



Shri Balasaheb Mane Shikshan Prasarak Mandal's,
ASHOKRAO MANE GROUP OF INSTITUTIONS

NH - 4, Vathar Tarf Vadgaon, Tal: -Hatkanangale, Dist: - Kolhapur-416112


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Curriculum Structure And Evaluation Scheme For B. Tech. In AIDS Engineering With Honors and Multidisciplinary Minor

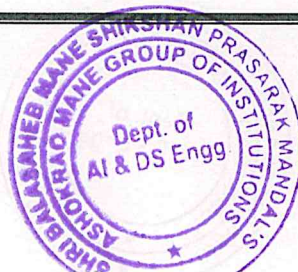
(To be implemented for 2025-2029 Batch)


Dr. S. S. Sarade
Head of Department


Dr. S. S. Patil
Dean Academics


Dr. Mrs. S. R. Chougule
Director
DIRECTOR

AMGOI, Vathar



Shri Balasaheb Mane Shikshan Prasarak Mandal's
Ashokrao Mane Group of Institutions
Vathar Tarf Vadgaon, Tal. Hatkanangale
Dist. Kolhapur, Maharashtra - 416112



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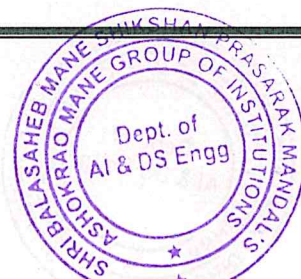
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ABBREVIATIONS

- **L:** Lecture
- **T:** Tutorial
- **P:** Practical
- **CA1-** Continuous Assessment 1
- **CA2-** Continuous Assessment 2
- **MSE:** Mid Semester Exam
- **ESE:** End Semester Exam
- **BSC -**Basic Science Courses
- **ESC:** Engineering Science Courses
- **AEC:** Ability Enhancement Courses
- **IKS:** Indian Knowledge System
- **VSEC:** Vocational and skill Enhancement Course
- **PCC:** Program Core Course
- **PEC:** Program Elective Course
- **CC:** Co-curricular Courses





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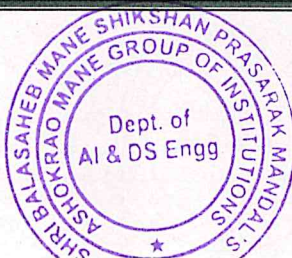
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Department: Department of Artificial Intelligence & Data Science
Semester: III

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25AD301	Data Structures	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD302	Operating System and Computer Organization Architecture	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD303	Computational Mathematics	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
MDM	25AD304	Multidisciplinary Minor – I	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
Entre./Econo./Manag	25AD305	Professional Skill Development	2	-	-	2	ISE-I	25	20	
							ISE-II	25		
VEC	25AD306	Universal Human Values	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
CEP/FP	25AD307	Mini Project – I	-	-	2	1	ISE-I	25	20	
							ISE-II	25		
PCC	25AD308	Data Structures Lab	-	-	2	1	ISE	50		40
							ESE(POE)	50		
PCC	25AD309	Operating System Lab	-	-	2	1	ISE	50		40
							ESE(POE)	50		
Total			16	1	06	20		800		
Total Contact Hours- 23						Total Credits- 20				





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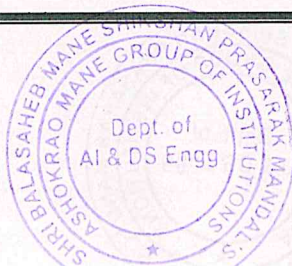
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Department: Department of Artificial Intelligence & Data Science
Semester: IV

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25AD401	Database Management System	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD402	Introduction to Data science	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD403	Discrete Mathematical Structures	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
MDM	25AD404	Multidisciplinary Minor – II	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
OE	25AD405	Open Elective – I	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
VSEC	25AD406	Entrepreneurship Development	1	-	-	1	ISE-I	25	20	
						ISE-II	25			
AEC	25AD407	Quantitative Aptitude and Logical Reasoning - I	1	-	-	1	ISE-I	25	20	
							ISE-II	25		
Entre./Econo./Manag	25AD408	Constitution of India	2	-	-	2	ISE-I	25	20	
							ISE-II	25		
VEC	25AD409	R-Programming (Skill Enhancement Lab)	-	-	2	2	ISE-I	25	20	
							ISE-II	25		
PCC	25AD410	Database Management System Lab	-	-	2	1	ISE	50	40	
							ESE(POE)	50		
PCC	25AD411	Python Lab	-	-	2	1	ISE	50	40	
							ESE(POE)	50		
Total			18	1	06	22		900		
Total Contact Hours- 25						Total Credits- 22				





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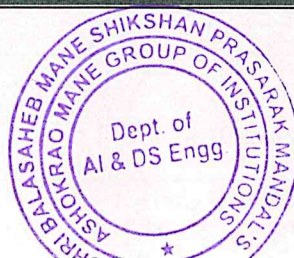
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Department: Department of Artificial Intelligence & Data Science
Semester: V

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25AD501	Big Data Analytics	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD502	Machine Learning	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD503	Theory of Automata	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PEC	25AD504	Program Elective - I	4	-	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
MDM	25AD505	Multidisciplinary Minor – III	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
OE	25AD506	Open Elective – II	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
AEC	25AD507	Quantitative Aptitude and Logical Reasoning - II	1	-	-	1	ISE-I	25	20	
							ISE-II	25		
CEP/FP	25AD508	Project Based Learning – II	-	-	2	1	ISE-I	25	20	
							ISE-II	25		
PCC	25AD509	Data Analysis Lab	2	-	-	1	ISE	50	40	
							ESE(POE)	50		
PCC	25AD510	Machine Learning Lab	-	-	2	1	ISE	50	40	
							ESE(POE)	50		
Total			21	-	04	22		900		
Total Contact Hours- 25						Total Credits- 22				





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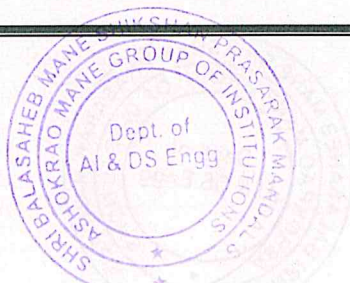
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Department: Department of Artificial Intelligence & Data Science
Semester: VI

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25AD601	Deep Learning	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD602	Computer Networks	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PEC	25AD603	Program Elective - II	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PEC	25AD604	Program Elective - III	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
MDM	25AD605	Multidisciplinary Minor – IV	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
VSEC	25AD606	Project Phase-I	-	-	4	2	ISE-I	25	20	
							ISE-II	25		
OE	25AD607	Open Elective – III	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD608	Deep Learning- Lab	-	-	2	1	ISE	50	40	
							ESE(POE)	50		
PEC	25AD609	Program Elective – II Lab	1	-	2	1	ISE	50	40	
							ESE(POE)	50		
Total			19	00	08	22		850		
Total Contact Hours- 27						Total Credits- 22				





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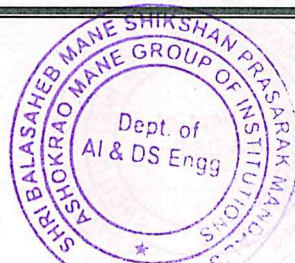
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Department: Department of Artificial Intelligence & Data Science

Semester: VII

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25AD701	Generative AI	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD702	IOT	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PEC	25AD703	Program Elective - IV	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PEC	25AD704	Program Elective - V	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
MDM	25AD705	Multidisciplinary Minor – V	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25AD706	Advanced Databases Management System lab	-	-	2	1	ISE	50	50	40
							ESE(POE)	50		
PCC	25AD707	Advanced Computer Vision Lab	-	-	2	1	ISE	50	50	40
							ESE(POE)	50		
Project	25AD708	Project Phase-II	-	-	8	4	ISE	50	20	60
							ESE(POE)	100	40	
Total			14	-	12	20		850		
Total Contact Hours- 26						Total Credits- 20				





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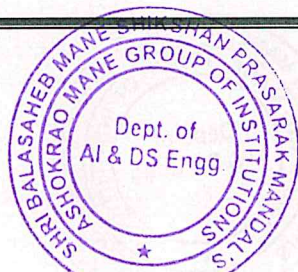
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Department: Department of Artificial Intelligence & Data Science
Semester: VIII

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25AD801	Data Engineering	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PEC	25AD802	Program Elective – VI	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
RM	25AD803	Research Methodology	4	-	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
Intern. / OJT	25AD804	Internship/On Job Training	-	-	24	12	ISE	100	40	80
							ESE	100	40	
Total			10	-	24	22		500		
Total Contact Hours- 34			Total Credits- 22							





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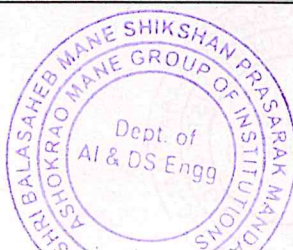


MULTIDISCIPLINARY MINOR (MDM) BASKET

Important Note:

1. Students should select **any one basket** for the award of Minor Degree of their interest from the table below.
2. The student must complete **all five courses under the selected MDM Basket** to qualify for the Minor.
3. The credits earned under the Multidisciplinary Minor shall form part of the total **172 Credits** required for award of the degree.

MDM Basket Name	Sr. No.	Course Code	Course Name	Semester	Offered by the Department
Data Analyst	1	25AM304A	Data Structure	III	Artificial Intelligence & Machine Learning (To all UG Programs except UG AIML, AIDS, CSE, E&C Engg.)
	2	25AM404A	R-programming	IV	
	3	25AM505A	DBMS	V	
	4	25AM605A	Big Data Technologies	VI	
	5	25AM705A	Introduction to Machine Learning	VII	
Prompt Engineering	1	25AM304B	R-programming	III	Artificial Intelligence & Machine Learning (To all UG Programs except UG AIML, AIDS, CSE, E&C Engg.)
	2	25AM404B	Introduction to AI and ML	IV	
	3	25AM505B	IOT	V	
	4	25AM605B	Introduction to Blockchain Technology	VI	
	5	25AM705B	Prompt Engineering	VII	
Intelligent Data Systems	1	25AD304A	Computer Organization Architecture	III	Artificial Intelligence & Data Science (To all UG Programs except UG AIDS, AIML, CSE, E&C Engg.)
	2	25AD404A	R-programming	IV	
	3	25AD505A	Data Manipulation, Analysis and Visualization	V	
	4	25AD605A	DBMS	VI	
	5	25AD705A	Big Data Technologies	VII	
Cognitive Computing	1	25AD304B	Computer Organization Architecture	III	Artificial Intelligence & Data Science (To all UG)
	2	25AD404B	Introduction to Data Science	IV	
	3	25AD505B	Introduction to Machine Learning	V	





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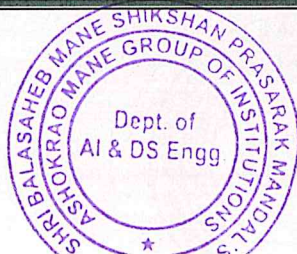
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	4	25AD605B	Social Network Analysis	VI	Programs except UG AIDS, AIML CSE, E&C Engg.)
	5	25AD705B	Natural Language Processing	VII	
Essentials of Software Development	1	25CS304 A	Data Structures	III	Computer Science & Engineering (To all UG Programs except UG CSE, AIML, AIDS, E&C Engg.)
	2	25CS404 A	Python Programming	IV	
	3	25CS505 A	Computer Algorithms	V	
	4	25CS605 A	Database Management System	VI	
	5	25CS705 A	Software Engineering	VII	
Modern Computing Systems	1	25CS304 B	Data Structures	III	Computer Science & Engineering (To all UG Programs except UG CSE, AIML, AIDS, E&C Engg.)
	2	25CS404 B	Python Programming	IV	
	3	25CS505 B	Java Programming	V	
	4	25CS605 B	Artificial Intelligence & Machine Learning	VI	
	5	25CS705 B	Cloud Computing	VII	
Smart Energy Systems and Sustainability	1	25EE304A	Fundamentals of Energy Systems	III	Electrical Engineering (To all UG Programs except UG Electrical & E&TC Engg.)
	2	25EE404A	Solar and Wind Energy Technologies	IV	
	3	25EE505A	Fundamentals of Energy Management Systems	V	
	4	25EE605A	Energy Storage Systems	VI	
	5	25EE705A	Renewable Energy Integration in Smart Grids	VII	
Intelligent Electrical Systems	1	25EE304B	Introduction to Intelligent Electrical Systems	III	Electrical Engineering (To all UG Programs except UG Electrical & E&TC Engg.)
	2	25EE404B	IoT and IOV for Electrical Systems	IV	
	3	25EE505B	AI Applications in Electrical Systems	V	
	4	25EE605B	Automation and Control in Energy Systems	VI	
	5	25EE705B	Smart Grid and Intelligent Monitoring Systems	VII	
Communication System	1	25EC304A	Principles of Communication	III	Electronics & Computer Engineering (To all UG Programs except
	2	25EC404A	Wireless and Mobile Communication	IV	
	3	25EC505A	Wireless Sensor Networks	V	





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	4	25EC605A	Information theory and Coding	VI	UG E&C, AIML, AIDS, CSE Engg.)
	5	25EC705A	Satellite and Radar Communication	VII	
Computing Solutions for Industry	1	25EC304B	Python programming	III	Electronics & Computer Engineering (To all UG Programs except UG E&C, AIML, AIDS, CSE Engg.)
	2	25EC404B	Industry Analytics	IV	
	3	25EC505B	Cloud Computing	V	
	4	25EC605B	Industrial Internet of Things (IIoT)	VI	
	5	25EC705B	Power BI	VII	
Internet of Things (IoT)	1	25ET304A	Fundamentals of IoT	III	Electronics & Telecommunication Engineering (To all UG Programs except UG E&TC & Electrical Engg.)
	2	25ET404A	Technologies Enabling IoT	IV	
	3	25ET505A	IoT System Design	V	
	4	25ET605A	Industrial IoT	VI	
	5	25ET705A	Capstone Project	VII	
Embedded Systems	1	25ET304B	Digital Design	III	Electronics & Telecommunication Engineering (To all UG Programs except UG E&TC & Electrical Engg.)
	2	25ET404B	Microcontroller & Interfacing Techniques	IV	
	3	25ET505B	Embedded Systems Design	V	
	4	25ET605B	Real-Time Operating Systems	VI	
	5	25ET705B	Advanced Embedded Systems & Product Development	VII	
Product Development	1	25ME304A	Design Thinking Approach	III	Mechanical Engineering (To all UG Programs except UG Mech Engg.)
	2	25ME404A	Engineering Design Process	IV	
	3	25ME505A	Rapid Prototyping and Testing	V	
	4	25ME605A	Product Development	VI	
	5	25ME705A	Commercialization and Sustainability	VII	
Refrigeration and Air Conditioning	1	25ME304B	Fundamentals of Refrigeration	III	Mechanical Engineering (To all UG Programs except UG Mech Engg.)
	2	25ME404B	Refrigeration Components and Low Temperature Cycles	IV	
	3	25ME505B	Psychrometry and Air Conditioning Process	V	





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	4	25ME605B	HVAC Systems and Emerging Technologies	VI	
	5	25ME705B	Application Based System Design	VII	
Planning and Execution of Projects	1	25CE304A	Building Construction Materials	III	Civil Engineering (To all UG Programs except UG Civil Engg.)
	2	25CE404A	Engineering Management	IV	
	3	25CE505A	Resource Management	V	
	4	25CE605A	Optimization Technique	VI	
	5	25CE705A	Engineering Economics	VII	





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OPEN ELECTIVE COURSES

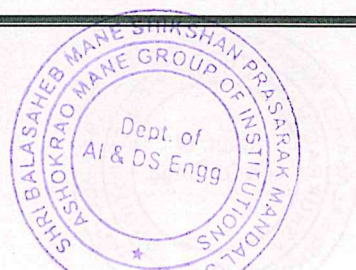
(Students have to select any one Open Elective course, for each applicable semester, of their interest (other than open electives offered by his/her department) from the table below)

Open Elective – I

Sr. No.	Course Code	Course Name	Offered by Department
1	25AM405A/ 25AD405A	E Commerce	Artificial Intelligence & Machine Learning & Artificial Intelligence & Data Science
2	25CE405B	Environmental Science	Civil Engineering
3	25CS405C	Human Computer Interaction (HCI)	Computer Science & Engineering
4	25EE405D	Electrical Safety & Standards	Electrical Engineering
5	25EC405E/ 25ET405E	Sensor Technology	Electronics & Computer Engineering & Electronics & Telecommunication Engineering
6	25ME405F	Project Management	Mechanical Engineering

Open Elective – II

Sr. No.	Course Code	Course Name	Offered by Department
1	25AM506A/ 25AD506A	Design Thinking	Artificial Intelligence & Machine Learning & Artificial Intelligence & Data Science
2	25CE506B	Disaster Management	Civil Engineering
3	25CS506C	Cyber Security	Computer Science & Engineering
4	25EE506D	Energy Audit	Electrical Engineering
5	25EC506E/ 25ET506E	Drone Technology	Electronics & Computer Engineering & Electronics & Telecommunication Engineering
6	25ME506F	Startup and Business Strategy	Mechanical Engineering





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Open Elective – III

Sr. No.	Course Code	Course Name	Offered by Department
1	25AM606A/ 25AD606A	Recommender System	Artificial Intelligence & Machine Learning & Artificial Intelligence & Data Science
2	25CE606B	Environmental Impact Assessment	Civil Engineering
3	25CS606C	Cyber Laws	Computer Science & Engineering
4	25EE606D	E-Mobility	Electrical Engineering
5	25EC606E/ 25ET606E	Engineering Economics	Electronics & Computer Engineering & Electronics & Telecommunication Engineering
6	25ME606F	Industrial Automation	Mechanical Engineering





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PROGRAM ELECTIVE CORE

(Students have to select any one Program Elective Core course out of 03, for each applicable semester, of their interest, offered by the Department from the table below) **Program Elective Core - I**

Sr..	Course Code	Domain	Course Name	Semester
1	25AD504A	Computer Vision	Image Processing	V
2	25AD504B	Data Science/ Mathematics	OOMD	
3	25AD504C	Software Engineering	Software Architecture and Design patterns	

Program Elective - II

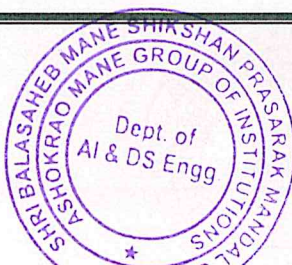
Sr..	Course Code	Domain	Course Name	Semester
1	25AD604A	Cloud Technologies	Cloud computing	VI
2	25AD604B	Artificial Intelligence / Machine Learning	Artificial Intelligence for Data Science	
3	25AD604C	Data Analytics	Blockchain Technology	

Program Elective - III

Sr..	Course Code	Domain	Course Name	Semester
1	25AD603A	Web Development	Prompt Engineering	VI
2	25AD603B	Systems Programming	Compiler Design	
3	25AD603C	Distributed Systems	Business Intelligence	

Program Elective - IV

Sr..	Course Code	Domain	Course Name	Semester
1	25AD703A	Artificial Intelligence / Deep Learning	E-Commerce	VII
2	25AD703B	Cyber security / Network Security	Cyber Security	
3	25AD703C	Software Engineering	Software Project Management	





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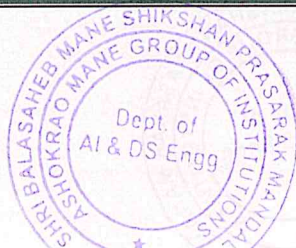


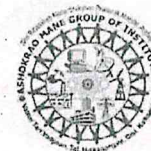
Program Elective – V

Sr..	Course Code	Domain	Course Name	Semester
1	25AD704A	Artificial Intelligence / Fuzzy Systems	Soft Computing	VII
2	25AD704B	Software Engineering / Quality Assurance	Software Testing and Quality Assurance	
3	25AD704C	Data Science	Computer Vision	

Program Elective – VI

Sr..	Course Code	Domain	Course Name	Semester
1	25AD802A	Artificial Intelligence / ML	Advanced Machine Learning	VIII
2	25AD802B	Artificial Intelligence / Automation	Robotic Process Automation	
3	25AD802C	Artificial Intelligence / Applied AI	Application of AI	





B. Tech. in Artificial Intelligence & Data Science Honors in Explainable AI.

Course Code	Name of the Course	Credit
25AD3H	Artificial Intelligence: Search Methods for Problem Solving	3
25AD4H	Artificial Intelligence: Knowledge Representation And Reasoning	3
25AD5H	AI:Constraint Satisfaction	3
25AD6H	Responsible & Safe AI Systems	3
25AD7H	Artificial Intelligence (AI) for Management	3
25AD8H	Explainable AI (XAI) Specialization	3
	Total	18

Guidelines for Honor Certification Courses

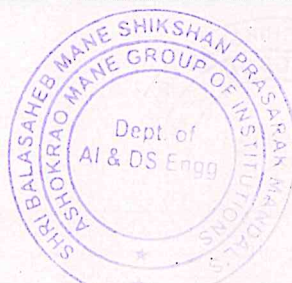
1. Students are required to complete six courses (each carrying 3 credits) through an online platform to earn a total of 18 credits under the Honor Certification scheme.
2. All six courses must be completed starting from the Second Year First Semester (Semester III) to the Final Year Second Semester (Semester VIII).
3. The student has to obtain all 18 credits by the last semester of the program.
4. While selecting the course platform, first preference must be given to SWAYAM/NPTEL.
5. Registration on platforms such as Coursera or UdeMy is permitted only under the following conditions:
 - a. The SWAYAM/NPTEL course schedule does not align with the academic calendar.
 - b. The subsequent course in the learning sequence is not available on SWAYAM/NPTEL.
 - c. Any other unavoidable circumstances arise.
 - d. About 80% of the contents of the course should match with the SWAYAM/NPTEL courses.
6. Course selection must strictly adhere to the recommendations of the Chairman of Board of Studies (BOS).





7. Credits for the respective Honor courses will be awarded under the following conditions:
- For NPTEL courses, students must complete all assignments on time, pass the examination, and obtain the certificate.
 - For Coursera or Udemy courses, students must obtain the course certificate and appear for the Online examination which will be conducted under the supervision of the Institute by Examination Cell
8. While selecting an online course, the following criteria must be ensured:
- The course should be of an advanced level, not basic or introductory.
 - The course content must not overlap with subjects already included in the regular curriculum or listed under elective courses.
 - The duration of each course must be:
 - o Minimum 8/12 weeks for SWAYAM/NPTEL courses
 - o At least 30+ hours for Coursera/Udemy courses

Course Code	Name of the Course and SWAYAM/NPTEL Links	Credit
25AD3H	Artificial Intelligence: Search Methods for Problem Solving https://onlinecourses.nptel.ac.in/noc25_cs88/preview	3
25AD4H	Artificial Intelligence: Knowledge Representation And Reasoning https://onlinecourses.nptel.ac.in/noc25_cs07/preview	3
25AD5H	AI:Constraint Satisfaction https://onlinecourses.nptel.ac.in/noc25_cs05/preview	3
25AD6H	Responsible & Safe AI Systems https://onlinecourses.nptel.ac.in/noc25_cs118/preview	3
25AD7H	Artificial Intelligence (AI) for Management https://onlinecourses.nptel.ac.in/noc26_cs10/preview	3





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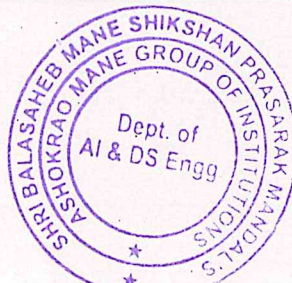
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25AD8H	Explainable AI (XAI) Specialization https://www.coursera.org/specializations/explainable-artificial-intelligence-xai	3
Total		18





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**Exit Courses
(After First Year)**

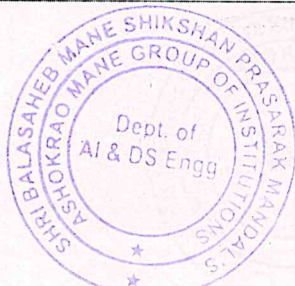
The Candidate should pass following skill based courses to qualify for Diploma.

Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
		L	T	P	Cr	Components	Max	Min for Passing	
25AD310	Python Programming	3	-	-	3	ISE-I	10	20	40
						MSE	30		
						ISE-II	10		
						ESE	50		
25AD311	Introduction to Generative AI	3	-	-	3	ISE-I	10	20	40
						MSE	30		
						ISE-II	10		
						ESE	50		
25AD312	Mini Project	-	-	4	2	ISE	50	40	
						ESE	50	40	
Total		6	0	4	8		300		
Total Contact Hours- 10		Total Credits- 8							

**Exit Courses
(After Second Year)**

The Candidate should pass following skill based courses to qualify for Diploma.

Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
		L	T	P	Cr	Components	Max	Min for Passing	
25AD412	Computer Vision	3	-	-	3	ISE-I	10	20	40
						MSE	30		
						ISE-II	10		
						ESE	50		
25AD413	Applied Machine Learning	3	-	-	3	ISE-I	10	20	40
						MSE	30		
						ISE-II	10		
						ESE	50		
25AD414	Industrial Internship	-	-	4	2	ISE	50	40	
						ESE	50	40	
Total		6	0	4	8		300		
Total Contact Hours- 10		Total Credits- 8							





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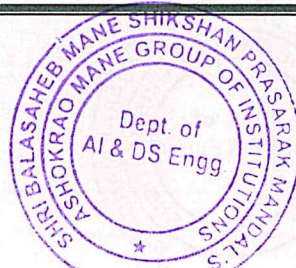
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**Exit Courses
(After Third Year)**

The Candidate should pass following skill based courses to qualify for Diploma.

Course Code	Course Name	Teaching Scheme				Evaluation Scheme		
		L	T	P	Cr	Components	Max	Min for Passing
25AD610	Reinforcement Learning	3	-	-	3	ISE-I	10	40
						MSE	30	
						ISE-II	10	
						ESE	50	
25AD611	Explainable Artificial Intelligence (XAI)	3	-	-	3	ISE-I	10	40
						MSE	30	
						ISE-II	10	
						ESE	50	
25AD612	Industrial Internship	-	-	4	2	ISE	50	40
						ESE	50	40
Total		6	0	4	8		300	
Total Contact Hours- 10		Total Credits- 8						





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Data Structures

Title of the Course Name: Data Structures	L	T	P	Credits
Course Code: 25AD301	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

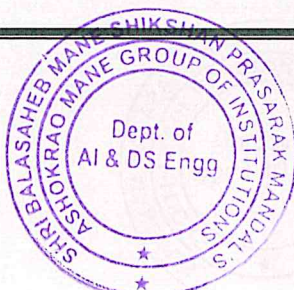
Pre-Requisite: Basic knowledge of programming concepts, problem solving techniques, and elementary mathematics.

Course Objectives: The course aims to:

1. To understand the concepts of data, information, algorithms, and abstract data types
2. To study linear data structures and their representations using sequential and linked methods,
3. To implement stacks, queues, and linked lists using appropriate programming techniques,
4. To understand non-linear data structures such as trees and graphs and their applications,
5. To analyze searching and sorting techniques and select suitable data structures for problem solving

Course Outcomes:

CO1	Explain fundamental data structures and analyze algorithm characteristics	Understand
CO2	Implement linear data structures such as arrays, stacks, queues, and linked lists	Apply
CO3	Apply trees, graphs, and hashing techniques to solve computational problems	Analyze
CO4	Analyze and compare searching and sorting algorithms for efficiency	Evaluate





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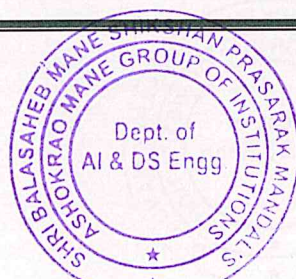


CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2										2		2
CO2	2	2	2		2							3		2
CO3	2	3	2	2	2							3	1	3
CO4	2	3	2	2							1	3		3

Course Content

Unit No.	Unit title and Content	Hrs
1	Data Structures Basics and Linear Structures- Data and information, characteristics of algorithms, data structures, abstract data types (ADT), representation of information, arrays and lists, sequential and linked representations, linear and non-linear data structures, sparse matrices, transpose of sparse matrix, hashing concepts, hash tables, hash functions, collision resolution techniques.	07
2	Stacks- Introduction to stacks, stack ADT, representation and implementation using Python, sequential and linked allocation, stack operations, applications of stack, expression evaluation, expression conversion, recursion using stack	07
3	Queues- Introduction to queues, queue ADT, representation and implementation using Python, sequential and linked allocation, queue operations, circular queue and its implementation, priority queue, applications of queues	07
4	Linked Lists –Concept of linked organization, singly linked list, doubly linked list, circular linked list, operations on linked lists including insertion, deletion, traversal and concatenation, dynamic memory management	07
5	Trees and Graphs - Basic terminology of trees, binary trees and representations, binary search tree operations, tree traversal techniques,	07





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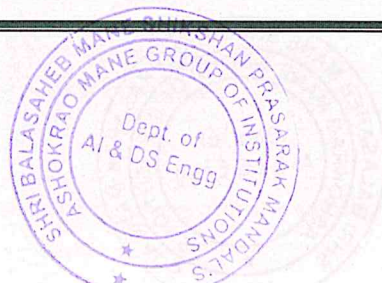
	introduction to graphs, graph terminology, graph representations using adjacency matrix and adjacency list, Warshall's algorithm	
6	Searching, Sorting and Advanced Structures – Searching techniques including linear search and binary search, linear list representation and operations, insertion and deletion in lists, sorting techniques including insertion sort, selection sort, radix sort, analysis of searching and sorting algorithms	07

Textbooks:

1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education
2. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structures Using C and C++, Pearson Education
3. Gilberg and Forouzan, Data Structures: A Pseudocode Approach with C, Cengage Learning

Reference books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, *Introduction to Algorithms*, MIT Press
2. Robert Lafore, *Data Structures and Algorithms in Java*, Pearson Education
3. Narasimha Karumanchi, *Data Structures and Algorithms Made Easy*, CareerMonk Publications





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Operating System and Computer Organization Architecture

Title of the Course Name: Operating System and Computer Organization Architecture	L	T	P	Credits
Course Code: 25AD302	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

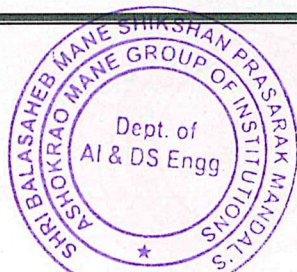
Pre-Requisite: Basic Computer Fundamentals, Digital Logic Basics, Data communication

Course Objectives: The course aims to:

1. To understand the basics of operating systems and CPU scheduling.
2. To learn process synchronization, deadlocks, and memory management concepts.
3. To understand arithmetic operations and instruction set architecture.
4. To study memory architecture, control unit, and input-output organization.

Course Outcomes: Students will be able to

CO1	Understand the fundamentals of operating systems, including types, structures, services, and real-time operating systems.	Understand
CO2	Understand and apply process synchronization, deadlocks, and memory management concepts.	Understand
CO3	Explain arithmetic operations, instruction sets, and processor architecture concepts including RISC and CISC.	Understand
CO4	Explain memory architecture, control unit operations, and I/O organization in computer systems.	Understand





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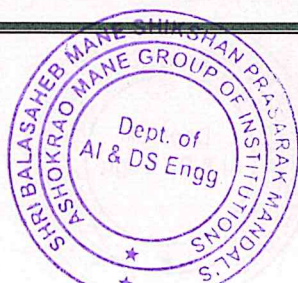


CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	1									2	2	
CO2	2	2	1									2	2	
CO3	1	2	2									2	2	
CO4	2	2	1									2	1	

Course Content

Unit No.	Unit title and Content	Hrs
1	Basics of Operating Systems, Processes, and CPU Scheduling Introduction and Operating system structures: Definition, Types of Operating system, Real Time operating system, System Components- System Services, Systems Calls, System Programs, System structure. Processes and CPU Scheduling: Process Concept, Process Scheduling, Operation on process, Cooperating processes. Inter-process Communication, Scheduling criteria, scheduling Algorithms,	07
2	Basics of Process Synchronization and Deadlocks Process Synchronization: The critical-section problem, Critical regions, Synchronization Hardware, Classical Problems of synchronization. Deadlocks: Systems Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	07
3	Memory Management Basic concept, Logical and Physical address map, Memory allocation: Continuous Memory Allocation, Fixed and variable partition, Internal and external fragmentation and compaction, Paging: Principle of operation, Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging; Segmentation.	07
4	Introduction to Arithmetic Operations and Instruction Sets: The arithmetic and logic Unit, Integer representation, Integer arithmetic, Introduction of arithmetic co-processor. Instruction Sets: Characteristics, Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Introduction to RISC and CISC architecture.	07
5	Memory Architecture: Internal Memory: Semiconductor main memory, Error	07





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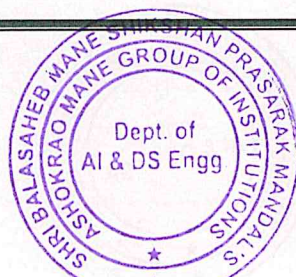
	correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID.	
6	Control Unit and Input-Output Basics Control Unit: Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro-programmed Control Unit, Basic concepts, Micro-instruction execution, Applications of micro-programming. Input/ Output Organization: External devices, I/O module, Programmed I/O, Interrupt driven I/ O, Direct memory access and MESI protocol.	07

Textbooks:

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, Wiley Publication, 8th Edition, 2008.
2. William Stalling, Computer Organization and Architecture: Designing for Performance, Prentice Hall Publication, 8th Edition, 2009.
2. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.

Reference books:

1. Andrew S. Tanenbaum, Modern Operating System, PHI Publication, 4th Edition, 2015.
2. D. M. Dhamdhare, Systems Programming and Operating Systems, McGraw-Hill, 2nd Edition, 1996.
3. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan and Kaufman Publication, 4th Edition, 2007.
4. Morris Mano, Computer System Architecture, Pearson Education India, 3rd Edition, 2007.





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Computational Mathematics

Course Name: Computational Mathematics	L	T	P	Credits
Course Code: 25AD303	3	1		4
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

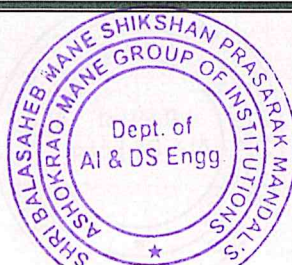
Pre-Requisite: Students should have a foundational understanding of engineering mathematics, including calculus, linear algebra, probability, statistics, and basic set theory.

Course Objective: The course aims to:

1	Understand and apply numerical techniques to solve algebraic and transcendental equations.
2	Apply numerical differentiation and integration methods for engineering computations.
3	Understand the fundamentals of fuzzy sets and fuzzy arithmetic for handling uncertainty.
4	Analyze relationships between variables using correlation techniques.
5	Develop and interpret linear regression models for engineering data analysis.

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

CO1	Apply numerical methods such as Bisection, Regula-Falsi, Newton-Raphson, and Secant methods to solve algebraic and transcendental equations.	Remember, Apply
CO2	Use numerical differentiation and integration techniques for solving engineering problems.	Remember, Apply, Evaluate
CO3	Apply fuzzy set concepts, fuzzy arithmetic, and solve simple fuzzy equations.	Apply,
CO4	Analyze engineering data using correlation and regression techniques for interpretation and prediction.	Analyze





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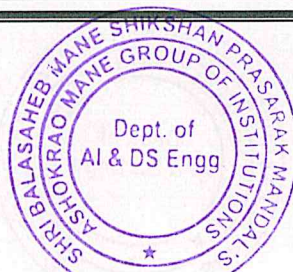
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CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2											2	
CO2	3	2											2	
CO3	3	2											2	
CO4	3	2			1						1		2	

Course Content		
Unit No.	Unit Title and Content	Hrs
1	Numerical Methods : Solution of algebraic and transcendental equations: Bisection method, Regula-Falsi Method, Newton-Raphson method, Secant Method	6
2	Numerical differentiation & Integration : Numerical differentiation - Newton's forward interpolation formula, Newton's backward interpolation formula, Lagrange's interpolation, Numerical Integration- Trapezoidal Rule, Simpson's 1/3 rd Rule, Simpson's 3/8 th Rule, Weddle's Rule (Only formula and examples), Applications in engineering	8
3	Introduction to Fuzzy Sets : Basic concepts of fuzzy sets, Crisp set & Fuzzy set, Membership functions, Basic operations on fuzzy sets, Properties of fuzzy sets	7
4	Fuzzy Arithmetic: Fuzzy numbers, Fuzzy cardinality, Operations on Fuzzy number, Fuzzy equations of type $A+X = B$ and $A.X = B$	7
5	Correlation	7





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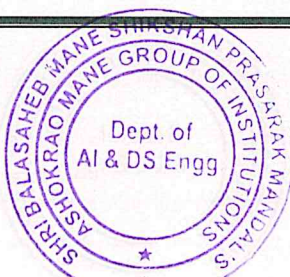
	Introduction to types of correlation, correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient and its examples, Spearman's rank correlation, Probable errors and its examples.	
6	Linear Regression Analysis Introduction, Linear and non-linear regression, Lines of regression, Properties of regression Coefficients, Derivative of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression and its examples.	7

Text books:

1. Numerical Methods for Engineers - Steven C. Chapra & Raymond P. Canale
2. Fuzzy Sets and Fuzzy Logic: Theory and Application - George J. Klir & Bo Yuan
3. Correlation and Regression: Principles and Applications – *Philip Bobko*.
4. Applied Linear Regression Models – *Kutner, Nachtsheim, Neter & Li*

Reference books:

1. Introductory Methods of Numerical Analysis – S.S. Sastry
2. Introduction to Fuzzy Sets and Fuzzy Logic – Witold Pedrycz & Fernando Gomide
3. Applied Statistics and Probability for Engineers- Douglas C. Montgomery & George C. Runger
4. *B.S. Grewal*,- Higher Engineering Mathematics, Khanna Publishers, New Delhi.





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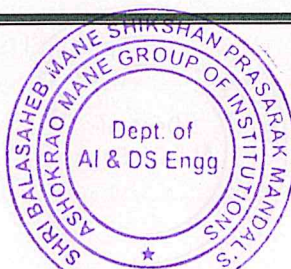
Professional Skill Development

Course Name: Professional Skill Development	L	T	P	Credits
Course Code: 25AD305	2			2
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	25		25	

Pre-Requisite: Basic concepts of

Course Objective: The course aims to:	
1	Students learn to acknowledge themselves, develop confidence, and take action without fear.
2	Students understand that dreams are realized through process, not talent or luck.
3	Acquiring Practical Task Management Skills
4	Students learn how to break goals into tasks, manage time, and sustain effort.

Course Outcomes: At the end of the course, students will be able to:		Blooms Levels
CO1	Demonstrate self-awareness, self-esteem, and confidence through reflection and inner dialogue practices.	Apply
CO2	Formulate a clear personal vision and long-term goals by converting abstract dreams into structured plans.	Create
CO3	Apply goal-setting, task breakdown, and time management techniques to plan and execute personal and academic tasks effectively.	Apply
CO4	Evaluate personal progress through reflection, feedback, and process improvement methods to develop resilience and continuous improvement habits.	Evaluate





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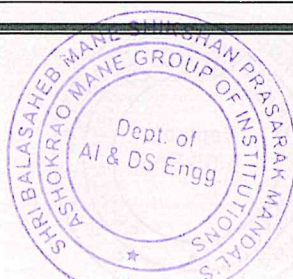


CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1							3	1	1				
CO2	1	2						2		1				
CO3	2	2	2		1				1	2				
CO4	1	2	2	2				2	2	2	1			

Course Content

Unit No.	Unit title and Content	Hrs
1	Self-Esteem and Inner Dialogue What is self-esteem, and why does it matter? The power of writing and reflection (core philosophy of KAMI-MEMO) Self-awareness and value clarification exercises	5
2	Visualizing the Future Designing a personal vision (5-year / 10-year future) Turning abstract dreams into concrete descriptions	5
3	Goal Setting and Task Breakdown Translating dreams into goals SMART goals and milestone design Weekly planning and prioritization	5
4	Execution and Reflection Monitoring progress through written reflection Understanding success and failure as data Peer feedback and discussion	5
5	Process Improvement Reviewing and redesigning action plans Strengthening problem-solving and resilience Creating a personal improvement cycle (PDCA)	4





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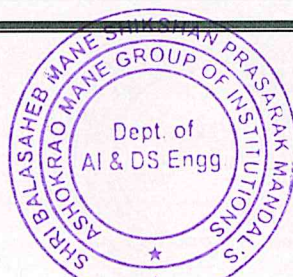
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6	Final Presentation Presentation of personal growth portfolio Reflection on mindset, behavior, and outcomes	4
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Reference books:

1. KAMI-MEMO Successful future will be ahead for you with the method of writing notes on a piece of paper (English Edition) Kindle Edition
2. English Edition by Kunio Hara (Author) Format: Kindle Edition





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Universal Human Values

Title of the Course Name: Universal Human Values	L	T	P	Credits
Course Code: 25AD306	2			2
	ISE	MSE	ESE	Total
	20	30	50	100

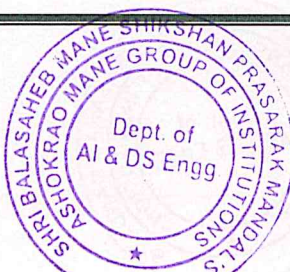
Pre-Requisite: Basic knowledge of management, Communication Skill

Course Objectives: The course aims:

1. Develop clarity of human values to enable students to understand harmony at individual, family, society, and nature levels.
2. Help students identify their aspirations related to happiness and prosperity.
3. Enable students to evaluate ethical and moral issues in personal and professional life.
4. Promote responsible behavior, social commitment, and holistic development among engineering students.

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

CO	Course Outcomes	Blooms Level
CO1	Understand the concept of human values and the need for value-based education.	Understand
CO2	Analyze the relationship between self, family, society, and nature for achieving harmony.	Analyze
CO3	Apply universal human values in personal, social, and professional decision-making.	Apply
CO4	Demonstrate ethical conduct, social responsibility, and sustainable thinking as an engineer.	Apply





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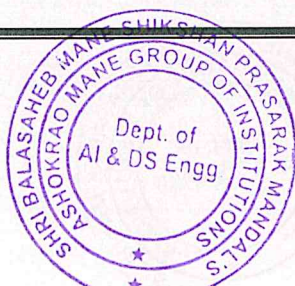


CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1				2		2		1	2			2
CO2		2				3	2	2	1	1	2	1	2	3
CO3						3		3	2	2	3	2	2	3
CO4						3	3	3	1	1	3		1	3

Course Content

Unit No.	Contents	Hrs.
1	Introduction to Universal Human Values Introduction to Value Education, Need and importance of Universal Human Values, Self-exploration and self-awareness, Natural acceptance, Right understanding, Relationship between values, skills, and knowledge.	05
2	Understanding Happiness and Prosperity Concept of happiness and prosperity, Difference between happiness and pleasure, Short-term vs long-term happiness, Continuous happiness and prosperity, Role of values in achieving sustainable happiness.	05
3	Harmony in the Individual (Self) Human aspirations, Co-existence of self and body, Understanding needs of self and body, Right utilization of physical facilities, Holistic development of individual.	05
4	Harmony in Family and Society Family as a basic unit of society, Values in family: trust, respect, affection, care, guidance, Reverence, Social harmony, Justice, equality, and mutual cooperation, Ethical human conduct.	05
5	Harmony in Nature and Existence Relationship between human beings and nature, Mutual enrichment, Sustainable development, Environmental responsibility, Concept of co-existence, Role of engineers	04





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	in environmental protection.	
6	Professional Ethics and Value-Based Engineering Ethical responsibilities of engineers, Professional ethics, Social accountability, Case studies related to ethical dilemmas in engineering practice, Value-based decision making.	04

Text Books:

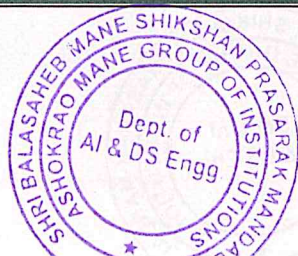
1. Gaur, R. R., Sangal, R., and Bagaria, G. P., *A Foundation Course in Human Values and Professional Ethics*, Excel Books, New Delhi.
2. Tripathi, A. N., *Human Values*, New Age International Publishers.

Reference Books:

1. *Universal Human Values*, AICTE Model Curriculum.
2. *Ethics in Engineering*, Mike Martin and Roland Schinzinger, McGraw Hill.
3. *Professional Ethics and Human Values*, R. Subramanian, Oxford University Press.

MOOC/NPTEL Platform:

1. Sharma, A. K., *Exploring Human Values: Visions of Happiness and Perfect Society*, NPTEL, IIT Kanpur. <https://nptel.ac.in/courses/109104068>
2. Kapur, N. S., and Sreesailam, V., *Applied Ethics*, SWAYAM. https://onlinecourses.swayam2.ac.in/nou26_ge38/preview
3. Pandey, A., *Essential Values and Ethics: Cultivating Professional Excellence and Career Advancement*, SWAYAM. https://onlinecourses.swayam2.ac.in/imb26_mg88/preview





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Mini Project I

Title of the Course Name: Mini Project I	L	T	P	Credits
Course Code: 25AD307			2	1
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	25		25	

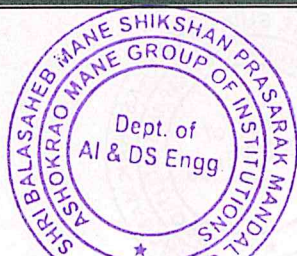
Pre-Requisite: Awareness of social, community or environmental issues relevant to engineering solutions.

Course Objectives: The course aims:

1. To develop awareness of social responsibility and community challenges.
2. To enable students to identify real-life problems and design practical solutions.
3. To promote teamwork, leadership, and communication skills.
4. To enhance ethical conduct and professional documentation practices.

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

CO	Course Outcomes	Bloom's Level
CO1	Identify community needs through interaction and field surveys.	Understand
CO2	Analyze societal problems and design feasible intervention strategies.	Analyze
CO3	Implement community-based projects using participatory methods.	Apply
CO4	Evaluate project outcomes and prepare professional technical documentation.	Evaluate





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CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	1	2		3	2	2	1	2		1		
CO2	2	3	3	2	1	2	2	2	2	2	1	2	2	2
CO3		2	3	2	2	3	3	2	3	3	2	1	2	2
CO4		3	2	3	1	2	2	3	2	3	3	2	3	3

Course Overview: The Mini Project-I course is designed to instill social responsibility among students and strengthen the connection between academic institutions and local communities. The project encourages students to apply their academic knowledge to solve real-life societal challenges and contribute towards sustainable development.

- The guiding motto of this course is: **“Campus to Community”**
- Students are expected to identify socially relevant issues under the guidance of faculty mentors and propose or implement practical solutions. These projects promote collaboration, empathy, leadership skills, and civic responsibility, enabling students to gain real-world experience while benefiting society.
- A group of students (max. 4 and min. 2) could be assigned with a project guide.

The topics for the course may cover the following diverse sectors (but not limited to):

Health: Free health check-up camps, mental health awareness programs.

Livelihood: Skill development workshops, micro-entrepreneurship support.

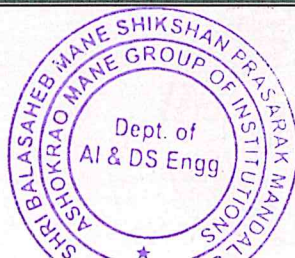
Education: Digital literacy programs, mobile libraries, career guidance camps.

Environment: Rainwater harvesting awareness, solar lighting initiatives.

Cultural Heritage: Documentation of local history, cultural exchange programs.

Through such initiatives, communities become active partners in development, creating a more inclusive and resilient society.

Sr.No.	Guidelines
1	Project Overview: Students will engage with a local community or a specific group within the community, such as schools, women’s groups, farmers, etc. to identify challenges and collaboratively develop solutions. This hands-on project allows students to apply their knowledge and





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skills while fostering social responsibility.

Key Components of the Project:

1. Community Selection & Understanding:

Community Identification: Choose a community in need of support, whether it's based on location (urban, rural) or a demographic group (youth, elderly, marginalized populations).

Problem Identification: Engage with community members to identify pressing issues or challenges, such as education, health, environment, or livelihoods.

Cultural Sensitivity: Understand the cultural, social, and economic background of the community before engaging.

2. Engagement Approach:

Participatory Method:

Involve the community at every stage—from identifying problems to developing and implementing solutions.

Partnership with Local Leaders:

Collaborate with community leaders, NGOs, or local government representatives to ensure the project's effectiveness.

Capacity Building:

Focus on empowering community members with knowledge and skills that promote self-reliance.

3. Community Engagement Methodology:

A. Pre-Engagement Research:

Conduct preliminary research on the community to understand its demographics, socio-economic conditions and existing services or infrastructure.

Review similar case studies or projects to gain insights into best practices.

B. Initial Field Visits:

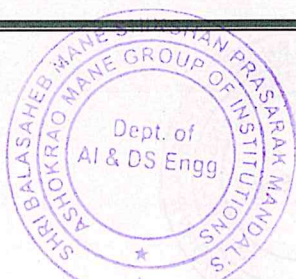
Arrange field visits to meet with key stakeholders and community members. Hold informal meetings to build rapport and trust.

C. Needs Assessment:

Use surveys, interviews or focus group discussions to gather information about the community's needs.

Assess both short-term and long-term needs related to areas such as education, healthcare, sanitation, livelihoods and environment.

D. Project Design:





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Based on the findings from the needs assessment, propose actionable solutions. Ensure that the proposed interventions are feasible, sustainable and culturally appropriate.

Examples of interventions could include awareness campaigns, skill development workshops, environmental conservation activities or infrastructure improvements.

4. Implementation Plan:

A. Action Plan:

- **Timeline:** Create a clear timeline for implementing the project, with specific milestones.
- **Roles & Responsibilities:** Assign specific tasks to team members and involve community members in the implementation process.
- **Resource Management:** Identify the resources (financial, material, human) needed to implement the project and create a budget.

B. Pilot Project (if applicable):

- Consider implementing a pilot phase to test the intervention on a smaller scale and make necessary adjustments before full-scale implementation.

C. Community Participation:

- Encourage community ownership by involving them in the execution phase (e.g., labor, materials, decision-making).
- Provide opportunities for community members to gain skills during the implementation, such as through training sessions or workshops.

5. Monitoring & Evaluation:

Monitoring Progress:

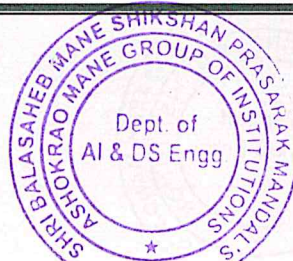
- Regularly assess the progress of the project against the action plan.
- Identify any challenges or delays and address them promptly in collaboration with the community.

B. Evaluation:

- Measure the impact of the project by comparing pre-project and post-project conditions.
- Use both qualitative and quantitative methods to evaluate success (e.g., improvements in literacy rates, health outcomes, or income levels).

D. Community Feedback:

- Gather feedback from the community on the effectiveness of the intervention.
- Hold feedback sessions with community leaders and participants to assess whether the project has met their expectations and addressed their needs.





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6. Reporting & Documentation:

B. Final Report:

- Prepare a comprehensive report documenting the entire project process, from the initial engagement to implementation and evaluation.
- Include sections on:
 - Introduction and community background
 - Needs assessment findings
 - Project design and implementation strategy
 - Challenges and lessons learned
 - Outcomes and impact analysis
 - Recommendations for future engagement

C. Visual Documentation:

- Include photographs, videos or other visual media to document the process and outcomes.
- Create info graphics or presentations that highlight key results and impact.

7. Reflection and Learning:

B. Team Reflection:

- Hold a reflection session with your project team to discuss the experiences, challenges, and personal growth resulting from the project.
- Identify what worked well and what could be improved for future community engagement efforts.

C. Community Reflection:

- Engage the community in a reflective discussion about their experience with the project and the changes they have observed or experienced.

8. Ethical Considerations:

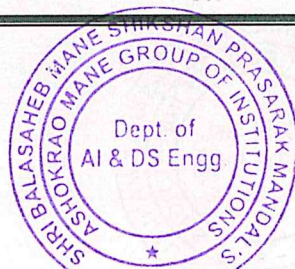
A. Informed Consent:

- Ensure that community members give informed consent before participating in the project, especially in data collection activities (e.g., interviews, surveys).
- Maintain transparency about the project's goals and the expected outcomes.

C. Respect for Cultural Norms:

- Respect the community's cultural practices, beliefs, and social norms throughout the project.
- Avoid imposing external solutions that may not align with the community's values.

D. Confidentiality:





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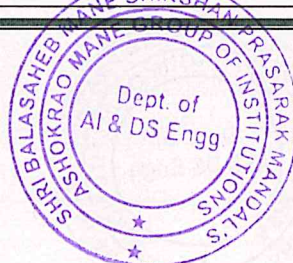
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	<ul style="list-style-type: none"> • Ensure confidentiality and privacy when dealing with sensitive information, especially personal or demographic data. <p>9. Submission Guidelines:</p> <p>A. Final Report:</p> <ul style="list-style-type: none"> • Submit a well-organized report that includes all phases of the project. <p>B. Presentation:</p> <ul style="list-style-type: none"> • Prepare a final presentation summarizing the project, including key results, challenges and recommendations. • Use visual aids, such as photos, videos or maps to illustrate the community engagement process and outcomes. <p>10. Evaluation Criteria:</p> <ul style="list-style-type: none"> • Community Involvement (25%): Extent of community participation in the project. • Problem-Solution Match (25%): Appropriateness of the solution developed for the identified community needs. • Implementation Effectiveness (20%): How effectively the project was executed, including timeliness and resource use. • Impact (20%): Tangible improvements or changes in the community. • Reflection and Learning (10%): Depth of insight gained through reflection on the process and outcomes. <p>11. Timeline:</p> <ul style="list-style-type: none"> • Week 1-2: Community research and selection. • Week 3-4: Field visits and needs assessment. • Week 5-6: Project design and planning. • Week 7-10: Implementation and monitoring. • Week 11-12: Evaluation and reporting.
2	<p>Deliverables</p> <ul style="list-style-type: none"> • Mini Project Proposal (Hard copy and Soft copy – before implementation) • Weekly Progress Logbook duly signed by the project guide • Final Project Report (Hard copy and PDF) • Working Model / Simulation Output (As applicable) • Presentation Slides (PPT) • Final Viva-Voce • Source Code / Design Files (Pen Drive / Cloud Link) if any.





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Data Structures Lab

Title of the Course Name: Data Structures Lab	L	T	P	Credits
Course Code: 25AD308			2	1
Evaluation Scheme:	ISE		ESE	
Marks:	50		50	

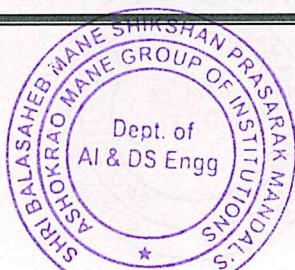
Pre-Requisite: Basic knowledge of C programming, data types, control structures, and simple problem-solving techniques.

Course Objectives: The course aims to:

1. Understand the basic concepts of data structures and their applications.
2. Implement data structures using C programming.
3. Apply suitable data structures to solve real-world problems.
4. Analyze the performance of different data structures.

Course Outcomes:

CO1	Implement basic data structures like arrays, stacks, queues, and linked lists.	Apply
CO2	Apply searching, sorting, and tree operations using appropriate data structures.	Apply
CO3	Analyze time and space complexity of algorithms.	Analyze
CO4	Design efficient programs using suitable data structures.	Create





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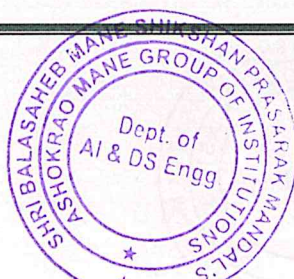
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CO-PO Mapping

CO-PO Mapping														
CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1			3							2		1
CO2	2	2	1	1	2							3		2
CO3	2	3	1	2							1	3		2
CO4	2	3	3	2	2						1	3	1	3

Exp No	Experiment Title	Hrs
1	Implement basic operations on one-dimensional and two-dimensional arrays such as insertion, deletion, traversal, and searching.	2
2	Implement the program to represent and perform operations on sparse matrices using array representation.	2
3	Implement a singly linked list and perform insertion, deletion, and traversal operations.	2
4	Implement a doubly linked list and perform insertion and deletion operations.	2
5	Implement stack operations using array representation (push, pop, peek, display).	2
6	Implement stack operations using linked list representation.	2
7	Implement a program to evaluate a postfix expression using stack.	2
8	Implement queue operations using array representation (enqueue, dequeue, display).	2
9	Implement a circular queue operations using array representation.	2
10	Implement a priority queue using array representation.	2
11	Implement a Binary Search Tree (BST) and perform insertion, deletion, and traversal operations.	2





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12	Implement graph traversal using Breadth First Search (BFS).	2
13	Implement graph traversal using Depth First Search (DFS).	2
14	Implement searching techniques (Linear Search and Binary Search) and basic sorting techniques (Bubble Sort, Selection Sort, Insertion Sort).	2

Note:-

1. Out of all experiments, at least 10 should be completed.
2. One micro project should be developed based on these experiments.

Textbooks:

1. Reema Thareja, Data Structures Using C, Oxford University Press, New Delhi.
2. E. Balagurusamy, Data Structures Using C, Tata McGraw-Hill Education, New Delhi.

Reference books:

1. Seymour Lipschutz, Data Structures with C, Schaum's Outline Series, McGraw-Hill.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education.
3. Robert Lafore, Data Structures and Algorithms in C, Pearson Education.





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Operating System Lab

Title of the Course Name: Operating System Lab Course Code: 25AD309	L	T	P	Credits
			2	1
Evaluation Scheme:	ISE			ESE
Marks:	50			50

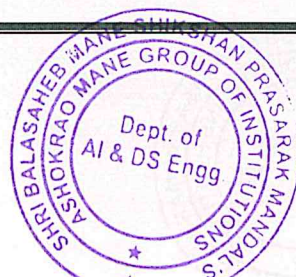
Pre-Requisite: Basic Computer Fundamentals, Computer Fundamentals, C programming.

Course Objectives: The course aims to:

1. To understand the basics of operating systems and CPU scheduling.
2. To learn process synchronization, deadlocks, and memory management concepts.
3. To understand arithmetic operations and instruction set architecture.
4. To study memory architecture, control unit, and input-output organization.

Course Outcomes: Students will be able to

CO1	Install Linux OS and perform basic Unix commands and shell scripting programs.	Apply
CO2	Develop shell programs for arithmetic operations, file handling, and problem-solving tasks.	Apply
CO3	Implement CPU scheduling, page replacement, synchronization, and deadlock algorithms.	Apply
CO4	Demonstrate concurrent programming using threads, processes, and system calls.	Apply





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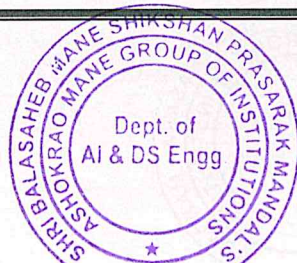
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CO-PO Mapping

CO-PO Mapping														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	3	3										2	
CO2	1	3	3										2	
CO3	1	2	2										2	
CO4	1	3	3										1	

Exp. No.	Experiment Content / Experiment Question	Hrs
1	Study and explain the basic concepts and types of Operating Systems.	2
2	Install Linux Operating System and demonstrate its basic features.	2
3	Execute and demonstrate basic Unix commands with suitable examples.	2
4	Write a shell script to display system information such as date, time, and logged-in user.	2
5	Write a shell script to perform basic arithmetic operations.	2
6	Write a shell script to check whether a given number is prime or not.	2
7	Write a shell script to find the factorial of a given number.	2
8	Write a shell program to perform file handling operations.	2
9	Write a shell script to find the largest of three numbers.	2
10	Write a shell script using grep, awk, and sed commands.	2
11	Implement page replacement algorithms such as FIFO, Optimal, and LRU.	2
12	Demonstrate concurrent programming using processes, threads, fork(), and vfork() system calls.	2
13	Compare the performance of threads and processes.	2





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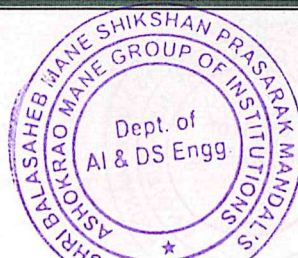
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14	Implement Quick Sort, Merge Sort, and Traveling Salesperson Problem.	2
15	Design and implement a Mini Project on Operating System concepts.	2
Textbooks: 1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, Wiley Publication, 8th Edition, 2008.		
Reference books: 1. Andrew S. Tanenbaum, Modern Operating System, PHI Publication, 4th Edition, 2015. 2. D. M. Dhamdhere, Systems Programming and Operating Systems, McGraw-Hill, 2nd Edition, 1996.		





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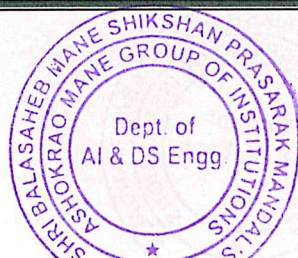
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SEM – IV





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Database Management System

Title of the Course Name: Database management System Course Code: 25AD401	L	T	P	Credits
	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

Pre-Requisite: Basic understanding of database concepts and familiarity with relational algebra and SQL fundamentals.

Course Objectives: The course aims to:

1. To understand DBMS fundamentals, data models, ER modeling, and normalization.
2. To apply SQL and RDBMS concepts for data definition and manipulation.
3. To implement MySQL control, looping, transactions, and functions.
4. To analyze database security, recovery, and advanced database concepts.

Course Outcomes:

CO1	Understand DBMS concepts, data models, ER modeling, and normalization techniques.	Understand
CO2	Design relational schemas and apply SQL for data definition, manipulation, and querying.	Apply
CO3	Implement subqueries, joins, control statements, and transaction management in MySQL.	Apply
CO4	Analyze database security, recovery methods, indexing, triggers, and advanced database concepts.	Analyze

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2												
CO2	3	2	2		3							1		
CO3	3	3	2	2	3							1	2	
CO4	2	3	2	2	2							2	2	





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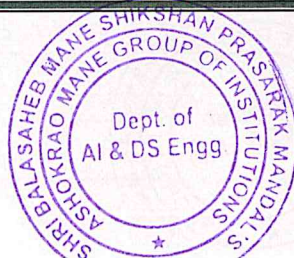
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Course Content		
Unit No.	Unit title and Content	Hrs
1	Basics of DBMS- Introduction to Data & Database, Database Management System (DBMS)- Definition, Characteristics ,advantages and disadvantages of DBMS, Data models- Hierarchical, Network, Relational, Concepts- Schema and Instances, DBMS architecture- Three Schema Architecture, Data independence- Logical, Physical, Database Terminology.	07
2	Entity–Relationship & Normalization- Introduction to ER model concepts, Entities and Entity Sets, Attributes and Types of Attributes, Relationships, Cardinality, ER Diagrams, Extended ER (EER) Model, Integrity Constraints- Domain, Entity Referential, Keys in DBMS- Primary Key, Candidate Key ,Super Key, Foreign Key, Alternate Key, Normalization- need for normalization.	07
3	Introduction to RDBMS- Difference between DBMS & RDBMS, Introduction to SQL, SQL Data Types, SQL Operators, SQL Constraints- primary key, foreign key, unique key, null, not null, default key, SQL statements/commands-Data Definition Language (DDL), Data Manipulation Language (DML)- Data Query Language (DQL), Relational Algebra (Basic Operations).	07
4	Subqueries and Joins in MySQL- Subqueries- Concepts of Subqueries, subqueries with IN, EXISTS, NOT EXISTS, subqueries restrictions, Nested subqueries, correlated subqueries, Concepts of Join Types of Joins -Inner Join, Outer Join, Left Join, Right Join, Cross Join, SQL Clauses- Where, Group By, Having, Order By, Limit, Views.	07
5	MySQL looping and Control Statements- MySQL Control Statements-IF Statement, IF–ELSE Statement, IF-ELSEIF - ELSE Statement, Looping statements- WHILE Loop, REPEAT Loop, Transaction Control Statements (TCL)-COMMIT, ROLLBACK, SAVEPOINT , Aggregate functions, String Functions, Date and Time Functions in SQL.	07
6	Database Security and Advanced Concepts Database Security and Authorization, User Roles and Privileges, Backup and Recovery Concepts, Database Failures and Recovery Techniques, Indexing and Hashing, Introduction to Triggers, Current Trends in Database Systems	07





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Textbooks:

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Education, 7th Edition.
2. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, “Database System Concepts”, McGraw-Hill Education, 6th / 7th Edition.
- 3: C. J. Date, “An Introduction to Database Systems”, Pearson Education, 8th Edition.

Reference books:

1. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, McGraw-Hill Education, 3rd Edition.
2. Elmasri, R. and Navathe, S. B., “Fundamentals of Database System”, Pearson Education.
3. Silberschatz, A., Korth, H. F., and Sudarshan, S., “Database System Concepts”, McGraw-Hill Education.
4. C. J. Date, An Introduction to Database Systems, Pearson Education





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Introduction to Data Science

Title of the Course Name: Introduction to Data Science	L	T	P	Credits
Course Code: 25AD402	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

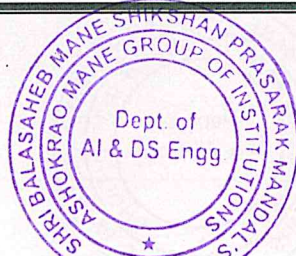
Pre-Requisite: Basic understanding of mathematics, statistics, programming fundamentals, and general awareness of data and technology.

Course Objectives:

1. Introduce fundamental concepts, processes, and applications of Data Science.
2. Develop basic skills in data handling, preprocessing, and exploratory analysis.
3. Familiarize students with introductory machine learning concepts for data-driven decision making.
4. Create awareness of ethical issues, employability, and future trends in Data Science.

Course Outcomes:

CO1	Explain core concepts, lifecycle, and applications of Data Science	Understand
CO2	Perform basic data preprocessing and exploratory data analysis.	Apply
CO3	Understand introductory machine learning techniques used in Data Science.	Understand
CO4	Identify ethical issues, societal impact, employability skills, and future trends in Data Science.	Evaluate





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CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2										1		
CO2	2	2		2	2							3	1	1
CO3	2	3		2								2	2	2
CO4						3	3	1		1	2		3	

Course Content

Unit No.	Unit title and Content	Hrs
1	Introduction to Data Science Definition of Data Science, evolution and importance of data science, data-driven decision making, data science lifecycle, roles and responsibilities of a data scientist, interdisciplinary nature of data science, applications in real-world domains, challenges and limitations.	7
2	Data Types and Data Collection Types of data – structured, semi-structured, and unstructured data, qualitative and quantitative data, sources of data, data collection methods, introduction to datasets, data quality issues.	7
3	Data Preprocessing Techniques Data cleaning, handling missing values, noise removal, data transformation, normalization and standardization, feature selection (basic idea), importance of preprocessing in data analysis.	7
4	Exploratory Data Analysis (EDA) Descriptive statistics – mean, median, mode, variance, standard deviation, summary statistics, data visualization concepts, charts and plots, correlation analysis, basic interpretation of results.	7
5	Introduction to Machine Learning for Data Science Concept of learning, supervised and unsupervised learning, regression and classification (conceptual understanding), clustering overview, simple use cases of ML in data science.	7
6	Applications, Ethics and Future Trends	7





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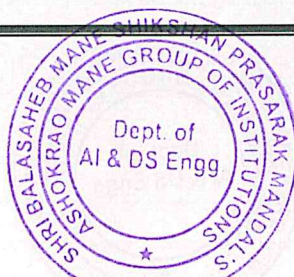
Applications of data science in healthcare, finance, education, agriculture, smart cities, ethical issues – privacy, bias, data security, data governance, employability skills in data science, future trends in data science and analytics.

Textbooks:

1. Cathy O’Neil and Rachel Schutt, *Doing Data Science: Straight Talk from the Frontline*, O’Reilly Media.
2. Joel Grus, *Data Science from Scratch*, O’Reilly Media.

Reference books:

1. Jiawei Han, Micheline Kamber, and Jian Pei, *Data Mining: Concepts and Techniques*, Morgan Kaufmann.
2. Jake VanderPlas, *Python Data Science Handbook*, O’Reilly Media.





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Discrete Mathematical Structures

Title of the Course Name: Discrete Mathematical Structures	L	T	P	Credits
Course Code: 25AD403	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

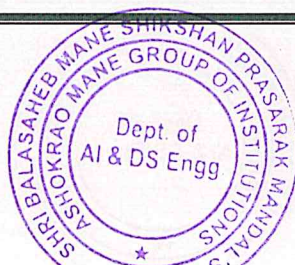
Pre-Requisite: Basic knowledge of algebra, arithmetic operations, logical reasoning, true–false statements, elementary set concepts, simple functions and relations, basic graph interpretation, and problem-solving skills.

Course Objectives: The course aims to:

1. To introduce fundamental concepts of propositional and predicate logic and develop logical reasoning skills.
2. To provide knowledge of set theory, relations, functions, and combinatorial techniques for problem solving.
3. To develop the ability to model computational problems using graphs, trees, and related algorithms.
4. To understand algebraic structures such as groups, rings, fields, and Boolean algebra and their applications.

Course Outcomes:

CO1	Apply propositional and predicate logic concepts to analyze and validate logical statements and arguments.	Apply, Analyze
CO2	Analyze and solve problems using set theory, relations, functions, and combinatorial techniques.	Analyze
CO3	Model and solve computational problems using graphs, trees, and associated algorithms.	Analyze
CO4	Understand and apply algebraic structures such as groups, rings, fields, and Boolean algebra to solve discrete mathematical problems.	Understand, Apply





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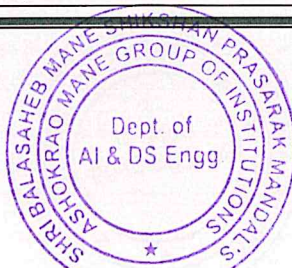
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CO-PO Mapping														
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO1	3	3	1	2								2	1	
CO2	3	3	2	2								2	2	
CO3	3	3	3	2								3	2	
CO4	3	2	2	1								2	1	

Unit No.	Unit title and Content	Hrs
1	Introduction to Propositional Logic- Introduction to propositional logic, propositions, truth values, logical operators, truth tables for logical operators, truth tables of compound propositions, precedence of logical operators, propositional equivalences, logical equivalences, normal forms	07
2	Predicates, Quantifiers and Rules of Inference- Predicates, quantifiers, universal quantifiers, existential quantifiers, quantifiers with restricted domains, precedence of quantifiers, logical equivalences involving quantifiers, negating quantified expressions, translating English statements into logical expressions, nested quantifiers, order of quantifiers, negating nested quantifiers, rules of inference, valid arguments in propositional logic, rules of inference for propositional logic	07
3	Set Theory, Relations and Functions- Basic notions of set theory, sets and representations, Venn diagrams, subsets, power sets, Cartesian products, set operations, set identities, generalized unions and intersections, cardinality of sets, functions, types of functions- injective, surjective, bijective, inverse functions, composition of functions, relations, properties of relations, representation of relations, closures, equivalence relations, equivalence classes and partitions, partial ordering relations, Hasse diagram.	07





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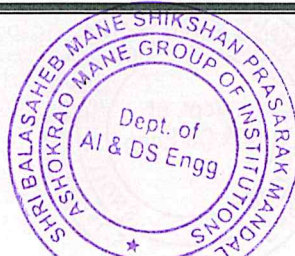
4	Combinatorics- Basic counting principles, sum rule and product rule, permutations without repetition, permutations with repetition, combinations, recurrence relations, solving homogeneous and non-homogeneous linear recurrence relations, particular solutions and general solutions	07
5	Graphs and Trees- Graphs, some special simple graphs, bipartite graphs, new graphs from old, shortest path problems, Euler and Hamiltonian paths and circuits, isomorphic graphs, planar graphs, matching and graph coloring, trees and properties, spanning trees, minimal spanning trees, Kruskal's algorithm, Prim's algorithm, prefix codes.	07
6	Algebraic Structures and Morphism- Algebraic structures with one binary operation, semigroups, monoids, groups, subgroups, normal subgroups, cyclic groups, algebraic structures with two binary operations, rings, integral domains, fields, Boolean algebra, Boolean ring, morphisms and homomorphisms	07

Textbooks:

1. C. L. Liu, Elements of Discrete Mathematics, McGraw-Hill.
2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill.

Reference books:

1. Seymour Lipschutz, Discrete Mathematics, Schaum's Outline, McGraw-Hill.
2. Bernard Kolman et al., Discrete Mathematical Structures, Pearson.
3. Eric Gossett, Discrete Mathematics with Proof, Wiley.





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Entrepreneurship Development

Title of the Course Name: Entrepreneurship Development	L	T	P	Credits
Course Code: 25AD406	1			1

Pre-Requisite: Basic knowledge of management

Course Objectives: The course aims:

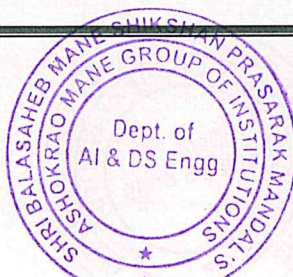
1. To introduce the concept of entrepreneurship and its significance in economic development.
2. To develop entrepreneurial competencies and motivation.
3. To familiarize with business planning and project management.
4. To create awareness about startup ecosystem, government schemes, and legal frameworks.

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

CO	Course Outcomes	Bloom's Level
CO1	Understand the role and characteristics of an entrepreneur	Understand
CO2	Develop business ideas and conduct market surveys	Apply
CO3	Prepare a basic business plan and understand project financing	Analyze
CO4	Identify government policies, start-up ecosystem support, and legal requirements	Evaluate

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1						1		1			1			
CO2		2	2	1		1		2	1					
CO3		2	2			1		1	1	3			1	
CO4						3	3		1	2	1		2	





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Course Content		
Unit No.	Contents	Hrs.
1	Introduction to Entrepreneurship: Definition, Importance, Entrepreneur vs. Manager, Entrepreneurial motivation and Barriers, Classification of Entrepreneurship, Theory of Entrepreneurship, Concept of Entrepreneurship.	3
2	Corporate Entrepreneurship: Introduction, Flavors of corporate entrepreneurship, Corporate venturing, Entrepreneurship, organizational transformation, Industry rule bending, Need for corporate entrepreneurship, domain of corporate entrepreneurship	4
3	Business Plan and Project Management: Idea generation, Screening and Project Identification, Creative Performance, feasibility study, market survey, business plan elements,TRL	3
4	Family and Non Family Entrepreneur & Women entrepreneurs: Role of Professionals, Professionalism vs. family entrepreneurs, Role of Woman entrepreneur, , Factors influencing women entrepreneur, Challenges for women entrepreneurs, Growth and development of women entrepreneurs in India	4

Text Books:

1. Vasant Desai, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing.
2. S.S. Khanka, Entrepreneurial Development, S. Chand.
3. P. Saravanavel, Entrepreneurship Development, Ess Pee Kay Publishing House.

Reference Books:

1. C.B. Gupta & N.P. Srinivasan, Entrepreneurial Development, Sultan Chand & Sons.
2. Hisrich, Peters & Shepherd, Entrepreneurship, McGraw Hill.





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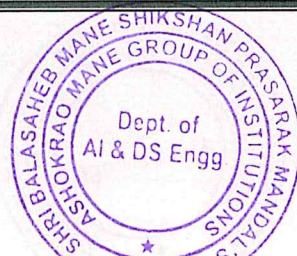
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3. David H. Holt, Entrepreneurship: New Venture Creation, Prentice Hall of India.

MOOC/NPTEL Platform:

1. **Entrepreneurship Prof. S. S. S. Kumar (IIT Madras)**
<https://nptel.ac.in/courses/110106141>
2. **Entrepreneurship and Innovation Prof. V. Gopal (IIT Roorkee)**
<https://nptel.ac.in/courses/110107094>
3. **Developing Soft Skills and Personality Prof. T. Ravichandran (IIT Kanpur)**
<https://nptel.ac.in/courses/109104115>





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Quantitative Aptitude and Logical Reasoning - I

Course Name: Quantitative Aptitude and Logical Reasoning - I	L	T	P	Credits
Course Code: 25AD407	1			1
Evaluation Scheme:	ISE-I			ISE-II
Marks:	25			25

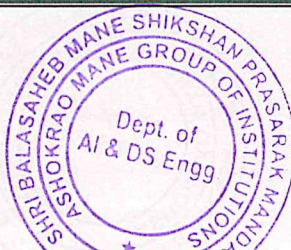
Course Description :

This course builds essential skills in arithmetic, percentages, ratios, profit & loss, and interest, alongside problem-solving methods like LCM-HCF, time-rate-work, and SI-CI. It also covers logical reasoning topics—blood relations, coding-decoding, direction sense, and series—to sharpen analytical thinking. Learners gain speed, accuracy, and adaptability for exams, recruitment, and entrepreneurial decisions.

Pre-Requisite: Basic concepts of

Basic Mathematical Knowledge, Language Proficiency and Analytical Readiness.

Course Objective: The course aims to:	
1	Develop the ability to recall and explain fundamental principles, enabling learners to build a strong conceptual foundation for quantitative and reasoning skills.
2	Gain proficiency in applying methods and techniques to solve structured problems and practical scenarios with accuracy and confidence.
3	Cultivate analytical thinking by examining relationships, patterns, and logical structures, thereby enhancing decision-making and problem validation skills.
4	Integrate diverse approaches and create effective strategies, supporting innovation and adaptability in academic, professional, and real-world contexts.





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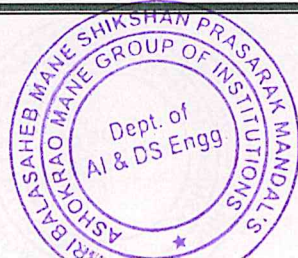
Course Outcomes: At the end of the course, students will be able to:		Blooms Texanomy
CO1	Recall key concepts of Mathematics for placements and business applications.	Remember
CO2	Apply quantitative methods to solve structured numerical problems in exams and entrepreneurial contexts.	Apply
CO3	Analyse logical reasoning problems to identify patterns and enhance reasoning skills.	Analyze
CO4	Evaluate alternative solution approaches for efficiency and create integrated solutions supporting innovation and adaptability.	Evaluate

CO-PO Mapping :

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2										1	2		
CO2	3	2										3		
CO3	2	3	1									2		1
CO4	1	2	2							1	2	2	1	1

Course Content

Unit No.	Description	Hrs
1	Foundations of Quantitative Aptitude : Number Systems- Basics, Base System, Exponents, Numerical Analogy- Basics, Relation between two numbers. Percentage- numerical Percentage Understand Conversion, Single change, Successive change, Product Stability, Applications of percentage. Ratios and Fractions- Comparison of Ratio & fraction, Properties of Ratio & Proportion, Mean Proportion., Joint ratio.	3
2	Averages, Profit & Loss, and Interest Calculations: Average - Average, Allegations Weighted average, Concept of average speed & allegation, Applications of Average & mixture allegation. Profit & Loss - Same selling price different Cost Price, Same cost price different	3





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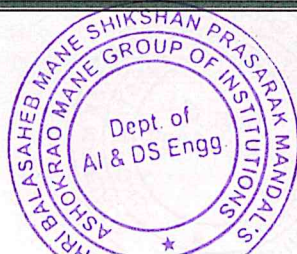
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	selling price, Concept of false scale. Simple and Compound Interest- Basics, Difference between SI CI, Conversion Periods, Depreciation.	
3	Advanced Quantitative Methods : LCM and HCF - LCM and HCF, Factors, Cyclicity , Different Methods to find LCM-HCF, HCF-LCM relation, Applications of HCF-LCM. TRW- Time, Rate and Work-Unitary Method, LCM Method, Calculation of remuneration. Pipes & Cisterns -Concept of negative work, LCM Method.	3
4	Logical Reasoning Essentials : Blood Relations -Symbols, generation of tree diagram, types of questions-pointing towards person, tree based, coded blood relation. Coding Decoding - Letter-Letter, Letter- Number, Number-Number, Letter-Symbol, Mixed Coding. Direction Sense and Time Numericals - Basics, shadow-based concept, Concept of local time zone (IST, GMT, Longitude, Latitude), Problems on local time difference, Coded direction sense.	3
5	Pattern Recognition and Analytical Series : Series Completion - Types of series, Number series pattern, Letter series, Alphanumeric series. Pattern, Step Completion - Image completion, Mirror images, Water images, input-Output. Syllogism- Basics, Types of Statements, Different diagram for different statements, Types of Questions-Based on Conclusion, Based on Statements.	2

Reference books:

1. R. S. Aggarwal, "Quantitative Aptitude", S Chand Publishing, New Delhi.
2. R. S. Aggarwal, "Logical Reasoning", S Chand Publishing, New Delhi.
3. Arun Sharma, "Quantitative Aptitude", McGraw Hill Publishing, New Delhi.
4. Arun Sharma, "Logical Reasoning", McGraw Hill Publishing, New Delhi.





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Constitution of India

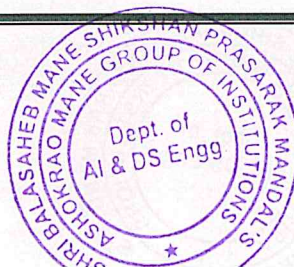
Course Name: Constitution of India	L	T	P	Credits
Course Code: 25AD408	2			2
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	25		25	

Course Description:

This course provides an overview of the Indian Constitution, focusing on its historical background, structure, and key features. It covers fundamental rights, directive principles, duties, and the functioning of Union, State, and local governments. The course also explains constitutional bodies, amendment processes, emergency provisions, and Centre-State relations. It promotes active citizenship and highlights the role of engineers in democratic governance and nation-building..

Pre-Requisite: Basic knowledge of Indian History

Course Objective: The course aims to:	
1	Introduction to the historical and legal foundations of the Indian Constitution and its key features.
2	Understanding of the structure and functioning of Union, State, and local governments.
3	Familiarization with fundamental rights, duties, directive principles, and constitutional bodies.
4	Promotion of responsible citizenship and active participation in a democratic society.





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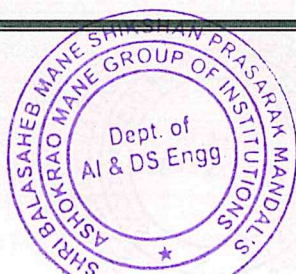


Course Outcomes: At the end of the course, students will be able to:		Blooms Taxonomy
CO1	Understand the historical and legal foundations of the Indian Constitution and its key features.	Understand
CO2	Explain the structure and functions of government at Union, State, and local levels.	Understand
CO3	Describe fundamental rights, duties, directive principles, and the roles of constitutional bodies and governance mechanisms.	Understand
CO4	Understand responsibility of citizenship and active participation in a democratic society.	Analyze

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1						2	1				1			
CO2						2	1							
CO3						3	3						1	
CO4						3	3	2	1		2		2	

Unit No.	Contents	Hrs
1	Introduction to the Constitution: Historical background of the Indian Constitution, Framing of the Constitution and the Constituent Assembly, Features of the Indian Constitution, Preamble and its significance, Citizenship: Types and constitutional provisions	4
2	Fundamental Rights and Duties Fundamental Rights: Definition, types, and limitations, Directive Principles of State Policy (DPSP), Fundamental Duties of Indian citizens	5





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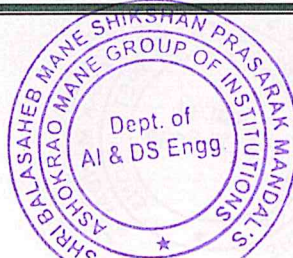
	Relationship between Fundamental Rights and DPSP	
3	Union Government Structure Parliament: Lok Sabha and Rajya Sabha – composition and functions President: Powers, election, and role, Prime Minister and Council of Ministers, Judiciary: Supreme Court – structure, powers, and independence	5
4	State Government and Local Governance State legislature and Governor, Chief Minister and State Council of Ministers, High Courts and Subordinate Courts, Panchayati Raj System and Municipalities – 73rd & 74th Amendments	5
5	Constitutional Bodies and Amendments Different types of Constitutional Bodies, Constitutional amendment process (Article 368), Major constitutional amendments (42nd, 44th, 73rd, 74th, 86th)	4
6	Important Provisions and Current Developments Emergency provisions: National, State, and Financial, Official language and special provisions, Center-State relations: Legislative, administrative, financial, Recent constitutional and legal developments, Role of citizens and engineers in democracy and governance	5

Text Books:

1. M. Laxmikanth, Indian Polity, McGraw-Hill Education
2. D.D. Basu, Introduction to the Constitution of India, LexisNexis
3. J.N. Pandey, Constitutional Law of India, Central Law Agency

Reference Books:

1. Subhash C. Kashyap, Our Constitution: An Introduction to India's Constitution and Constitutional Law, National Book Trust
2. V.N. Shukla, Constitution of India, Eastern Book Company





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3. Brij Kishore Sharma, Introduction to the Constitution of India, Pearson Education

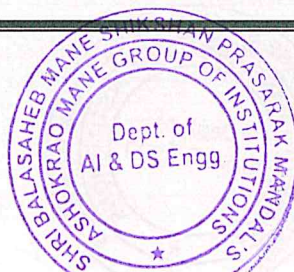
MOOC/NPTEL Platform:

1. NPTEL Course: Constitution of India, Prof. M.K. Bhandari (Rajasthan Technical University)

<https://nptel.ac.in/courses/109/104/109104074>

2. Indian Government and Politics, Prof. R. Sudarshan (IIT Delhi)

<https://nptel.ac.in/courses/109/104/109104068>





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R Programming (Skill Enhancement Lab)

Title of the Course Name: R Programming (Skill Enhancement Lab)	L	T	P	Credits
			2	1
Course Code: 25AD409				
Evaluation Scheme:	ISE-I		ISE-II	
Marks:	25		25	

Pre-Requisite: Basic programming knowledge, fundamentals of mathematics and statistics, and problem-solving skills

Course Objectives: The course aims to:

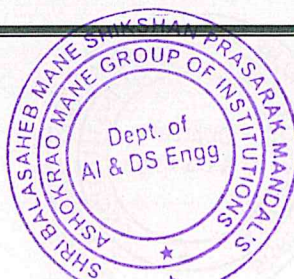
1. To understand the R programming environment and basic data structures.
2. To develop skills in data manipulation and statistical computations using R.
3. To learn file handling, object management, and simulation techniques in R.
4. To apply data visualization techniques for analyzing and presenting data effectively.

Course Outcomes:

CO1	Understand fundamental concepts of R programming environment.	Understand
CO2	Apply data structures and control statements in R.	Apply
CO3	Perform data manipulation and statistical computations using R.	Apply
CO4	Generate and interpret data visualizations using R tools..	Analyze

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3				2						2	2		
CO2	3	2			3							3		
CO3	3	3			3							3	2	3
CO4	2	3	2		3							3	3	3





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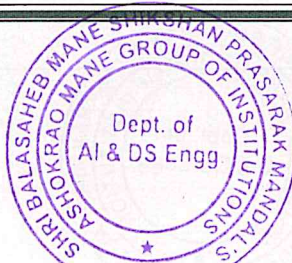
Exp.No.	Experiment Content / Experiment Question	Hrs
1	Install and Explore R and RStudio Environment	2
2	Create and Manipulate Vectors using Loops	2
3	Perform Vectorized Computations using Looping Constructs	2
4	Implement Matrix Operations in R	2
5	Apply Functions on Matrices	2
6	Create and Operate on Lists	2
7	Construct and Manipulate Data Frames	2
8	Create and Analyze Factors and Categorical Data	2
9	Implement and Manage S3 and S4 Classes with Input/Output Operations	2
10	Perform Mathematical Computations and Simulations in R	2
11	Execute File Handling Operations in R	2
12	Generate Basic Visualizations using Line Plots and Histograms	2
13	Create and Interpret Bar Charts and Pie Charts	2
14	Construct and Analyze Boxplots and Scatterplots	2

Note:-

1. Out of all experiments, at least 10 should be completed.
2. One micro project should be developed based on these experiments.

Textbooks:

1. Norman Matloff, *The Art of R Programming: A Tour of Statistical Software Design*, No Starch Press, 2011.
2. Jared P. Lander, *R for Everyone: Advanced Analytics and Graphics*, Addison-Wesley Data & Analytics Series, 2013.





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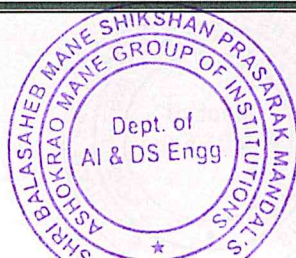
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Reference books:

1. Mark Gardener, *Beginning R: The Statistical Programming Language*, Wiley, 2013.
2. Robert Knell, *Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R*, Amazon Digital South Asia Services Inc., 2013.
3. Hadley Wickham, *Advanced R*, Chapman and Hall/CRC, 2015.





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Database Management System Lab

Title of the Course Name: Database management System Lab	L	T	P	Credits
Course Code: 25AD410			2	1
Evaluation Scheme:	ISE		ESE	
Marks:	50		50	

Pre-Requisite: Basic understanding of database concepts and familiarity with relational algebra and SQL fundamentals.

Course Objectives: The course aims to:

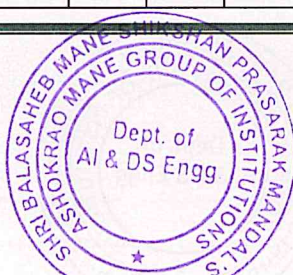
1. To Understand and demonstrate database and table creation in MySQL.
2. Apply DDL, DML, DCL, and TCL commands for database operations.
3. Perform complex SQL queries using joins, subqueries, constraints, and functions.
4. Develop and demonstrate a mini project using practical database concepts.

Course Outcomes:

CO1	Create and manage databases and tables using MySQL commands.	Understand/ Apply
CO2	Apply DDL, DML, DCL, and TCL commands for managing databases.	Apply
CO3	Perform SQL queries using joins, subqueries, constraints, and functions.	Analyze
CO4	Develop a mini project integrating practical database operations.	Create

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1			3							3		
CO2	3	2	1		3							3	2	
CO3	3	3	2	1	3							3	2	
CO4	3	2	3	2	3							3	1	





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Exp. No.	Experiment Content / Experiment Question	Hrs
1	Demonstration on the following: a) Creating a Database b) Viewing all databases c) Viewing all Tables in a Database.	2
2	Demonstration on Create a table Student and insert at least 10 records in each table.	2
3	Demonstration on DDL Commands-Create, Alter Drop, truncate, Rename	2
4	Demonstration on DML Commands-insert record, update record, select and delete record.	2
5	Demonstration on Creating and Using Primary, Foreign, and Candidate Keys in MySQL.	2
6	Demonstration on creating table and use different constraint on a table, insert at list 10 records.	2
7	Demonstration on DCL command –Grant, revoke.	2
8	Demonstration on TCL Commands-Rollback, Commit, Save point.	2
9	Demonstration on different aggregate functions in SQL.	2
10	Querying Databases Using WHERE, GROUP BY, HAVING, and ORDER BY Clauses.	2
11	Perform queries with String Functions.	2
12	Perform queries with Join Queries- Inner Join, Outer Join.	2
13	Demonstration on Subqueries Using IN, EXISTS, and NOT EXISTS in MySQL.	2
14	Demonstration on Conditional Logic in MySQL Using Control Statements.	2

Note:-

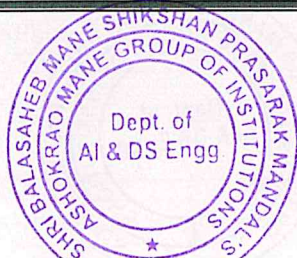
1. Out of all experiments, at least 10 should be completed.
2. One micro project should be developed based on these experiments.

Textbooks:

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Education, 7th Edition.
2. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, “Database System Concepts”, McGraw-Hill Education, 6th / 7th Edition.
3. C. J. Date, “An Introduction to Database Systems”, Pearson Education, 8th Edition.

Reference books:

1. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, McGraw-Hill Education, 3rd Edition.





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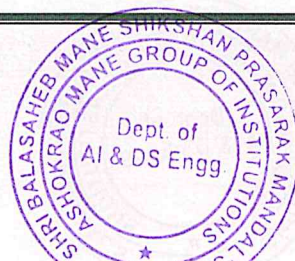
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2. Elmasri, R. and Navathe, S. B., "Fundamentals of Database System ", Pearson Education.
3. Silberschatz, A., Korth, H. F., and Sudarshan, S., "Database System Concepts ", McGraw-Hill Education.
4. C. J. Date, An Introduction to Database Systems, Pearson Education.





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Python Lab

Title of the Course Name: Python Lab	L	T	P	Credits
Course Code: 25AD411			2	1
Evaluation Scheme:	ISE			ESE
Marks:	50			50

Pre-Requisite: Basic understanding of programming concepts, elementary mathematics, and familiarity with computers.

Course Objectives:

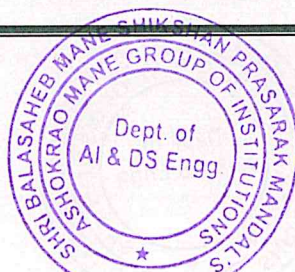
1. Introduce students to Python programming fundamentals.
2. Develop problem-solving skills using Python.
3. Enable students to write simple programs using core Python features.
4. Build a foundation for advanced programming and data-related courses

Course Outcomes:

CO1	Write simple Python programs using basic syntax and data types.	Apply
CO2	Implement decision making and looping constructs in Python.	Apply
CO3	Use functions, lists, tuples, dictionaries, and strings effectively.	Apply\Analyze
CO4	Develop small Python programs to solve basic real-world problems.	Create

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1									2	1	
CO2	2	3	2									2	1	
CO3	2	2	3		1							2	2	
CO4	2	2	3	2	1							2	2	1





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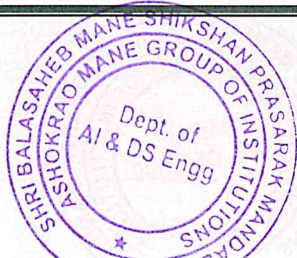
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Exp. No.	Experiment Statement	Hrs
1	Study and demonstrate the Python development environment. Write a simple program to display a welcome message and understand program execution.	2
2	Write a Python program to demonstrate the use of variables, different data types, and input/output operations (e.g., accept user details and display formatted output).	2
3	Write a Python program to perform arithmetic operations and demonstrate relational and logical operators using suitable examples.	2
4	Write a Python program to implement decision-making using conditional statements (if, if-else, elif) for real-world scenarios such as grading system or number classification.	2
5	Write Python programs to demonstrate the use of looping statements (for and while) by printing patterns or calculating factorial/sum of numbers.	2
6	Write a Python program to demonstrate the use of break, continue, and pass statements within loops using appropriate examples.	2
7	Write Python programs using user-defined functions with arguments and return values (e.g., calculate area of shapes or perform mathematical operations).	2
8	Write a Python program to perform various string operations such as concatenation, slicing, searching, and formatting.	2
9	Write a Python program to create and manipulate lists, including operations such as append, insert, remove, and sorting.	2
10	Write Python programs to demonstrate tuple operations and dictionary manipulation (e.g., storing and retrieving student data).	2
11	Write a Python program to demonstrate the use of built-in functions such as len(), max(), min(), sum(), and type().	2
12	Write Python programs to implement simple searching (linear search) and sorting (bubble sort or built-in sort) algorithms.	2
13	Write a Python program to perform basic file handling operations such as reading from and writing to a text file.	2
14	Write a Python program to handle simple exceptions using try-except blocks (e.g., division by zero or invalid input handling).	2

Note:-

1. Out of all experiments, at least 10 should be completed.
2. One micro project should be developed based on these experiments.





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Textbooks:

1. Joel Grus, *Data Science from Scratch: First Principles with Python*, O'Reilly Media.
2. Wes McKinney, *Python for Data Analysis*, O'Reilly Media.

Reference books:

1. Jake VanderPlas, *Python Data Science Handbook*, O'Reilly Media.
2. Cathy O'Neil and Rachel Schutt, *Doing Data Science*, O'Reilly Media.





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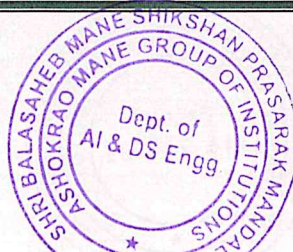
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MDM





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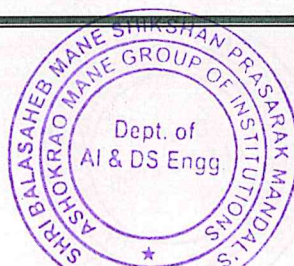
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MDM – Intelligent Design Systems





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Computer organization Architecture

Title of the Course Name: Computer Organization Architecture	L	T	P	Credits
Course Code: 25AD304A	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

Pre-Requisite: Basic Computer Fundamentals, Digital Logic Basics, Data communication

Course Objectives: The course aims to:

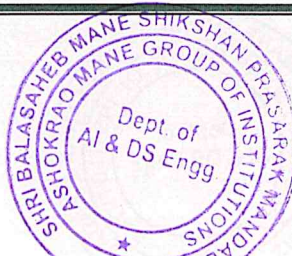
1. To understand the basic structure and functioning of computer systems.
2. To study arithmetic units, instruction sets, and processor architectures.
3. To learn memory hierarchy and memory management techniques.
4. To understand the control unit and input-output organization.

Course Outcomes:

CO1	Understand the evolution of computer systems and evaluate computer performance using standard architectures, benchmarks, and performance metrics	Understand
CO2	Students will be able to understand CPU organization, instruction execution, and memory system architecture.	Understand
CO3	Students will be able to understand control unit design, input/output organization, and concepts of pipelining and parallel processing.	Understand
CO4	Students will be able to understand parallel computer architectures, multiprocessing, multithreading, and multicore systems.	Understand

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	1										2	1
CO2	2	2	1										2	2
CO3	1	2	2										2	2
CO4	2	2	1										1	2





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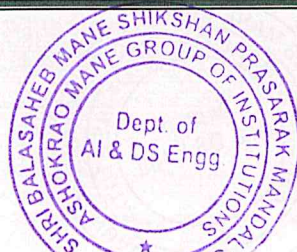
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Course Content		
Unit No.	Unit title and Content	Hrs
1	Evolution of Computer Systems and Performance Analysis A Brief History of Computers, Von Neumann Architecture, Harvard Architecture. Computer Performance Measurement – Benchmarks (SPEC) for Evaluation, Metrics such as CPU Time, Throughput, etc., Aspects & Factors affecting Computer Performance, Comparing Computer Performances	07
2	CPU Organization and Design Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Introduction to RISC and CISC architecture. The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation	07
3	Memory System Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers	07
4	Control Unit Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro- programmed Control Unit, Basic concepts, Micro-instruction execution, Applications of micro-programming. Control Unit Design Methods - Hardwired Control – State Table Method, Design example - Multiplier CU. Micro-Programmed Control - Basic Concepts, Microinstructions & Formats, Control Memory.	07
5	Input/output Organization Input/output Organization: External devices, I/O module, Programmed I/O, Interrupt driven I/O, Direct memory access, I/O channels and processors, External interface. Instruction pipe-lining: Concepts. Parallel processing: Multiple processor organization, and the MESI protocol.	07
6	Parallel Computer Systems Parallel Organization – Multiprocessors, Multicores & Clusters. Flynn's Taxonomy for Multiple Processor Organizations, Closely and Loosely Coupled Multiprocessors Systems, Symmetric Multiprocessor (SMP) Organization, Multithreading – Fine Grained, Coarse Grained & Simultaneous (SMT) Threading, Chip Multiprocessing.	07





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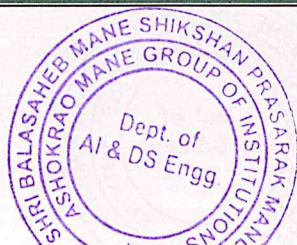


Textbooks:

1. William Stalling, Computer Organization and Architecture: Designing for Performance, Prentice Hall Publication, 8th Edition, 2009.
2. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.

Reference books:

1. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.
2. Zaky, Computer Organization, McGraw-Hill Publication, 5th Edition, 2011.
3. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan and Kaufman Publication, 4th Edition, 2007.





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R Programming

Title of the Course Name: R Programming	L	T	P	Credits
Course Code: 25AD404A	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

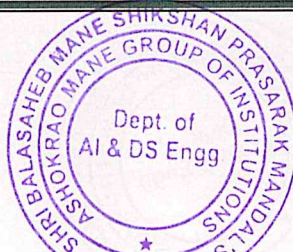
Pre-Requisite: Basic programming knowledge, fundamentals of mathematics and statistics, and problem-solving skills

Course Objectives: The course aims to:

1. To understand fundamentals of R programming and environment setup.
2. To develop skills in data handling and function implementation.
3. To learn object-oriented programming and advanced R features.
4. To apply statistical analysis and visualization using R tools.

Course Outcomes:

CO1	Understand core concepts of R programming and data structures.	Understand
CO2	Apply matrices, arrays, lists, and data frames for data manipulation.	Apply
CO3	Implement object-oriented programming and file operations in R.	Apply
CO4	Analyze data using statistical models and visualization techniques in R.	Analyze





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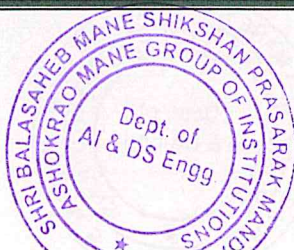
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CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2			3						2	3		
CO2	3	3	2		3							3	2	
CO3	3	2			3							3		
CO4	3	3	3	3	3							3	3	3

Unit No.	Unit title and Content	Hrs
1	Introduction to R Programming: Introduction to R, R Studio and environment setup, R data types and variables, Vectors and scalars, Vector Recycling, Vector operations, Control statements (if, if-else, loops), Built-in functions and help system, Handling NA, NULL and logical values	07
2	Matrices, Arrays and Lists: Matrices : Creating matrices, Matrix operations, Applying functions to matrix rows and columns, Adding and Deleting rows and columns, Vector matrix distinction, Arrays Definition of arrays, Creation of arrays, Array dimensions, Accessing array elements, Array operations, Lists : Creating lists, General list operations, Accessing list components and values, Applying functions to lists, Recursive lists	07
3	Data Frames and Functions: Creating data frames, Matrix-like operations in frames , Applying functions to data frames, Data frame indexing and manipulation, Factors and levels : Common functions used with factors, Working with tables,, Default values for arguments, R – functions, Environment and scope Issues	07
4	Object Oriented Programming : S3 classes, S4 classes, Managing objects,	07





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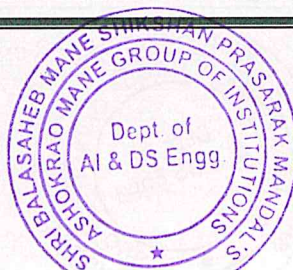
	Input and Output Features in R: Accessing keyboard and monitor, Reading files, Writing files, Accessing the internet, String: String creation, accessing and manipulation, String functions,	
5	Interfacing and Advanced Applications in R Interfacing R to other languages, Parallel R, Basic statistics, Linear model, Generalized linear models, Non-linear models, Time series and auto-correlation, Clustering	07
6	R Charts and Graphs : Basic graphics : Creating graphs, Creating three-dimensional plots, R - Pie charts, R - Bar charts, R - Boxplots, R - Histograms, R - Line graphs, R - Scatterplots	07

Textbooks:

1. Norman Matloff, *The Art of R Programming: A Tour of Statistical Software Design*, publication: No Starch Press, 2011.
2. Jared P. Lander, *R for Everyone: Advanced Analytics and Graphics*, publication: Addison-Wesley Data & Analytics Series, 2013

Reference books:

1. Mark Gardener, "*Beginning R: The Statistical Programming Language*", Wiley, 2013.
2. Robert Knell, *Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R*, Amazon Digital South Asia Services Inc., 2013.





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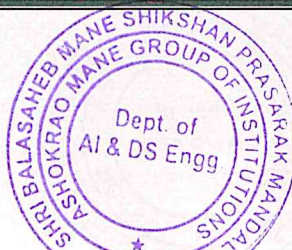
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MDM – Cognitive Computing





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Computer Organization Architecture

Title of the Course Name: Computer Organization Architecture	L	T	P	Credits
Course Code: 25AD304B	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

Pre-Requisite: Basic Computer Fundamentals, Digital Logic Basics, Data communication

Course Objectives: The course aims to:

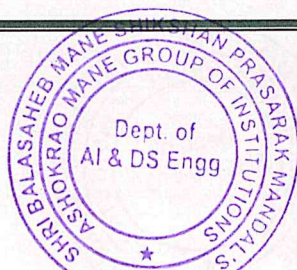
1. To understand the basic structure and functioning of computer systems.
2. To study arithmetic units, instruction sets, and processor architectures.
3. To learn memory hierarchy and memory management techniques.
4. To understand the control unit and input-output organization.

Course Outcomes:

CO1	Understand the evolution of computer systems and evaluate computer performance using standard architectures, benchmarks, and performance metrics	Understand
CO2	Students will be able to understand CPU organization, instruction execution, and memory system architecture.	Understand
CO3	Students will be able to understand control unit design, input/output organization, and concepts of pipelining and parallel processing.	Understand
CO4	Students will be able to understand parallel computer architectures, multiprocessing, multithreading, and multicore systems.	Understand

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	1										2	1
CO2	2	2	1										2	2
CO3	1	2	2										2	2
CO4	2	2	1										1	2





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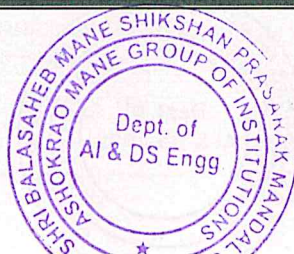
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Unit No.	Unit title and Content	Hrs
1	Evolution of Computer Systems and Performance Analysis A Brief History of Computers, Von Neumann Architecture, Harvard Architecture. Computer Performance Measurement – Benchmarks (SPEC) for Evaluation, Metrics such as CPU Time, Throughput, etc., Aspects & Factors affecting Computer Performance, Comparing Computer Performances	07
2	CPU Organization and Design Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Introduction to RISC and CISC architecture. The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation	07
3	Memory System Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers	07
4	Control Unit Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro- programmed Control Unit, Basic concepts, Micro-instruction execution, Applications of micro-programming. Control Unit Design Methods - Hardwired Control – State Table Method, Design example - Multiplier CU. Micro-Programmed Control - Basic Concepts, Microinstructions & Formats, Control Memory.	07
5	Input/output Organization Input/output Organization: External devices, I/O module, Programmed I/O, Interrupt driven I/O, Direct memory access, I/O channels and processors, External interface. Instruction pipe-lining: Concepts. Parallel processing: Multiple processor organization, and the MESI protocol.	07
6	Parallel Computer Systems Parallel Organization – Multiprocessors, Multicores & Clusters. Flynn's Taxonomy for Multiple Processor Organizations, Closely and Loosely Coupled Multiprocessors Systems, Symmetric Multiprocessor (SMP) Organization, Multithreading – Fine Grained, Coarse Grained & Simultaneous (SMT) Threading, Chip Multiprocessing.	07

Textbooks:

1. William Stalling, Computer Organization and Architecture: Designing for Performance, Prentice Hall Publication, 8th Edition, 2009.
2. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.





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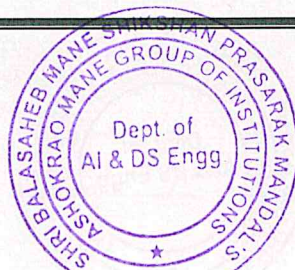
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Reference books:

1. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.
2. Zaky, Computer Organization, McGraw-Hill Publication, 5th Edition, 2011.
3. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan and Kaufman Publication, 4th Edition, 2007.





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Introduction to Data Science

Title of the Course Name: Introduction to Data Science	L	T	P	Credits
Course Code: 25AD404B	3			3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

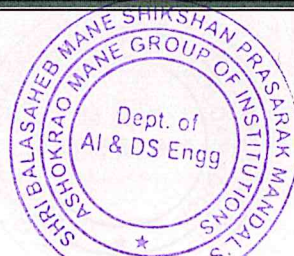
Pre-Requisite: Basic understanding of mathematics, statistics, programming fundamentals, and general awareness of data and technology.

Course Objectives:

1. Introduce fundamental concepts, processes, and applications of Data Science.
2. Develop basic skills in data handling, preprocessing, and exploratory analysis.
3. Familiarize students with introductory machine learning concepts for data-driven decision making.
4. Create awareness of ethical issues, employability, and future trends in Data Science.

Course Outcomes:

CO1	Explain core concepts, lifecycle, and applications of Data Science	Understand
CO2	Perform basic data preprocessing and exploratory data analysis.	Apply
CO3	Understand introductory machine learning techniques used in Data Science.	Understand
CO4	Identify ethical issues, societal impact, employability skills, and future trends in Data Science.	Evaluate





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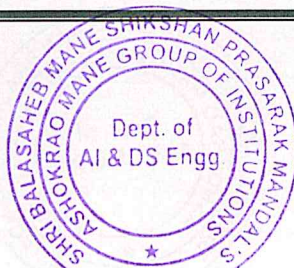


CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2										1		
CO2	2	2		2	2							3	1	1
CO3	2	3		2								2	2	2
CO4						3	3	1		1	2		3	

Course Content

Unit No.	Unit title and Content	Hrs
1	Introduction to Data Science Definition of Data Science, evolution and importance of data science, data-driven decision making, data science lifecycle, roles and responsibilities of a data scientist, interdisciplinary nature of data science, applications in real-world domains, challenges and limitations.	7
2	Data Types and Data Collection Types of data – structured, semi-structured, and unstructured data, qualitative and quantitative data, sources of data, data collection methods, introduction to datasets, data quality issues.	7
3	Data Preprocessing Techniques Data cleaning, handling missing values, noise removal, data transformation, normalization and standardization, feature selection (basic idea), importance of preprocessing in data analysis.	7
4	Exploratory Data Analysis (EDA) Descriptive statistics – mean, median, mode, variance, standard deviation, summary statistics, data visualization concepts, charts and plots, correlation analysis, basic interpretation of results.	7
5	Introduction to Machine Learning for Data Science Concept of learning, supervised and unsupervised learning, regression and classification (conceptual understanding), clustering overview, simple use cases of ML in data science.	7
6	Applications, Ethics and Future Trends	7





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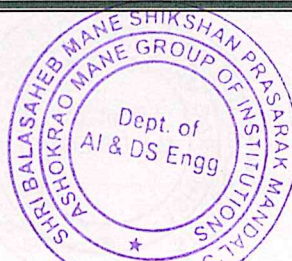
Applications of data science in healthcare, finance, education, agriculture, smart cities, ethical issues – privacy, bias, data security, data governance, employability skills in data science, future trends in data science and analytics.

Textbooks:

1. Cathy O'Neil and Rachel Schutt, *Doing Data Science: Straight Talk from the Frontline*, O'Reilly Media.
2. Joel Grus, *Data Science from Scratch*, O'Reilly Media.

Reference books:

1. Jiawei Han, Micheline Kamber, and Jian Pei, *Data Mining: Concepts and Techniques*, Morgan Kaufmann.
2. Jake VanderPlas, *Python Data Science Handbook*, O'Reilly Media.





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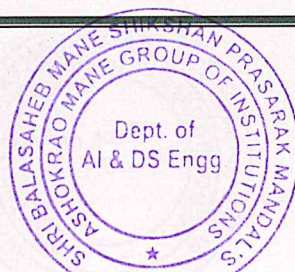
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Open Elective – I





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E Commerce

Title of the Course Name: E Commerce	L	T	P	Credits
Course Code: 25AD405A	2			2
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

Pre-Requisite: Basic understanding of computers, internet usage, and fundamental business concepts.

Course Objectives:

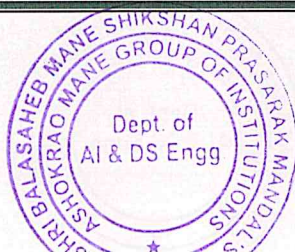
1. Introduce the fundamentals and framework of E-Commerce.
2. Familiarize students with E-Commerce models, technologies, and applications.
3. Develop understanding of online transactions, security, and digital payments.
4. Create awareness of legal, ethical, and societal issues related to E-Commerce.

Course Outcomes:

CO1	Explain basic concepts, architecture, and models of E-Commerce.	Understand
CO2	Analyze E-Commerce technologies, online payment systems, and security mechanisms.	Analyze
CO3	Apply E-Commerce concepts to design simple online business solutions.	Apply
CO4	Evaluate legal, ethical, managerial, and societal aspects of E-Commerce.	Evaluate

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1												
CO2		3		2	2							2		
CO3		2	3	1	2			1		1		2	2	1
CO4						3	3		1	2			3	





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Course Content		
Unit No.	Unit title and Content	Hrs
1	Introduction to E-Commerce Definition of E-Commerce, evolution of E-Commerce, traditional commerce vs E-Commerce, advantages and limitations, scope of E-Commerce, E-Commerce ecosystem, role of internet and web technologies.	4
2	E-Commerce Models Business-to-Business (B2B), Business-to-Consumer (B2C), Consumer-to-Consumer (C2C), Consumer-to-Business (C2B), Business-to-Government (B2G), mobile commerce (m-commerce), social commerce.	5
3	E-Commerce Infrastructure and Technologies E-Commerce architecture, web servers and hosting, databases, front-end and back-end systems, electronic catalogues, shopping cart systems, content management systems.	4
4	Online Payment Systems and Security Electronic payment systems, credit/debit cards, net banking, UPI and digital wallets, payment gateways, security issues in E-Commerce, encryption, authentication, digital signatures, cyber threats.	5
5	E-Commerce Applications and Digital Marketing E-Commerce applications in retail, banking, education, healthcare, supply chain management, digital marketing basics, SEO, online advertising, customer relationship management (CRM).	5
6	Legal, Ethical and Managerial Issues in E-Commerce E-Commerce laws and regulations, consumer protection, privacy and data protection, ethical issues, taxation in E-Commerce, project management in E-Commerce, future trends in E-Commerce.	5

Textbooks:

1. Efraim Turban et al., *Electronic Commerce: A Managerial and Social Networks Perspective*, Springer.
2. Gary P. Schneider, *Electronic Commerce*, Cengage Learning.

Reference books:

1. Kenneth C. Laudon & Carol G. Traver, *E-Commerce: Business, Technology, Society*, Pearson.
2. Bharat Bhaskar, *Electronic Commerce*, McGraw-Hill.

