD code, and other codes. Boolean algebra and logic gates: Boolean algebra, Venn diagrams, representation of Boolean functions, logic gates, logic diagrams and Boolean expressions using karnaugh map. Computer Software: Introduction to computer software, classification of computer software, system software, application software, firmware, middleware, acquiring computer software, design and implementation of correct, efficient and maintainable programs.

Text Book:

Reema Thareja, Fundamentals of Computers.

References:

1. **V.Rajaraman, 6th Edition Fundamentals of Computers, Neeharika Adabala.**
2. **Anita Goel, Computer Fundamentals.**

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – I YEAR SEMESTER- II

Paper-II: OBJECT PROGRAMMING USING PYTHON

HPW- 4T+2P **Credits - 4** **Marks – 70 + 30**

Unit - I

Identifiers, keywords, statements and Expressions, Variables, operators, precedence and associativity, data types, indentation, comments, reading input, print output, type conversions, the type() function and is operator, dynamic and strongly typed language, control flow statements, the if decision control flow statement, the if decision control flow statement, the if … else decision control flow statement, the if .. elif.. else decision control statement, nested if statement, the while loop, the for loop, the continue and break statements, catching exceptions using try and except statement, functions, built-In functions, commonly used modules, function definition and calling the function, the return statement and void function, scope and lifetime of variables, default parameters, keyword arguments, *args and **kwargs, command line arguments.

Unit – II

Creating and string strings, basic string operations, accessing characters in string by index number, string slicing and joining, string methods, formatting strings, lists, creating lists, basic list operations, indexing and slicing in lists, built-In functions used on lists, list methods, the del statement. Dictionaries: creating dictionary, accessing, and modifying key: value pairs in dictionaries, built-in functions used on dictionaries, dictionary methods, the del statement, tuples and sets, creating tuples, basic tuple operations, indexing and slicing in tuples, built-in functions used on tuples, relation between tuples and lists, relation between tuples and dictionaries, tuple methods, using zip() functions, sets, set methods, traversing of sets, frozen set.

Unit – III

Types of files, creating and reading text data, file methods to read and write data, reading and writing binary files, the pickle module, reading and writing CSV files, python os and os.path modules, regular expression operations, using special characters, regular expression methods, named groups in python regular expressions, regular expressions with glob module.

Unit - IV

Creating classes in python, creating objects in python, the constructor method, classes with muiltiple objects, class attributes versus data attributes, encapsulation, inheritance, the polymorphism.

Text book:

1. Gowrishankar s, veena A, "Introduction to python programming", 1st edition, CRC press/Taylor & francis 2018. ISBN-13:978-0815394372.
2. Jake vanderplas, "python data science handbook: Essentail tools for working with data", 1st edition, o'reilly media, 2016 ISBN-13:978-149-1912058.
3. AurelienGeron, Hands-on machine learning with scikit-learn and tensorflow: concepts, toolsand techniques to build intelligent systems, 1st edition, O'Reilly media, 2017. ISBN-13:978-149-1962299.
4. Wesley J Chun, "Core python applications programming", 3rd edition, pearson education india, 2015. ISBN-13:978-1491991732.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – I YEAR SEMESTER- II

Practical- II: OBJECT PROGRAMMING USING PYTHON (Lab)

HPW- 2P **Credits- 1** **Marks - 50**

Note:

- Programs of all the Concepts from Text Book including exercises must be practice and execute.
- In the external lab examination student must execute two programs with compilation and deployment steps are necessary.
- External Vice-Voce is compulsory.

COURSE OBJECTIVE:

To implement python with conditionals and loops. Also represent compound data using python lists, tuples, dictionaries. Read and write from/ to files in python.

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. First n prime numbers
8. Multiply matrices
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file.
11. Simulate elliptical orbits in Pygame
12. Simulate bouncing ball using Pygame

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – II YEAR SEMESTER- III

SEC- II: MINI -PROJECT

HPW-2T **Credits-2** **Marks – 50**

Course Objectives:

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical skill for solving the selected task.
3. To get confidence for implementing the task and solving the real time problems.
4. Express technical and behavioural ideas and thought in oral settings.
5. Prepare and conduct oral presentations

Outcomes:

On the successful completion of the course, student will be able to:

1. Formulate a real-world problem and develop its requirements develop a design solution for a set of requirements

2. Test and validate the conformance of the developed prototype against the original requirements of the problem

3. Work as a responsible member and possibly a leader of a team in developing software solutions

4. Express technical ideas, strategies and methodologies in written form. Self-learn new tools, algorithms and techniques that contribute to the software solution of the project

5. Generate alternative solutions, compare them and select the optimum one.

Aim of the project work:

1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.
2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application-oriented concepts.
3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.

Viva Voce:

1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the Annexure Report available in the College, for a total of 50 marks at the last day of the practical session.
2. Out of 50 marks, 35 marks for project report and 15 marks for Viva Voce.

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD

(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – II YEAR SEMESTER- III

Paper-III: Operating Systems with Linux

HPW- 4T+2P **Credits – 4** **Marks – 70 + 30**

UNIT I

Operating System: Concept, Components of Operating System, Operating System Operations, Protection and Security. Computing Environment. Abstract View of OS: User view, System View, Operating System Services, System Calls: Concept, Types of System Calls. Computer System Architecture: Single-Processor Systems, Multiprocessor Systems. Types of Operating Systems: Batch Operating System, Multi-Programmed Operating System, Time-Shared Operating System, Real Time Operating System, Distributed Operating Systems. Process Management: Process Concept, Operation on Processes, Cooperating Processes, Inter-Process Communication, Threads. Linux Operating System: Introduction to Linux OS, Basic Commands of Linux OS.

UNIT II

Process Synchronization: Introduction, The Critical-Section Problem with solution, Bakery Algorithm, Synchronization hardware, Semaphores, Semaphores Implementation, Classical Problems of Synchronization with algorithms, Critical Regions, Monitors. CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling algorithms, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling. Linux Operating System: Process Management Commands and System Calls.

UNIT III

Deadlock: System Models, Deadlock Characterization, Resource Allocation Graph, Deadlock Prevention, Avoidance, Detection and Recovery, Banker's algorithm. Memory Management: Main Memory: Contiguous Memory Allocation, Fragmentation, Paging, And Segmentation. Virtual Memory: Demand Paging, Page Replacement, Page replacement algorithm, Allocation of frames, Thrashing. Linux Operating System: Memory Management Commands and System Calls.

UNIT IV

File, Devices and Secondary Storage Management: File-System Interface: Concepts, Access Methods, Directory and Disk Structure. File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management. Devices: Types of devices, Channels and Control Unit, Multiple Paths, Block Multiplexing. Secondary Storage: Mass-Storage Structure, Disk Structure, Disk Scheduling Algorithms, Disk Management, RAID structure of disk. Linux Operating System: File Management Commands and System Calls.

TEXTBOOKS:

1. **Silberschatz, Galvin, Greg, "Operating System Concepts", Wiley and Sons, 9th Edition, 2015.**
2. **Sumitabha Das, "Unix concept and Programming", McGraw Hill education, 4th Edition, 2015.**

REFERENCE BOOKS:

1. **Godbole, Achyut, "Operating System", McGraw-Hill Education, 2nd Edition, 2005.**
2. **William Stallings, "Operating System: Internals and Design Principles", Person, 9th Edition, 2018.**
3. **A. S. Tanenbaum, "Modern Operating Systems ", Pearson, 3rd Edition, 2007.**
4. **Kenneth H. Rosenet al, "UNIX: The Complete Reference", McGraw-Hill/Osborne, 6th Editi ,•**
5. **iAadnick E. and Donovan J., "Operating Systems", Tata McGraw Hill, 2001.**

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – II YEAR SEMESTER- III

Practical- II: Operating Systems with Linux (Lab)

HPW- 2P Credits- 1 Marks – 50

LEARNING OBJECTIVES:
In this course, the learners will be able to develop the working expertise of the following: -

1. Perform Linux Operating System Installation.
2. Implement the policies of Process Management, Inter process communication and Memory Management.
3. Apply the basics of File Management, Device and Disk Storage Management

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – II YEAR SEMESTER- III

SEC- IV: MINI -PROJECT

HPW-2T **Credits-2** **Marks – 50**

Course Objectives:

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical skill for solving the selected task.
3. To get confidence for implementing the task and solving the real time problems.
4. Express technical and behavioural ideas and thought in oral settings.
5. Prepare and conduct oral presentations

Outcomes:

On the successful completion of the course, student will be able to:

1. Formulate a real-world problem and develop its requirements develop a design solution for a set of requirements

2. Test and validate the conformance of the developed prototype against the original requirements of the problem

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – II YEAR SEMESTER- IV

Paper-IV: DATA ANALYTICS

HPW- 4T+2P **Credits – 4** **Marks – 70 + 30**

UNIT — I:
Introduction to Big Data: Introduction to Big Data Platform — Challenges of Conventional systems — Web data — Evolution of Analytic scalability, analytic process and tools, Analysis vs Reporting — Modern data analytic tools,
Statistical Concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT — II:
Data Analysis: Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and Kernel methods
Analysis of Time Series: Linear systems analysis, nonlinear dynamics — Rule induction — Neural Networks: Learning and and Generalisation, competitive learning, Principal component analysis and neural networks
Fuzzy Logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT — III:
Mining Data Streams: Introduction to Streams Concepts — Stream data model and architecture — Stream Computing, Sampling data in a stream — Filtering streams — Counting distinct elements in a stream — Estimating moments — Counting oneness in a Window — Decaying window — Real time Analytics Platform (RTAP) applications — case studies — real time sentiment analysis, stock market predictions.

UNIT — IV:
Frequent Itemsets and Clustering: Mining Frequent itemsets — Market based Modeling — Apriori Algorithm — Handling large data sets in Main Memory — Limited Pass Algorithm — Counting frequent itemsets in a Stream — Clustering Techniques — Hierarchical — K-Means. Clustering high dimensional data — CLIQUE and ProCLUS — Frequent pattern-based clustering methods — Clustering in non-Euclidean space — Clustering for streams and Parallelism.

TEXT BOOKS:
1. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007
2. Mining of Massive Datasets, Anand Rajaraman and Jeffrey David Ullman, Cambridge University Press, 2012

REFERENCES:
1. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, John Wiley & Sons, 2012
2. Big Data Glossary, Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, Pete Warden, O'Reilly, 2011
3. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, 2nd Edition, Elsevier, 2008

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – II YEAR SEMESTER- IV

Practical- IV: DATA ANALYTICS (Lab)

HPW- 2P **Credits- 1** **Marks – 50**

COURSE OBJECTIVES:
- To explore and understand various data management and handling methods
- To understand the concept of data analytics
- To use Big Data tools and techniques for data processing

Data Processing Tool — Hive (NoSQL query-based language)
Hive command line tool allows you to submit jobs via bash scripts.
Identifying properties of a data set:
We have a table 'user data' that contains the following fields: data date: string.
user id: string
properties: string
The properties field is formatted as a series of attribute=value pairs. Ex: Age=21; state=CA; gender=M;

Lab Instructions:
1. Create the table in HIVE using hive nosql based query.
2. Fill the table with sample data by using some sample data bases.
3. Write a program that produces a list of properties with minimum value(min_value), largest value(max_value) and number of unique values. Before you start, execute the prepare step to load the data into HDFS.
4. Generate a count per state.
5. Now that extracted the properties, calculate the number of records per state.
6. Write a program that lists the states and their count from the data input.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – II YEAR SEMESTER- IV

SEC- IV: MINI -PROJECT

HPW-2T **Credits-2** **Marks – 50**

Course Objectives:

1. To understand and select the task based on their core skills.
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Outcomes:

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- V

Paper-V (A): Natural Language Processing

HPW- 4T+2P **Credits – 4** **Marks – 70**

+ 30 Objective:

The main objective of this course is to give a practical introduction to NLP. It deals with morphological processing, syntactic parsing, information extraction, probabilistic NLP and classification of text using Python's NLTK Library.

Outcomes:

At the end of the course the student will be able to
- Write Python programs to manipulate and analyze language data
- Understand key concepts from NLP and linguistics to describe and analyze language
- Understand the data structures and algorithms that are used in NLP
- Classify texts using machine learning and deep learning

Unit-I

Language Processing and Python: Computing with Language: Texts and Words, A Closer Look at Python: Texts as Lists of Words, Computing with Language: Simple Statistics, Back to Python: Making Decisions and Taking Control, Automatic Natural Language Understanding **[Reference 1]**

Accessing Text Corpora and Lexical Resources: Accessing Text Corpora, Conditional Frequency Distributions, Lexical Resources, WordNet **[Reference 1]**

Unit-II

Processing Raw Text: Accessing Text from the Web and from Disk, Strings: Text Processing at the Lowest Level, Text Processing with Unicode, Regular Expressions for Detecting Word Patterns, Useful Applications of Regular Expressions, Normalizing Text, Regular Expressions for Tokenizing Text, Segmentation, Formatting: From Lists to Strings. **[Reference 1]**

Categorizing and Tagging Words: Using a Tagger, Tagged Corpora, Mapping Words to Properties Using Python Dictionaries, Automatic Tagging, N-Gram Tagging, Transformation-Based Tagging, How to Determine the Category of a Word **[Reference 1]**

Unit-III

Learning to Classify Text: Supervised Classification, Evaluation, Naive Bayes Classifiers **[Reference 1]**

Deep Learning for NLP: Introduction to Deep Learning, Convolutional Neural Networks, Recurrent Neural Networks, Classifying Text with Deep Learning **[Reference 2]**

Unit-IV

Extracting Information from Text Information Extraction, Chunking, Developing and Evaluating Chunkers, Recursion in Linguistic Structure, Named Entity Recognition, Relation Extraction. **[Reference 1]**

Analyzing Sentence Structure Some Grammatical Dilemmas, What's the Use of Syntax. Context-Free Grammar, Parsing with Context-Free Grammar, [Reference 1]

References:

1. Natural Language Processing with Python. Steven Bird, Ewan Klein, and Edward Lope, O'Reily, 2009

2. Natural Language Processing Recipes: Unlocking Text Data with Machine Learning and Deep Learning using Python. Akshay Kulkarni, AdarshaShivananda, Apress, 2019

Suggested Reading:

3. Allen James, Natural Language Understanding, Benjamin/Cumming,1995.

4. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- V

Practical- V (A): Natural Language Processing (Lab)

HPW- 2P **Credits- 1** **Marks – 50**

Objective:
The main objective of this laboratory is to write programs that manipulate and analyze language data using Python.

This lab requires mentoring sessions from TCS.

Python Packages
Students are expected to know/ learn the following Python NLP packages
- NLTK (www.nltk.org/ (http://www.nltk.org/))
- Spacy (https://spacy.io/)
- TextBlob (http://textblob.readthedocs.io/en/dev/
- Gensim (https://pypi.python.org/pypi/gensim)
- Pattern (https://pypi.python.org/pypi/Pattern)

Datasets:
1. NLTK includes a small selection of texts from the Project Gutenberg electronic text archive, which contains some 25,000 free electronic books, hosted at http://www.gutenberg.org/.

2. The Brown Corpus contains text from 500 sources, and the sources have been categorized by genre, such as news, editorial, and so on (http://icame.uib.no/brown/bcmlos.html).

3. Wikipedia Articles Or any other dataset of your choice

Reference:
Jacob Perkins. Python 3 Text Processing with NLTK 3 Cookbook. Packt Publishing. 2014

Exercises:
1. Text segmentation: Segment a text into linguistically meaningful units, such as paragraphs, sentences, or words. Write programs to segment text (in different formats) into tokens (words and word-like units) using regular expressions. Compare an automatic tokenization with a gold standard

2. Part-of-speech tagging: Label words (tokens) with parts of speech such as noun, adjective, and verb using a variety of tagging methods , e.g., default tagger, regular expression tagger, unigram tagger, and n-gram taggers.

3. Text classification: Categorize text documents into predefined classes using Naïve Bayes Classifier and the Perceptron model

4. Chunk extraction, or partial parsing: Extract short phrases from a part-of-speech tagged sentence. This is different from full parsing in that we're interested in standalone chunks, or phrases, instead of full parse trees.

5. Parsing: parsing specific kinds of data, focusing primarily on dates, times, and

HTML. Make use of the following preprocessing libraries:
- dateutil which provides datetime parsing and timezone conversion
- lxml and BeautifulSoup which can parse, clean, and convert HTML
- charade and UnicodeDammit which can detect and convert text character encoding

6. Sentiment Analysis: Using Libraries TextBlob and nltk, give the sentiment of a document.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- V

Paper-V (B): ARTIFICIAL INTELLIGENCE

HPW- 4T+2P Credits – 4 Marks – 70+ 30

UNIT — I:
Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT — II:
Searching: Searching for solutions, uniformed search strategies — Breadth first search, depth limited Search.
Search with partial information (Heuristic search) Greedy best first search, A* search, Memory-bounded heuristic search Local search algorithms- Hill climbing, Simulated annealing search, Local beam search, Genetic algorithms

UNIT —III
Constraint Satisfaction Problems: Backtracking search for CSP's, Local search for CSP
Game Playing: Adversial search, Games, Minimax algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

Knowledge Representation: Procedural Versus Declarative knowledge, Using Predicate logic, representing facts in logic, functions and predicates, Conversion to clause form, Resolution in propositional logic, Resolution in predicate logic, Unification.

UNIT — IV:
Learning: What is learning, Learning by Taking Advice, Learning in Problem-solving, Learning from example: induction, Explanation-based learning.
Introduction to Neural Networks, Differenttypes of Learning in Neural Networks, Applications of Neural Networks, Recurrent Networks.
Expert System: Representing and using Domain Knowledge, Reasoning with knowledge, Expert System Shells-examples, Knowledge acquisition skills-examples.

TEXT BOOKS:

1. Artificial Intelligence A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson Education
2. Artificial Intelligence, Kevin Knight, Elaine Rich, B. Shivashankar Nair, 2nd Edition, 2008
3. Artificial Neural Networks, B. Yagna Narayana, PHI

REFERENCES:

1. Expert Systems: Principles and Programming, Giarrantana, Riley, 4th Edition, Thomson
2. PROLOG Programming for Artificial Intelligence, Ivan Bratka, 3rd Edition, Pearson Education
3. Neural Networks, Simon Haykin, PHIcm] Intelligence, Patrick Henny Winston, 3rd Edition, Pearson Education

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(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- V

Practical- V (B): ARTIFICIAL INTELLIGENCE (Lab)

HPW- 2P Credits- 1 Marks – 50

COURSE OBJECTIVES:
- To apply various AI search algorithms
- To explore various knowledge representation concepts and Logic in AI

1.Write a program to solve any problem using depth first search.
2.Write a program to solve any problem using best first search algorithm
3. Write a program to implement depth limit search
4.Write a program to implement heuristic approach
5.Write a program to implement tic_tac_toe with min_max algorithm
6.Write a program to implement A*algorithm
7. Illustrate Knowledge representation using online tools

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B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- V

Paper-VI : GE : ADVANCED ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

CREDITS: 4T

MARKS: 70 + 30

SYALLBUS

OBJECTIVES:

- Acquire theoretical Knowledge on setting hypothesis for pattern recognition.
- Apply suitable machine learning techniques for data handling and to gain knowledge from it.
- Evaluate the performance of algorithms and to provide solution for various real-world applications.
- To demonstrate single layer and multilayer feed forward neural networks
- To understand training, building and evaluate a model.
- To demonstrate real word case study

DATASETS:

For this laboratory, appropriate publicly available datasets, can be studied and used.
Example:

UCI Machine Learning Repository (https://archive.ics.uci.edu/)
Kaggle (https://www.kaggle.com/datasets)
Waikato (http://old-www.cms.waikato.ac.nz/ml/research_groups.html)

OUTCOMES:

At the end of the course the student will be able to understand

- Basics of Machine Learning and its limitations
- Machine Learning Algorithms: supervised, unsupervised, bio-inspired.
- Probabilistic Modelling and Association Rule Mining understand the basics of deep learning.
- Understand the usage of tensors in deep learning.
- Understand the usage of ml5 in deep learning Use JavaScript deep-learning framework with Tensor-Flow & ML5 as a backend engine.

UNIT:1
ARTIFICIAL INTELLIGENCE: Introduction to Artificial Intelligence, AI and Knowledge Representation. **MACHINE LEARNING:** Introduction to Machine Learning, Supervised and Unsupervised Learning Decision Trees: ID3, Classification and Regression Trees, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression, Neural Networks: Introduction, Perception, Multilayer Perception, Support Vector Machines: Linear and Non-Linear, Kernel Functions, K Nearest Neighbors. Introduction to clustering, K-means clustering, K-Mode Clustering.

UNIT:2
INTRODUCTION TO WEB PROGRAMMING: Introduction to HTML, HTML Basic Formatting Tags, HTML-Grouping Using Div Span, HTML Lists, HTML Images, HTML Hyperlink, HTML Tables, HTML Form.CSS Introduction, CSS Syntax, CSS Selectors, CSS Colour Background Cursor, CSS Text Fonts, CSS List Tables, CSS Box Model.

UNIT:3
INTRODUCTION TO JAVASCRIPT: JavaScript Data Types and Variables, JavaScript Operators, JavaScript Statement, JavaScript Function, Objects in JavaScript, JavaScript Event Handling, Working with Http Requests, JavaScript Libraries & JavaScript Frameworks.

UNIT:4

INTRODUCTION TO TENSORFLOW: Tensors, Adding Tensorflow.js to your Project, Variable, Operations, Memory Management, Layers API. **CAPSTONE PROJECT ON TENSORFLOW: 1.** Real Time Object Detection, **2.** Real Time Body Segmentation, **3.** Sentiment Analysis, **4.** Speech Command Recognition, **5.** Making a Q&A Chatbot using BERT. **INTRODUCTION TO ML5**: Basics of ML5, **CAPSTONE PROJECT ON ML5: 6.** Image Classification, **7.** Object Detection, **8.** Face Landmark Detection, **9.** Pose Detection, **10.** Sentiment Analysis, **11.** Sound Classification

TEXTBOOK:

1. KNOWLEDGE REPRESENTATION AND REASONING, Ronald J. Brachman Hector J. Levesque
2. Ethem Alpaydin," Introduction to Machine Learning", MIT Press, Prentice Hall of India, 3rd Edition2014.
3. Internet & world wide web: HOW TO PROGRAM- H.M. Deitel, P.J. Deitel, Fourth Edition- Pearson edition
4. TensorFlow user guide https://www.tensorflow.org/guide.
5. ML5 user guide https://learn.ml5js.org/#/.

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- VI

Paper-VII (A): Deep Learning

HPW- 4T+2P **Credits – 4** **Marks – 70 + 30**

Objective:

The main objective of this course is to give a practical introduction to Deep Learning using Keras. It covers the concepts of deep learning and their implementation.

Outcomes:

At the end of the course the student will be able to

1. Understand the basics of deep learning.
2. Understand the usage of tensors in deep learning.
3. Use Python deep-learning framework Keras, with Tensor-Flow as a backend engine.

UNIT – I

Introduction: History, Hardware, Data, Algorithms Neural Networks, Data representations for neural networks, Scalars (0D tensors), Vectors (1D tensors), Matrices (2D tensors), 3D tensors and higher-dimensional tensors, Key attributes,. Manipulating tensors in Numpy,The notion of data batches, Real-world examples of data tensors, Vector data, Timeseries data or sequence data, Image data, Video data

Unit-II

Tensor operations: Element-wise operations, Broadcasting, Tensor dot,. Tensor reshaping, Geometric interpretation of tensor operations, A geometric interpretation of deep learning,

Unit-III

Gradient-based optimization, Derivative of a tensor operation, Stochastic gradient descent,. Chaining derivatives: the Backpropagation algorithm

Neural networks: Anatomy, Layers, Models, Loss functions and optimizers

Unit-IV

Introduction to Keras, Keras, TensorFlow, Theano, and CNTK Recurrent neural networks: A recurrent layer in Keras, Understanding the LSTM and GRU layers

Reference

1. François Chollet. Deep Learning with Python. Manning Publications, 2018

Suggested Reading:

2. AurélienGéron. Hands on Machine Learning with SciKit-Learn, Keras and Tensor Flow. O'Reily, 2019

HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- VI

Practical- VII (A): Deep Learning (Lab)

HPW- 2P **Credits- 1** **Marks – 50**

Objectives:

- The main objective of this lab is to develop deep learning models using Keras
- Deep Learning Tools
- Students are expected to learn Keras deep-learning framework (https://keras.io), which is
- open source and free to download. They should have access to a UNIX machine; though it's
- possible to use Windows, too. It is also recommended that they work on a recent NVIDIA GPU

Exercises:
Note: The exercises should following Keras workflow consisting of four steps

1. Define your training data: input tensors and target tensors

2. Define a network of layers (or model) that maps your inputs to your targets

3. Configure the learning process by choosing a loss function, an optimizer, and some metrics to monitor

4. Iterate on your training data by calling the fit() method of your model

Exercise 1:

Dataset:
IMDB dataset, a set of 50,000 highly polarized reviews from the Internet Movie Database. They're split into 25,000 reviews for training and 25,000 reviews for testing, each set consisting of 50% negative and 50% positive reviews. the IMDB dataset comes packaged with Keras

Binary Classification Task:
Build a network to classify movie reviews as positive or negative, based on the text content of the reviews

Exercise 2:
Dataset:
Reuters dataset, a set of short newswires and their topics, published by Reuters in 1986. It's a simple, widely used toy dataset for text classification. There are 46 different topics; some topics are more represented than others, but each topic has at least 10 examples in the training set. Reuters dataset comes packaged as part of Keras.

Single-label Multi class Classification Task:
Build a network to classify Reuters newswires into 46 mutually exclusive topics. Each data point should be classified into only one category (in this case, topic),. The problem is more specifically an instance of single-label, multiclass classification.

Exercise 3:
Dataset:
The Boston Housing Price dataset has an interesting difference from the two previous examples. It has relatively few data points: only 506, split between 404 training samples and 102 test samples. And each feature in the input data (for example, the crime rate) has a different scale. For instance, some values are proportions, which take values between 0 and 1; others take values between 1 and 12, others between 0 and 100, and so on.

Regression Task:
The two previous examples were classification problems, where the goal was to predict a single discrete label of an input data point. Another common type of machine-learning problem is regression, which consists of predicting a continuous value instead of a discrete label. You'll attempt to predict the median price of homes in a given Boston suburb in the mid-1970s, given data points about the suburb at the time, such as the crime rate, the local property tax rate, and so on.

3. More exercises can be defined on similar lines.

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(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- VI

Paper-VII (B): MACHINE LEARNING

HPW- 4T+2P **Credits – 4** **Marks – 70 + 30**

UNIT — I:

Introduction to Machine Learning: Human learning, types of human learning, machine learning, types of machine learning, problems not to be solved using machine learning, applications of machine learning, tools in machine learning, Issues in Machine Learning.

Supervised Learning: Classification

Introduction, example of supervised learning, classification model, classification learning steps, classification algorithms: K-Nearest Neighbour (k-NN), Decision tree, Random Forest model, Support vector machines.

UNIT — II:

Supervised Learning: Regression

Introduction, examples of regression, common regression algorithms: simple linear regression, multiple linear regression, assumptions in regression analysis. Main problems in regression analysis, improving accuracy of the linear regression model, polynomial regression model, logistic regression model, maximum likelihood estimation.

UNIT — III:

Unsupervised Learning

Introduction, unsupervised vs supervised learning, applications of unsupervised learning, clustering: clustering as a machine learning task, different types of clustering techniques, partitioning methods, k-medoids, hierarchical clustering, density-based methods — DBSCAN.

UNIT — IV:

Modelling and Evaluation:

Selecting a model: Predictive and Descriptive models, Training a model (for supervised learning): Holdout method, K-fold cross-validation method, Bootstrap sampling, Lazy vs Eager learner. Model representation and interpretability: Underfitting, Overfitting, Bias — Variance trade-off. Evaluating performance of a model: Supervised learning — classification, regression, Unsupervised learning — clustering, Improving performance of a model.

TEXTBOOKS:

1. Machine Learning, Saikar Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson India

2. Machine Learning, Tom M. Mitchell, McGraw-Hill Education

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(AUTONOMOUS)

B.Sc. (Artificial Intelligence and Machine Learning) – III YEAR SEMESTER- VI

Practical- VII (B): MACHINE LEARNING (Lab)

HPW- 2P Credits- 1 Marks – 50

COURSE OBJECTIVES:

- To get an overview of the various machine learning techniques
- To demonstrate single layer and multilayer feed forward neural networks
- To understand training, building and evaluate a model
- To demonstrate real word case study

1. Implement k-Nearest Neighbour (k-NN) and Decision Tree learning algorithm
2. Implement Random Forest model learning algorithm and Support vector machines learning algorithm
3: Implement Linear Regression learning algorithm.
4: Implement logistic Regression learning algorithm.
5: Implement unsupervised k-means algorithm
6: Model Training:
7. Holdout, K-Fold cross validation and Bootstrap Sampling
8. Evaluating Model Performance:
9. Supervised Learning- Classification
10. Supervised Learning- Regression
11. Unsupervised Learning-Clustering

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(AUTONOMOUS)
B.Sc. (Artificial Intelligence and Machine Learning) – III Year's
Semester – I to VI-Paper – I to VI
Theory Model Question Paper

Time: 2 ½ hrs **Max. Marks: 70**

SECTION A

I Write short notes on any Six of the following: **6 X 3 = 18 Marks**

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II
5. A question from Unit III
6. A question from Unit III
7. A question from Unit IV
8. A question from Unit IV

SECTION B

II Answer all the Questions. Each question carries 13 marks **4 X 13 = 52 Marks**

9 (a) A question from Unit I

(OR)

(b) A question from Unit I

10 (a) A question from Unit II

(OR)

(b) A question from Unit II .

11 (a) A question from Unit III.

(OR)

(b) A question from Unit III.

12 (a)A question from Unit IV

(OR)

(b) A question from Unit IV.

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B.Sc. (Artificial Intelligence and Machine Learning) – III Year's
Semester – I to VI-Paper – I to VI
Practical Model Question Paper

Time:2 hrs Max. Marks: 50

I. Answer any two questions: (30 Marks)
1.program1.
2.program 2
3.program 3
4.program 4

Program execution (10 Marks)
II. Record (10 Marks)
III. Viva

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B.Sc. (Artificial Intelligence and Machine Learning) – III Year's
Semester – I to VI-Paper – I to VI
Internal Theory Exam

Time: 1 1/2 hrs **Max. Marks: 30**

Two internal exams (one at the middle of the semester and the other at the end) of one- hour duration are to be conducted carrying 20 marks each.
Average of the scores of two exams should be considered.
Following is the examination pattern.

- 20 MCQs (multiple choice questions) of 1 mark each, 20*1=20M
- 5 Marks will be allotted for seminar 5M
- 5 Marks will be allotted for Assignment 5M

Total Internal Assessment Marks **30 Marks**

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Hyderabad-500 007.

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B.Sc. (Artificial Intelligence and Machine Learning) – III Year's
Semester – I to VI-Paper – I to VI
Certification course (GE) Model Question Paper

Time: 2 ½ hrs **Max. Marks: 70**

SECTION A **70 X 1 = 70 Marks**

I objective questions

1 To 70 A question from Unit I to Unit IV

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(AUTONOMOUS)
B.Sc. (Artificial Intelligence and Machine Learning) – I Year
Semester – I & II -Paper – AECC I & II
Theory Model Question Paper

Time:2 hrs Max. Marks: 40

Section – A **(4 X 4M = 16 Marks)**

Answer any four of the following six questions. Each carries four marks.

Q1. From Unit 1 Q2. From Unit 1
03. From Unit 1 Q4. From Unit 2 Q5. From Unit 2
06. From Unit 2

Section – B **(2 X 12M = 24 Marks)**

Answer all the following two questions. Each carries fifteen marks.

Q09. (a) or (b) from Unit 1 Q10. (a) or (b) from Unit 2

INTERNAL EXAM (THEORY)

Time: 1/ 2 Hr. **Maximum marks: 10**

- One internal exam at the end of the semester, of half an hour duration is to be conducted carrying 10 marks.
- Following is the examination pattern.
- 10 MCQs (multiple choice questions) of one mark each, No assignment is required.

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B.Sc. (Artificial Intelligence and Machine Learning) – II Year
Semester – III & IV -Paper – SEC II & IV
Theory Model Question Paper

Time:2 hrs Max. Marks: 40

Section – A **(4 X 4M = 16 Marks)**

Answer any four of the following six questions. Each carry four marks.

Q1. From Unit 1 Q2. From Unit 1
03. From Unit 1 Q4. From Unit 2 Q5. From Unit 2
06. From Unit 2

Section – B **(2 X 12M = 24 Marks)**

Answer all the following two questions. Each carry fifteen marks.

Q09. (a) or (b) from Unit 1 Q10. (a) or (b) from Unit 2

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B.Sc. (Artificial Intelligence and Machine Learning) – III Year
Semester – V -Paper – GE
Theory Model Question Paper

Time: 2 ½ hrs **Max. Marks: 70**

SECTION A

I Write short notes on any Six of the following: **6 X 3 = 18 Marks**

1. A question from Unit I
2. A question from Unit I
3. A question from Unit II
4. A question from Unit II
5. A question from Unit III
6. A question from Unit III
7. A question from Unit I
8. A question from Unit III

SECTION B

II Answer all the Questions. Each question carries 13 marks **4 X 13 = 52 Marks**

9 (a) A question from Unit I

(OR)

(b) A question from Unit I

10 (a) A question from Unit II

(OR)

(b) A question from Unit II .

11 (a) A question from Unit III.

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(b) A question from Unit III.

12 (a)A question from Unit II

(OR)

(b) A question from Unit III

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Semester – V -Paper – GE

INTERNAL EXAM (THEORY)

Time: 1/ 2 Hr. **Maximum marks: 30**

Two internal exams (one at the middle of the semester and the other at the end) of one- hour duration are to be conducted carrying 20 marks each.
Average of the scores of two exams should be considered.
Following is the examination pattern.

- 20 MCQs (multiple choice questions) of 1 mark each, 20*1=20M
- 5 Marks will be allotted for seminar 5M
- 5 Marks will be allotted for Assignment 5M

Total Internal Assessment Marks **30 Marks**

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