



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

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

Website: www.amgoi.edu.in

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**Curriculum Structure and
Evaluation Scheme for
B. Tech.
in
Electronics and Computer
Engineering
with Honor and
Multidisciplinary Minor
(To be implemented for 2025-2029 Batch)**



Dr. C.R. Dongarsane
Head of Department
HOD

DEPT. OF ELECTRONICS AND COMPUTER ENGINEERING
SHRI BALASAHEB MANE SHIKSHAN PRASARAK MANDAL'S
ASHOKRAO MANE GROUP OF INSTITUTIONS
AMGOI, Vathar

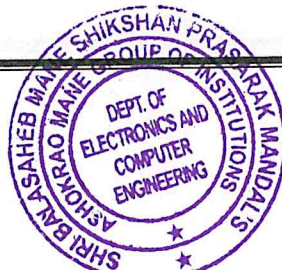


Dr. S. S. Patil
Dean Academics



Dr. S. R. Chougule
Director
Dr. Mrs. S. R. Chougule
DIRECTOR

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





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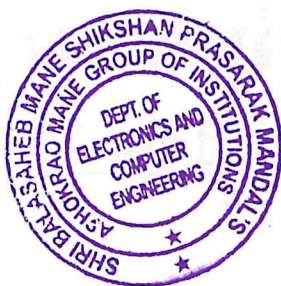
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ABBREVIATIONS

- **L:** Lecture
- **T:** Tutorial
- **P:** Practical
- **ISE1-** In Semester Evaluation 1
- **ISE2-** In Semester Evaluation 2
- **MSE:** Mid Semester Exam
- **ESE:** End Semester Exam
- **BSC** -Basic Science Courses
- **ESC:** Engineering Science Course
- **AEC:** Ability Enhancement Course
- **IKS:** Indian Knowledge System
- **VSEC:** Vocational and skill Enhancement Course
- **PCC:** Program Core Course
- **PEC:** Program Elective Course
- **CC:** Co-curricular Course



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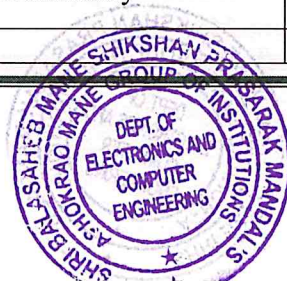
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Department: Applied Science & Humanities

Semester: I

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
BSC	25ASH101	Engineering Mathematics- I	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
BSC	25ASH102	Engineering Physics	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
ESC	25ASH104	Basic Electrical Engineering	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
ESC	25ASH105	Engineering Mechanics	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
VSEC	25ASH108	Programming in C	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
AEC	25ASH110	Communication skills	1	-	-	1	ISE-I	5	10	20
							MSE	15		
							ISE-II	5	10	
							ESE	25		
BSC	25ASH111	Engineering Physics Laboratory	-	-	2	1	ISE	50	20	
ESC	25ASH113	Basic Electrical Engineering Laboratory	-	-	2	1	ISE	50	20	
ESC	25ASH114	Engineering Mechanics Laboratory	-	-	2	1	ISE	50	20	
							ESE	50	20	
VSEC	25ASH117	Programming in C Laboratory	-	-	2	1	ISE	50	20	
							ESE	50	20	
CC	25ASH119	Yoga & Meditation	-	-	2	1	ISE	50	20	
AEC	25ASH121	Communication Skills Laboratory	-	-	2	1	ISE	50	20	
Total			15	1	12	22		900		





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Total Contact Hours- 28

Total Credits- 22

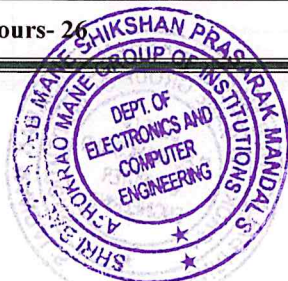
Department: Applied Science & Humanities

Semester: II

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
BSC	25ASH201	Engineering Mathematics-II	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
BSC	25ASH203	Engineering Chemistry	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
ESC	25ASH206	Fundamentals of Electronics	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
ESC	25ASH207	Engineering Graphics	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
IKS	25ASH209	Architecture and Town Planning	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
PCC	25ASH211	Measurements and Instrumentation	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
BSC	25ASH213	Engineering Chemistry Laboratory	-	-	2	1	ISE	50	20	
ESC	25ASH216	Fundamentals of Electronics Laboratory	-	-	2	1	ISE	50	20	
							ESE	50	20	
ESC	25ASH217	Computer Aided Engineering Graphics Laboratory	-	-	2	1	ISE	50	20	
							ESE	50	20	
VSEC	25ASH219	Workshop Practices	-	-	2	1	ISE	50	20	
CC	25ASH221	Social Life Skills	1	-	-	1	ISE	50	20	
	Total		17	1	08	22		950		

Total Contact Hours- 28

Total Credits- 22





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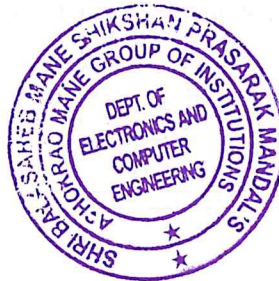
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Program Core Course offered by the Departments

Sr.No	Department	Course Title	Course Code
1	Computer Science & Engineering	Data Communication	25ASH211A
2	Electronics & Tele-Communication Engineering	Sensors & Transducers	25ASH211B
3	Electronics & Computer Engineering	Measurement & Instrumentation	25ASH211C
4	Artificial Intelligence & Data Science Engineering	Fundamentals of Artificial Intelligence	25ASH111A
5	Artificial Intelligence & Machine Learning Engineering	Fundamentals of Artificial Intelligence	25ASH111B
6	Electrical Engineering	Power Plant Engineering	25ASH111C
7	Mechanical Engineering	Fundamentals of Mechanical Engineering	25ASH111D
8	Civil Engineering	Fundamentals of Civil Engineering	25ASH111E





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Title of the Course Name: Measurements and Instrumentation	L	T	P	Credits
Course Code: To be Assigned.	2	--	--	2

Pre-Requisite: Basic Knowledge of Physics and Electronics

Course Objectives: The course aims:

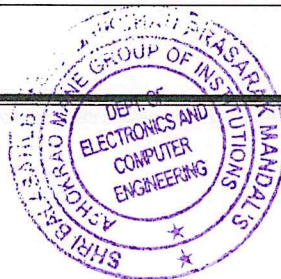
1. To introduce the fundamental principles of electronic instrumentation systems.
2. To provide an understanding of different types of electronic measuring instruments.
3. To develop the ability to analyze and interpret measurement data.
4. To familiarize students with signal conditioning, error analysis, and data acquisition techniques.

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

CO1	Explain the principles and types of electronic instruments used in measurements.
CO2	Analyze the performance of various transducers used in instrumentation systems.
CO3	Describe and design signal conditioning circuits and systems.
CO4	Perform error analysis and evaluate the accuracy of measurement systems.
CO5	Understand data acquisition systems and interfacing techniques with microcontrollers.
CO6	Demonstrate knowledge of emerging trends in electronic instrumentation such as smart sensors and IoT-based systems.

Course Content

Unit No.	Unit Title and Content	Hrs
1.	Basics of Instrumentation Definition of instrumentation system, block diagram, types of instrumentation systems, standards and calibration, static and dynamic characteristics of instruments.	5





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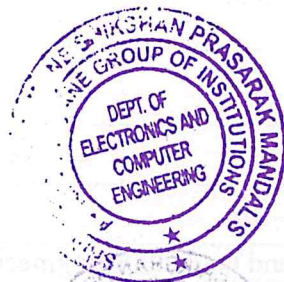
2.	Unit 2: Transducers and Sensors Classification, selection criteria, working of resistive, capacitive, inductive, piezoelectric and optical transducers, applications. Signal Conditioning Need for signal conditioning, amplifiers, filters, bridges, sample and hold circuits, analog to digital conversion	5
3.	Unit 3: OPAMP Introduction to Operational Amplifiers, Ideal Op-Amp Characteristics, Op-Amp Configurations, Applications	5
4.	Unit 4: Measurement of Physical Parameters Measurement of temperature, pressure, flow, displacement, level using electronic methods and sensors.	5
5.	Unit 5: Data Acquisition and Interfacing Block diagram of DAQ system, signal digitization, microcontroller interfacing, real-time data monitoring.	5
6.	Unit 6: Recent Trends in Instrumentation Smart sensors, wireless instrumentation, Introduction to IoT in instrumentation, virtual instrumentation and LabVIEW introduction.	5

Text books:

1. H.S. Kalsi, Electronic Instrumentation, Tata McGraw Hill.
2. A.K. Sawhney, Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co.
3. David A. Bell, Electronic Instrumentation and Measurements, PHI Learning.

Reference books:

4. John G. Webster, Measurement, Instrumentation, and Sensors Handbook, CRC Press.
5. E.O. Doebelin, Measurement Systems: Application and Design, McGraw-Hill.
6. Robert B. Northrop, Introduction to Instrumentation and Measurements, CRC Press.





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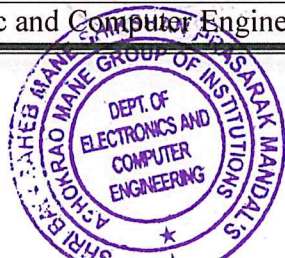
Department: Department of Electronic and Computer Engineering

Semester: III

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme				
			L	T	P	Cr	Components	Max	Min for Passing		
PCC	25EC301	Electronic Devices & Circuits	3	-	-	3	ISE-I	10	20	40	
							MSE	30			
							ISE-II	10	20		
							ESE	50			
PCC	25EC302	Data Structures	3	-	-	3	ISE-I	10	20	40	
							MSE	30			
							ISE-II	10	20		
							ESE	50			
PCC	25EC303	Computational Mathematics	3	1	-	4	ISE-I	10	20	40	
							MSE	30			
							ISE-II	10	20		
							ESE	50			
MDM	25MDM304	Multidisciplinary Minor - I	3	-	-	3	ISE-I	10	20	40	
							MSE	30			
							ISE-II	10	20		
							ESE	50			
Entre./Econo./Manag	25EC305	Professional Skill Development	2	-	-	2	ISE-I	25	20		
							ISE-II	25			
VEC	25EC306	Universal Human Values	2	-	-	2	ISE-I	10	40		
							MSE	30			
							ISE-II	10			
							ESE	50			
CEP/FP	25EC307	Mini Project - I	-	-	2	1	ISE-I	25	20		
							ISE-II	25			
PCC	25EC308	Electronic Devices & Circuits Lab				2	1	ISE	50	40	
								ESE	50		
PCC	25EC309	Data Structures Lab	-	-	2	1	1	ISE	50	40	
								ESE	50		
Total			16	1	6	20		900			
Total Contact Hours- 23						Total Credits- 20					

Department: Department of Electronic and Computer Engineering

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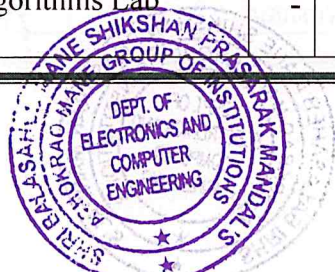
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Semester: IV

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25EC401	Digital system design	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25EC402	Computer Algorithms	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
PCC	25EC403	Operating System	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
MDM	25MDM404	Multidisciplinary Minor – II	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
OE	25OE405E	Open Elective – I	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50		
VSEC	25EC406	Entrepreneurship Development	1	-	-	1	ISE-I	25	20	
							ISE-II	25		
AEC	25EC407	Quantitative Aptitude and Logical Reasoning - I	1	-	-	1	ISE-I	25	20	
							ISE-II	25		
Entre./Econo./Manag	25EC408	Constitution of India	2	-	-	2	ISE-I	25	20	
							ISE-II	25		
VEC	25EC409	Skill Enhancement	-	-	2	1	ISE-I	25	20	
							ISE-II	25		
PCC	25EC4010	Digital System Design Lab	-	-	2	1	ISE	50	40	
							ESE	50		
PCC	25EC4011	Computer Algorithms Lab	-	-	2	1	ISE	50	40	
							ESE	50		





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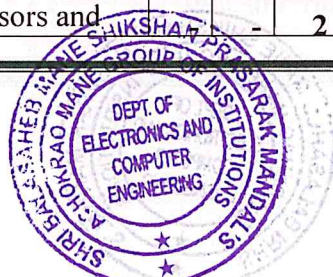


	Total		18	1	6	22		900
Total Contact Hours- 25			Total Credits- 22					

Department: Department of Electronic and Computer Engineering

Semester: V

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25EC501	Microprocessors and Microcontrollers	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
PCC	25EC502	Database Management System	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
PCC	25EC503	Networking principles and protocols	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
PEC	25EC504	Program Elective - I	4	-	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
MDM	25MDM505	Multidisciplinary Minor – III	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
OE	25OE506E	Open Elective – II	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
AEC	25EC507	Quantitative Aptitude and Logical Reasoning - II	1	-	-	1	ISE-I	25	20	
							ISE-II	25		
CEP/FP	25EC508	Mini Project – II	-	-	-	1	ISE-I	25	20	
							ISE-II	25		
PCC	25EC509	Microprocessors and	-	-	-	2	1	ISE	50	40





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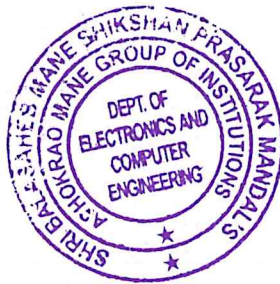
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		Microcontrollers Lab					ESE	50	
PCC	25EC5010	Database Management	-	-	2	1	ISE	50	40
		System Lab					ESE	50	
	Total		19	-	6	22		900	
Total Contact Hours- 25			Total Credits- 22						





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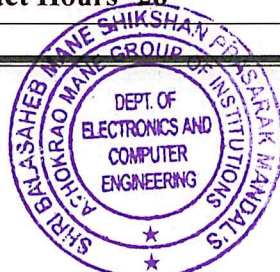
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Department: Department of Electronic and Computer Engineering

Semester: VI

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Component s	Max	Min for Passing	
PCC	25EC601	Embedded System	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PCC	25EC602	Artificial Intelligence and Machine Learning	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PEC	25EC603	Program Elective - II	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PEC	25EC604	Program Elective - III	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
MDM	25MDM605	Multidisciplinary Minor - IV	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
OE	25OE606E	Open Elective - III	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
VSEC	25EC607	Project Phase - I	-	-	4	2	ISE-I	25	20	
							ISE-II	25		
PCC	25EC608	Embedded System Lab	-	-	2	1	ISE	50	40	
							ESE	50		
PEC	25EC609	Program Elective - II Lab	-	-	2	1	ISE-I	25	20	
							ISE-II	25		
Total			18	-	8	22		900		
Total Contact Hours- 26						Total Credits- 22				





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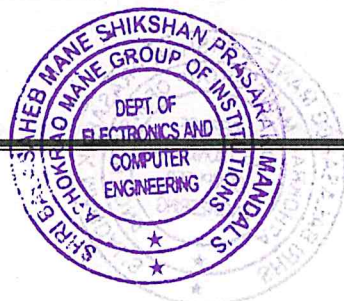
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Department: Department of Electronic and Computer Engineering
Semester: VII

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Component s	Max	Min for Passing	
PCC	25EC701	Image Processing & Machine Vision	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PCC	25EC702	IoT and Cloud Computing	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PEC	25EC703	Program Elective - IV	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PEC	25EC704	Program Elective - V	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
MDM	25MDM705	Multidisciplinary Minor - V	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PCC	25EC706	Image Processing & Machine Vision Lab	-	-	2	1	ISE-I	25	20	
						ISE-II	25			
PCC	25EC707	IoT and Cloud Computing Lab	-	-	2	1	ISE-I	25	20	
						ISE-II	25			
Project	25EC708	Project Phase-II	-	-	8	4	ISE	50	20	60
							ESE	100	40	
Total			14	-	12	20		900		
Total Contact Hours- 26						Total Credits- 20				





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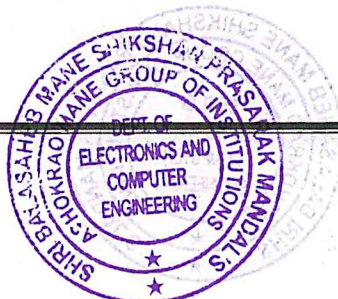


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Department: Department of Electronic and Computer Engineering
Semester: VIII

Type of Course	Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
PCC	25EC801	Industry 4.0 and Automation	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
PEC	25EC802	Program Elective – VI	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
RM	25EC803	Research Methodology	3	-	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
Intern./OJT	25EC804	Internship/On Job Training	3	-	-	12	ISE	100	40	80
							ESE	100	40	
Total			12	-	-	22		900		
Total Contact Hours- 12						Total Credits- 22				

* Internship/On Job Training – Student is expected to be in the Industry for 24 weeks.





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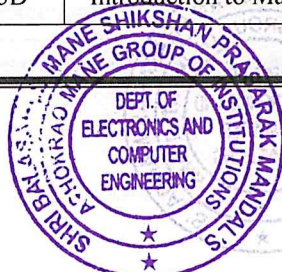


MULTIDISCIPLINARY MINOR (MDM) BASKET

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	25MDM304A	Data Structure	III	Artificial Intelligence & Machine Learning (To all UG Programs except UG AIML, AIDS, CSE, E&C Engg.)
	2	25MDM404A	R-programming	IV	
	3	25MDM505A	DBMS	V	
	4	25MDM605A	Big Data Technologies	VI	
	5	25MDM705A	Introduction to Machine Learning	VII	
Prompt Engineering	1	25MDM304B	R-programming	III	Artificial Intelligence & Machine Learning (To all UG Programs except UG AIML, AIDS, CSE, E&C Engg.)
	2	25MDM404B	Introduction to AI and ML	IV	
	3	25MDM505B	IOT	V	
	4	25MDM605B	Introduction to Blockchain Technology	VI	
	5	25MDM705B	Prompt Engineering	VII	
Intelligent Data Systems	1	25MDM304C	Computer Organization Architecture	III	Artificial Intelligence & Data Science (To all UG Programs except UG AIDS, AIML CSE, E&C Engg.)
	2	25MDM404C	R-programming	IV	
	3	25MDM505C	Data Manipulation, Analysis and Visualization	V	
	4	25MDM605C	DBMS	VI	
	5	25MDM705C	Big Data Technologies	VII	
Cognitive Computing	1	25MDM304D	Computer Organization Architecture	III	Artificial Intelligence & Data Science (To all UG Programs except
	2	25MDM404D	Introduction to Data Science	IV	
	3	25MDM505D	Introduction to Machine Learning	V	





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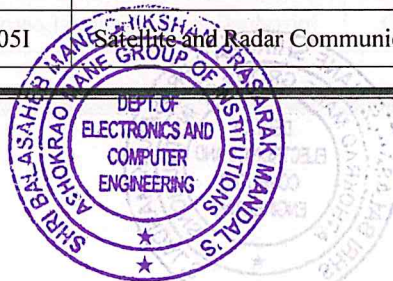
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	4	25MDM605D	Social Network Analysis	VI	UG AIDS, AIML CSE, E&C Engg.)
	5	25MDM705D	Natural Language Processing	VII	
Essentials of Software Development	1	25MDM304E	Data Structures	III	Computer Science & Engineering (To all UG Programs except UG CSE, AIML, AIDS, E&C Engg.)
	2	25MDM404E	Python Programming	IV	
	3	25MDM505E	Computer Algorithms	V	
	4	25MDM605E	Database Management System	VI	
	5	25MDM705E	Software Engineering	VII	
Modern Computing Systems	1	25MDM304F	Data Structures	III	Computer Science & Engineering (To all UG Programs except UG CSE, AIML, AIDS, E&C Engg.)
	2	25MDM404F	Python Programming	IV	
	3	25MDM505F	Java Programming	V	
	4	25MDM605F	Artificial Intelligence & Machine Learning	VI	
	5	25MDM705F	Cloud Computing	VII	
Smart Energy Systems and Sustainability	1	25MDM304G	Fundamentals of Energy Systems	III	Electrical Engineering (To all UG Programs except UG Electrical Engg.)
	2	25MDM404G	Solar and Wind Energy Technologies	IV	
	3	25MDM505G	Fundamentals of Energy Management Systems	V	
	4	25MDM605G	Energy Storage Systems	VI	
	5	25MDM705G	Renewable Energy Integration in Smart Grids	VII	
Intelligent Electrical Systems	1	25MDM304H	Introduction to Intelligent Electrical Systems	III	Electrical Engineering (To all UG Programs except UG Electrical Engg.)
	2	25MDM404H	IoT and IOV for Electrical Systems	IV	
	3	25MDM505H	AI Applications in Electrical Systems	V	
	4	25MDM605H	Automation and Control in Energy Systems	VI	
	5	25MDM705H	Smart Grid and Intelligent Monitoring Systems	VII	
Communication System	1	25 MDM304I	Principles of Communication	III	Electronics & Computer Engineering (To all UG Programs except UG E&C & E&TC Engg.)
	2	25 MDM404I	Wireless and Mobile Communication	IV	
	3	25 MDM505I	Wireless Sensor Networks	V	
	4	25 MDM605I	Information theory and Coding	VI	
	5	25MDM705I	Satellite and Radar Communication	VII	





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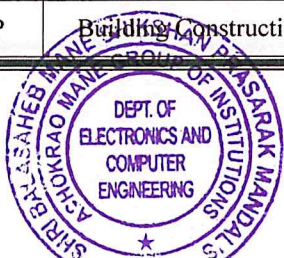
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Computing Solutions for Industry	1	25MDM304J	Python programming	III	Electronics & Computer Engineering (To all UG Programs except UG E&C, AIML, AIDS, CSE Engg.)
	2	25MDM404J	Industry Analytics	IV	
	3	25MDM505J	Cloud Computing	V	
	4	25MDM605J	Industrial Internet of Things (IIoT)	VI	
	5	25MDM705J	Power BI	VII	
Internet of Things (IoT)	1	25MDM304K	Fundamentals of IoT	III	Electronics & Telecommunication Engineering (To all UG Programs except UG E&TC Engg.)
	2	25MDM404K	Technologies Enabling IoT	IV	
	3	25MDM505K	IoT System Design	V	
	4	25MDM605K	Industrial IoT	VI	
	5	25MDM705K	IoT Security and Privacy	VII	
Embedded Systems	1	25MDM304L	Digital Design	III	Electronics & Telecommunication Engineering (To all UG Programs except UG E&TC Engg.)
	2	25MDM 404L	Microcontroller & Interfacing Techniques	IV	
	3	25MDM 505L	Embedded Systems Design	V	
	4	25MDM 605L	Real-Time Operating Systems	VI	
	5	25MDM 705L	Advanced Embedded Systems & Product Development	VII	
Product Development	1	25MDM 304M	Design Thinking Approach	III	Mechanical Engineering (To all UG Programs except UG Mech Engg.)
	2	25MDM 404M	Engineering Design Process	IV	
	3	25MDM 505M	Rapid Prototyping and Testing	V	
	4	25MDM 605M	Product Development	VI	
	5	25MDM 705M	Commercialization and Sustainability	VII	
Refrigeration and Air Conditioning	1	25MDM 304N	Fundamentals of Refrigeration	III	Mechanical Engineering (To all UG Programs except UG Mech Engg.)
	2	25MDM 404N	Refrigeration Components and Low Temperature Cycles	IV	
	3	25MDM 505N	Psychrometry and Air Conditioning Process	V	
	4	25MDM 605N	HVAC Systems and Emerging Technologies	VI	
	5	25MDM705N	Application Based System Design	VII	
Planning and	1	25MDM304P	Building Construction Materials	III	Civil Engineering





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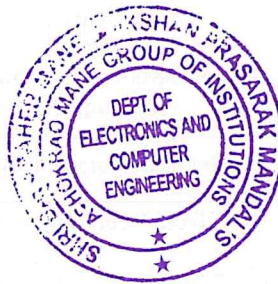
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Execution of Projects	2	25MDM404P	Engineering Management	IV	(To all UG Programs except UG Civil Engg.)
	3	25MDM505P	Resource Management	V	
	4	25MDM605P	Optimization Technique	VI	
	5	25MDM705P	Engineering Economics	VII	
Building Interior Design and Home Automation	1	25MDM304R	Introduction to Buildings and Spaces	III	Civil Engineering (To all UG Programs except UG Civil Engg.)
	2	25MDM404R	Basics of Interior Building Design	IV	
	3	25MDM505R	Building Interior Materials and Finishes	V	
	4	25MDM605R	Smart Devices and Sensors for Home Automation	VI	
	5	25MDM705R	Recent Techniques for Home Automation	VII	





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OPEN ELECTIVE

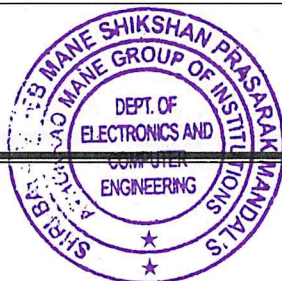
(Students have to select any one Open Elective course, for each applicable semester, of their interest (other than open electives offered by his/her department) from the table below)

Open Elective – I

Sr. No.	Course Code	Course Name	Offered by Department
1	25OE405A	E Commerce	Artificial Intelligence & Machine Learning & Artificial Intelligence & Data Science
2	25OE405B	Environmental Science	Civil Engineering
3	25OE405C	Human Computer Interaction (HCI)	Computer Science & Engineering
4	25OE405D	Electrical Safety & Standards	Electrical Engineering
5	25OE405E	Sensor Technology	Electronics & Computer Engineering & Electronics & Telecommunication Engineering
6	25OE405F	Project Management	Mechanical Engineering

Open Elective – II

Sr. No.	Course Code	Course Name	Offered by Department
1	25OE506A	Design Thinking	Artificial Intelligence & Machine Learning & Artificial Intelligence & Data Science
2	25OE506B	Disaster Management	Civil Engineering
3	25OE506C	Cyber Security	Computer Science & Engineering
4	25OE506D	Energy Audit	Electrical Engineering
5	25OE506E	Drone Technology	Electronics & Computer Engineering & Electronics & Telecommunication Engineering
6	25OE506F	Startup and Business Strategy	Mechanical Engineering





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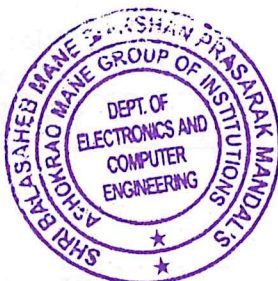
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Open Elective – III

Sr. No.	Course Code	Course Name	Offered by Department
1	25OE606A	Recommender System	Artificial Intelligence & Machine Learning & Artificial Intelligence & Data Science
2	25OE606B	Environmental Impact Assessment	Civil Engineering
3	25OE606C	Cyber Laws	Computer Science & Engineering
4	25OE606D	E-Mobility	Electrical Engineering
5	25OE606E	Engineering Economics	Electronics & Computer Engineering & Electronics & Telecommunication Engineering
6	25OE606F	Industrial Automation	Mechanical Engineering





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PROGRAM ELECTIVE CORE

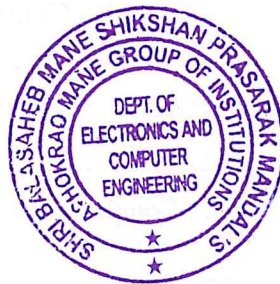
(Students have to select any one Program Elective Core course out of 03, for each applicable semester, of their interest, offered by the Department from the table below)

Program Elective Core - I

Sr..	Course Code	Domain	Course Name	Semester
1	25EC504A	VLSI and Semiconductor Devices	Semiconductor Modeling	V
2	25EC504B	Artificial Intelligence and Automation	Machine Learning and Applications	
3	25EC504C	Automation and Robotics	Mechatronics	

Program Elective - II

Sr..	Course Code	Domain	Course Name	Semester
1	25EC603A	VLSI and Semiconductor Devices	VLSI Design	VI
2	25EC603B	Artificial Intelligence and Automation	Deep Learning	
3	25EC603C	Automation and Robotics	Control Systems Engineering	





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Program Elective - III

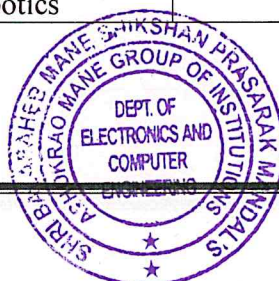
Sr..	Course Code	Domain	Course Name	Semester
1	25EC604A	VLSI and Semiconductor Devices	CMOS Design	VI
2	25EC604B	Artificial Intelligence and Automation	Computer Vision	
3	25EC604C	Automation and Robotics	Autonomous Robotics & Drones	

Program Elective – IV

Sr..	Course Code	Domain	Course Name	Semester
1	25EC703A	VLSI and Semiconductor Devices	Mixed-Signal Design	VII
2	25EC703B	Artificial Intelligence and Automation	Fuzzy Systems	
3	25EC703C	Automation and Robotics	Machine Learning for Robotics	

Program Elective – V

Sr..	Course Code	Domain	Course Name	Semester
1	25EC704A	VLSI and Semiconductor Devices	VLSI Testing	VII
2	25EC704B	Artificial Intelligence and Automation	Computer-Aided Manufacturing	
3	25EC704C	Automation and Robotics	Autonomous Systems	





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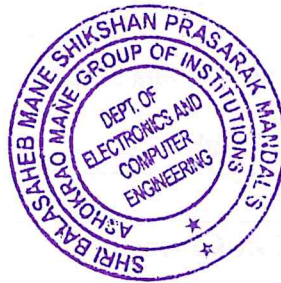
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Program Elective – VI

Sr.	Course Code	Domain	Course Name	Semester
1	25EC802A	VLSI and Semiconductor Devices	FPGA and ASIC Design	VIII
2	25EC802B	Artificial Intelligence and Automation	Cognitive Computing	
3	25EC802C	Automation and Robotics	Human-Centered Robotics	





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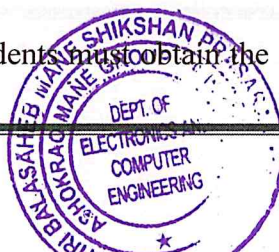


B.Tech. (Honors) in Data Science

Code	Name of the Course	Cr
25EC3H	Foundations of Data Science	3
25EC4H	Data Engineering & Pipelines	3
25EC5H	Data Analytics Using Python and R	3
25EC6H	Big Data Technologies	3
25EC7H	AI for Data-Driven Systems	3
25EC8H	Machine Learning for Data Science	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:
 - a. For NPTEL courses, students must complete all assignments on time, pass the examination, and obtain the certificate.
 - b. For Coursera or Udemy courses, students must obtain the course certificate and appear for





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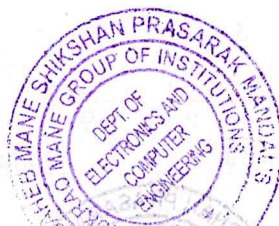
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the Online examination which will be conducted under the supervision of the Institute by Examination Cell

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:
 - Minimum 8/12 weeks for SWAYAM/NPTEL courses
 - At least 30+ hours for Coursera/Udemy courses

Course Code	Name of the Course and SWAYAM/NPTEL Links	Credit
25EC3H	Foundations of Data Science Data Science for Engineers - Course	3
25EC4H	Data Engineering & Pipeline: https://onlinecourses.nptel.ac.in/noc24_cs12/preview	3
25EC5H	Data Analytics Using Python and R : https://onlinecourses.nptel.ac.in/noc24_cs15/preview	3
25EC6H	Big Data Technologies https://onlinecourses.nptel.ac.in/noc24_cs44/preview	3
25EC7H	AI for Data-Driven Systems https://onlinecourses.nptel.ac.in/noc24_cs63/preview	3
25EC8H	Machine Learning for Data Science Introduction to Machine Learning - Course	3
	Total	18





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Exit Courses for Electronics & Computer Engineering (As per NEP Guidelines)

A. After First Year:

The candidate should pass following skill-based courses to qualify for Certification.

Course Code	Course Name	Teaching Scheme				Evaluation Scheme		
		L	T	P	Cr	Components	Max	Min for Passing
25EC222	Basics of PCB Design	3	-	2	4	ISE-I	10	40
						MSE	30	
						ISE-II	10	
						ESE	50	
25EC223	Introduction to Python Programming	3	-	2	4	ISE-I	10	40
						MSE	30	
						ISE-II	10	
						ESE	50	
Total		6	0	4	8		200	
Total Contact Hours- 10				Total Credits- 8				

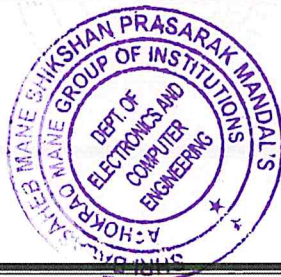
Total Credits: 8

B. 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
25EC4012	Programming with Arduino	3	-	2	4	ISE-I	10	40
						MSE	30	
						ISE-II	10	
						ESE	50	
25EC4013	Web Development	3	-	2	4	ISE-I	10	40
						MSE	30	
						ISE-II	10	
						ESE	50	
Total		6	0	4	8		200	
Total Contact Hours- 10				Total Credits- 8				

Total Credits: 8





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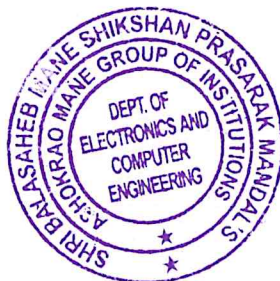


C. After Third Year:

The candidate should pass following skill-based courses to qualify for B. Voc.

Course Code	Course Name	Teaching Scheme				Evaluation Scheme			
		L	T	P	Cr	Components	Max	Min for Passing	
25CS610	Electronic System Design	3	-	2	4	ISE-I	10	20	40
						MSE	30		
						ISE-II	10		
						ESE	50		
25CS611	Machine Learning with Python	3	-	2	4	ISE-I	10	20	40
						MSE	30		
						ISE-II	10		
						ESE	50		
Total		6	0	4	8		300		
Total Contact Hours- 10		Total Credits- 8							

Total Credits: 8





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Department of Electronics and Computer Engineering



Title of the Course Name: Electronic Devices and Circuits	L	T	P	Credits
Course Code: 25EC301	3	--	--	3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

Pre-Requisite: Basic Electrical Engineering, Semiconductor Physics

Course Objectives: The course aims:

1. Develop understanding of amplifier circuits, their characteristics, and frequency response.
2. Introduce waveform shaping and timing circuits used in analog signal processing.
3. Explain feedback, oscillator circuits, and their role in stable signal generation.
4. Familiarize students with operational amplifier applications and advanced electronic devices used in modern systems.

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

CO	Course Outcomes	Bloom's Level
CO1	Analyze amplifier circuits and evaluate gain, bandwidth, and frequency response parameters.	AN
CO2	Design and analyze waveform shaping and multivibrator circuits for timing and pulse generation applications.	AP
CO3	Analyze feedback amplifiers and oscillator circuits for stability and performance improvement.	AN
CO4	Apply operational amplifier configurations and explain the working of advanced electronic devices in practical applications	AP

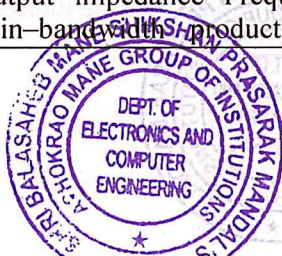
U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping

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

Course Content

Unit No.	Contents	Hrs.
1	Amplifiers: Concept of amplification, Single-stage BJT amplifier (CE configuration) Gain, input and output impedance Frequency response of amplifiers Bandwidth and gain-bandwidth product, Introduction to multistage	7



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Department of Electronics and Computer Engineering

	amplifiers,RC coupled amplifier Transformer coupled amplifier ,Power amplifier concept and need Classification of power amplifiers: Class A, B, AB, C	
2	Waveform Shaping Circuits: Introduction to wave shaping, Clippers: Series, Shunt, Biased clippers ,Clampers: Positive, Negative, Biased clampers Practical applications of clipping and clamping circuits, Introduction to pulse shaping circuits	7
3	Multivibrators and Timing Circuits: Concept of multivibrators, A stable multivibrator: operation and waveforms , Monostable multivibrator: principle and applications Bistable multivibrator: working and triggering , Applications in timing, pulse generation, and switching circuit	7
4	Feedback Amplifiers and Oscillator Circuits: Feedback concept and types, Effect of negative feedback on gain, bandwidth, noise, and stability, Oscillator principle and Barkhausen criterion, RC oscillators: Phase shift oscillator, Wien bridge oscillator, Introduction to tuned oscillators	7
5	Advanced Electronic Devices and Applications: UJT: construction, characteristics, and applications,Thyristor family: SCR, DIAC, TRIAC – basic operation, Opto-electronic devices: LED, Photodiode, Optocoupler, Special-purpose devices: Varactor diode, Phototransistor, Applications in control, power electronics, and communication systems	7
6	Operational Amplifier and Applications Ideal Op-Amp characteristics and limitations: Op-Amp configurations: Inverting and Non-inverting amplifier, Voltage follower, Linear applications: Summing amplifier, Difference amplifier, Integrator and Differentiator, Non-linear applications: Comparator, Zero crossing detector, Practical applications of Op-Amps in signal conditioning	7

Text Book:

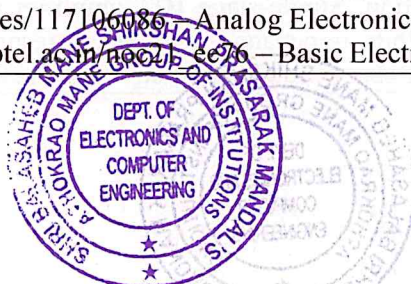
1. Robert L. Boylestad & Louis Nashelsky , *Electronic Devices and Circuit Theory* ,Pearson Education
2. Millman & Halkias, *Integrated Electronics: Analog and Digital Circuits & Systems*, McGraw-Hill

Reference Books:

1. Adel S. Sedra & Kenneth C. Smith, *Microelectronic Circuits*, Oxford University Press

MOOC/NPTEL Platform:

1. <https://nptel.ac.in/courses/117106086> - Analog Electronic Circuits
1. <https://onlinecourses.nptel.ac.in/noc21-ec76> – Basic Electronics



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Title of the Course Name: Electronic Devices and Circuits Lab	L	T	P	Credits
Course Code: 25EC308	--	--	2	1
Evaluation Scheme-	ISE	MSE	--	ESE
Marks-	50	--	--	50

Pre-Requisite: Basic Electrical Engineering, Semiconductor Physics

Course Objectives: The course aims:

1. To understand and analyze basic electronic devices and amplifier circuits through laboratory experiments.
2. To design and test waveform shaping and multivibrator circuits for timing applications.
3. To study oscillator and feedback circuits for stable signal generation.
4. To apply operational amplifiers and modern tools for practical analog circuit applications.

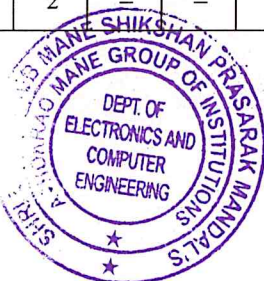
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Analyze and verify the characteristics of basic electronic devices and amplifier circuits using experimental methods.	AN
CO2	Design and implement waveform shaping and multivibrator circuits for timing and pulse applications.	AP
CO3	Investigate oscillator and feedback circuits by conducting experiments and interpreting results.	AN
CO4	Apply operational amplifier circuits and modern engineering tools for practical signal processing applications.	C

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO PO Mapping:

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





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Sr. No	List of Experiment
1	Study of PN Junction Diode characteristics under Forward Bias and Reverse Bias conditions.
2	Design and analysis of CE BJT Amplifier – measurement of voltage gain and frequency response.
3	Study of RC Coupled Amplifier and measurement of bandwidth.
4	Design and performance analysis of Series Clippers.
5	Design and performance analysis of Shunt Clippers.
6	Design and analysis of Positive and Negative Clampers.
7	Study of a Stable Multivibrator using BJT.
8	Study of Monostable Multivibrator using BJT and verification of timing calculations.
9	Verification of RC Phase Shift Oscillator characteristics.
10	Design and verification of Op-Amp Inverting Amplifier.
11	Design and verification of Op-Amp Non-Inverting Amplifier.
12	Study of Op-Amp Applications: Summing Amplifier, Integrator, Comparator.

Note: Minimum 10 Practical's / Experiments will be Completed.



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Title of the Course Name: Data Structures Course Code: 25EC302	L	T	P	Credits
	3	--	--	3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

Pre-Requisite: Basics of Programming in C

Course Objectives: The course aims:

1. To understand fundamental data structures and their applications.
2. To analyze algorithms using time and space complexity.
3. To select appropriate data structures for efficient problem solving.
4. To implement linear and non-linear data structures.

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

CO	Course Outcomes	Bloom's Level
CO1	Understand data structures, ADTs, and basic searching and sorting algorithms.	U
CO2	Implement stacks, queues, and linked lists to solve practical problems.	A
CO3	Develop and traverse tree structures and perform heap operations.	AN
CO4	Represent graphs and apply BFS and DFS traversal algorithms.	A

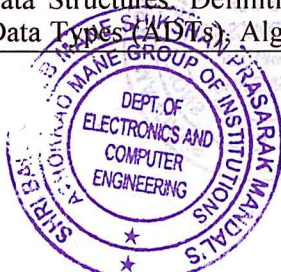
U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

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	2	1	-	-	-	-	-	-	-	2	2	1
CO3	2	2	2	2	1	-	-	-	-	-	-	2	3	2
CO4	2	2	2	2	1	-	-	-	-	-	-	2	2	2

Course Content

Unit No.	Contents	Hrs.
1	Introduction to Data Structures Introduction to Data Structures: Definitions, Need, Types (Linear, Non-linear), Abstract Data Types (ADTs); Algorithms: Definition, Characteristics,	8





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	Time and Space Complexity, Introduction to Asymptotic Notations, Types of Data Structures: Static vs Dynamic, Applications of Data Structures.	
2	Searching and Sorting Techniques Searching Algorithms: Linear Search, Binary Search, Concept of Hashing, Collision, Collision Resolution techniques. Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort, Simple Merge Sort , Simple Quick Sort, Comparison of Sorting Techniques (Time Complexity)	7
3	Stack and Queue Stacks: Definition, Operations on Stack, Applications (Infix to Postfix, Expression Evaluation, Recursion) Implementation using Arrays and Linked Lists Queues: Types: Simple Queue, Circular Queue, Dequeue, Priority Queue, Implementation using Arrays and Linked List.	7
4	Linked List Introduction and Comparison with Arrays, Types of Linked Lists: Singly Linked List, Doubly Linked List, Circular Linked List (Singly and Doubly)Operations: Create, Traverse, Insert, Delete, Reverse	7
5	Trees Tree terminology, Rrepresentation, Binary Tree, Binary Tree Traversal methods, Types of Binary Tree, Binary Search Tree, Operations on BST (Insertion, Deletion and Search).	7
6	Graphs Graph Terminology, Vertex, Edge, Degree, Types of Graphs, Graph Representations: Adjacency Matrix, Adjacency List, Sparse Matrix Representation. Graph Traversal Algorithms: Breadth-First Search (BFS), Depth-First Search (DFS)	7

Text books:

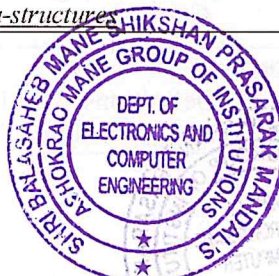
1. Ellis Horowitz, Sartaj Sahni & Susan Anderson-Freed, *Fundamentals of Data Structures in C*, Universities Press
2. A. M. Tenenbaum, Y. Langsam & M. J. Augenstein, *Data Structures Using C*, Pearson Education

Reference books:

2. Data Structures, 6th Edition, *Seymour Lipschutz*, McGraw-Hill Education, 2017
3. Data Structures Through C, 2nd Edition, *Yashwant Kanetkar*, BPB Publication, 2019

Online Resources:

1. Geeks for Geeks – Data Structures- <https://www.geeksforgeeks.org/data-structures/>
2. Coursera – Data Structures (University of California San Diego) - <https://www.coursera.org/learn/data-structures>



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Title of the Course Name: Data Structures Lab	L	T	P	Credits
Course Code: 25EC309	--	--	2	1
Evaluation Scheme-	ISE	MSE	--	ESE
Marks	50	--	--	50

Course Objectives:

1. To understand fundamental concepts of data structures, abstract data types, algorithm efficiency, and their role in problem-solving.
2. To develop ability to apply searching, sorting, and linear data structures such as stacks, queues, and linked lists for computational problems.
3. To enable students to design and implement non-linear data structures including trees and graphs for real-world applications.
4. To cultivate analytical, implementation, and debugging skills required to develop efficient and optimized data structure-based solutions.

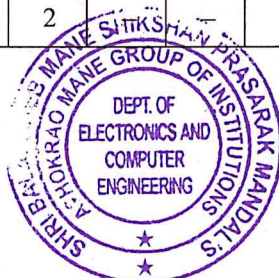
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Analyze time complexity of algorithms and compare performance of searching and sorting techniques.	AN
CO2	Implement linear data structures such as stacks, queues, and linked lists and apply them to solve computational problems.	AP
CO3	Implement non-linear data structures including trees and graphs and perform standard operations and traversals.	AP
CO4	Apply appropriate data structures and algorithms to solve real-world problems efficiently using programming techniques.	AN,AP

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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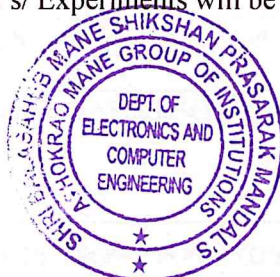
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Sr. No	List of Experiment
1	To study the time complexity of simple algorithms (best, worst, and average cases).
2	Implement Linear Search and Binary Search algorithms and compare their performance.
3	Implement Bubble Sort, Selection Sort, and Insertion Sort and analyze their time complexity.
4	Implement Merge Sort and Quick Sort and compare results with simple sorting methods.
5	Implement Stack using Array with basic operations (push, pop, display).
6	Implement Stack using Linked List with basic operations (push, pop, display).
7	Applications of Stack Infix to Postfix conversion Expression Evaluation
8	Implement Queue, Circular Queue, and Priority Queue using array or linked list.
9	Implement Singly Linked List with operations (create, insert, delete, traverse, reverse).
10	Implement Doubly Linked List and Circular Linked List with basic operations.
11	Implement Binary Search Tree (BST) with insertion, deletion, search, and traversals (inorder, preorder, postorder).
12	Implement Graph Representation using Adjacency Matrix and Adjacency List, and perform BFS and DFS traversals.

Note: Minimum 10 Practical's/ Experiments will be Completed



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Title of the Course Name: Computational Mathematics	L	T	P	Credits
Course Code: 25EC303	3	1	--	4
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks	10	30	10	50

Pre-Requisite: Students should have a basic understanding of calculus, linear algebra, differential equations, and elementary statistics.

Course Objectives: The course aims to:

1. Introduce Fourier transform techniques and enable students to apply Fourier integrals, sine and cosine transforms, and Parseval's identity in solving engineering and mathematical problems.
2. Develop a strong foundation in fuzzy set theory, including fuzzy numbers, fuzzy arithmetic, and solving basic fuzzy equations for handling uncertainty in real-world systems.
3. Understand graph theory concepts and algorithms, such as special graphs, trees, shortest paths, spanning trees and graph colouring, with applications in computer science and network design.
4. Apply correlation and regression techniques, including Karl Pearson's correlation coefficient, Spearman's rank correlation, and linear regression methods, to analyze and interpret data..

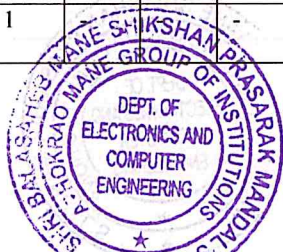
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Understand Fourier transform techniques and their applications for analyzing functions in the frequency domain.	U
CO2	Apply fuzzy set theory and fuzzy arithmetic to model uncertainty and solve fuzzy equations in engineering contexts.	A
CO3	Apply graph theory concepts, including trees, spanning trees, shortest paths, and graph coloring, to solve network and combinatorial problems.	A
CO4	Apply correlation and regression analysis techniques to model relationships among engineering variables and make informed decisions.	A

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

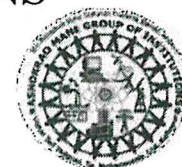
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	1	-	-	-	-	-	-	-	-



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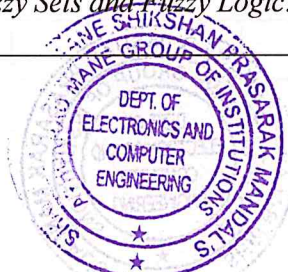
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CO4	3	2	-	-	1	-	-	-	-	-	1	-	-
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Course Content		
Unit No.	Contents	Hrs.
1	Fourier Transform Definitions – Integral transforms; Fourier integral theorem (without proof) ; Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier sine and cosine transforms; Properties of Fourier transforms; Parseval's identity for Fourier transform and Problems.	9
2	Introduction to Fuzzy sets Basic concepts of Fuzzy set, Crisp set and Fuzzy set, Membership functions; Basic operations on fuzzy sets, Properties of fuzzy sets.	6
3	Fuzzy Arithmetic Fuzzy numbers; Fuzzy cardinality; Operations on Fuzzy numbers; Fuzzy equations of type $A + X = B$ and $A.X = B$.	6
4	Graph Theory Graph: Some Special Simple Graphs, Bipartite Graphs, Path & Circuit Shortest path problems, Euler and Hamiltonian paths, Isomorphic graphs, Planar graphs, Connectivity, Matching & Colouring Trees: Rooted trees, path length tree, Binary Search tree Spanning trees and cut sets, Minimal spanning trees, Kruskal's and Prim's algorithms for minimal spanning trees	9
5	Correlation Introduction, Types of correlation, correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient and problems, Spearman's rank correlation and its problems & Probable Error	6
6	Linear Regression Analysis Introduction, Linear and non-linear regression, Lines of regression, Derivative of regression lines of y on x and x on y, Regression coefficients, Angle between the regression lines, Coefficients of regression and Problems.	6

Text books:

1. T. Veerarajan, *Engineering Mathematics*, Tata McGraw-Hill Education.
2. S. C. Gupta & V. K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons.
3. George J. Klir & Bo Yuan, *Fuzzy Sets and Fuzzy Logic: Theory and Applications*, Prentice Hall.



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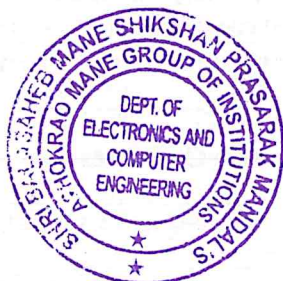
4. R. P. Agarwal, *Graph Theory*, S. Chand & Company.

Reference Books:

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers.
2. H. J. Zimmermann, *Fuzzy Set Theory and Its Applications*, Springer.
3. Douglas B. West, *Introduction to Graph Theory*, Pearson Education.
4. Murray R. Spiegel, *Probability and Statistics, Schaum's Series*, McGraw-Hill Education.

Online Resources:

1. Fourier Transforms: <https://nptel.ac.in/courses/111/106/111106053/>
2. Graph Theory: <https://nptel.ac.in/courses/111/106/111106047/>
3. Fuzzy Logic: <https://nptel.ac.in/courses/111/107/111107109/>
4. Correlation & Regression: <https://nptel.ac.in/courses/111/107/111107116/>





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Title of the Course Name: Principles of Communication Course Code: 25MDM304I	L	T	P	Credits
	3	--	--	3
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	10	30	10	50

Pre-Requisite: Signals and Systems, Basic Electronics

Course Objectives:

1. To understand the fundamentals of analog and digital communication systems, transmission models, spectrum utilization, and noise effects.
2. To study amplitude, angle modulation techniques and pulse modulation processes with their generation and detection methods.
3. To learn digital modulation schemes, data transmission concepts, multiplexing techniques, and their performance in communication systems.
4. To understand modern communication applications including radio, satellite, optical fiber, mobile communication, and IoT-based communication systems.

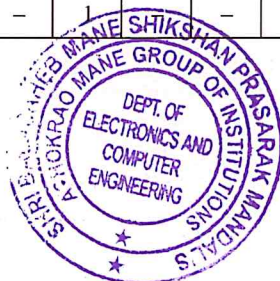
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Explain the principles, types, spectrum usage, and necessity of modulation in communication systems	U
CO2	Analyze AM, FM, PM, and pulse modulation techniques including their characteristics, generation, and detection methods.	AN
CO3	Apply digital modulation and data transmission techniques such as ASK, FSK, PSK, QAM, TDM, and FDM for communication system design.	A
CO4	Evaluate the performance of communication systems with respect to noise, bandwidth efficiency, BER, and modern applications including radio, satellite, optical fiber, and mobile systems.	E

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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Course Content

Unit No.	Contents	Hrs
1	Introduction to Communication Systems Basic communication model, Types of communication: Simplex, Half Duplex, Full Duplex, Analog vs Digital communication, Electromagnetic spectrum and bandwidth, Noise: Types of Noise, Signal-to-Noise Ratio (SNR), Need of modulation	6
2	Analog Modulation Techniques Amplitude Modulation (AM): Theory, Modulation Index, Power relations, AM Generation & Detection, Double Sideband, Single Sideband, Vestigial Sideband, Frequency Modulation (FM) and Phase Modulation (PM), FM Generation & Detection, Comparison of AM & FM	8
3	Pulse and Digital Communication Sampling Theorem & Quantization, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), PCM System – Encoding, Quantization noise, Differential PCM, Delta Modulation, Adaptive Delta Modulation	8
4	Digital Modulation Techniques ASK, FSK, PSK, QPSK, DPSK, QAM concepts, Bandwidth considerations Error performance – Bit Error Rate (BER), Eye diagram (concept only)	7
5	Data Transmission & Multiplexing Data transmission modes: Serial & Parallel, Synchronous and Asynchronous transmission, Line coding techniques (NRZ, RZ, Manchester), Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM)	7
6	Communication Systems & Applications Block diagram of Radio Receiver (AM/FM), Television communication basics (concept level), Satellite communication basics, Optical fiber communication fundamentals, Mobile communication overview (2G, 3G, 4G, 5G concept only), Applications in IoT and modern digital systems	7

Text Books:

1. Simon Haykin, *Communication Systems*, Wiley Publications.
2. B. P. Lathi, *Modern Digital and Analog Communication Systems*, Oxford University Press.

Reference Books:

1. H. Taub & D. Schilling, *Principles of Communication Systems*, McGraw Hill.
2. Wayne Tomasi, *Electronic Communication Systems*, Pearson Education.

MOOC/NPTEL Platform:

1. **NPTEL:** *Principles of Communication*
<https://nptel.ac.in/courses/117/104/117104125>
2. **SWAYAM / NPTEL:** *Digital Communication*
https://swayam.gov.in/nd1_noc20_ee40/



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Title of the Course Name: Python Programming	L	T	P	Credits
Course Code: 25MDM304J	3	--	--	3
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks	10	30	10	50

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

Course Objectives: The course aims:

1. To introduce the fundamentals of Python programming including environment setup, syntax, variables, operators, and basic programming constructs.
2. To develop logical thinking through control structures, functions, recursion, and efficient problem-solving approaches.
3. To impart knowledge of Python data structures, object-oriented programming concepts, and exception handling for real-time applications.
4. To familiarize students with file handling operations and essential Python libraries such as NumPy and Matplotlib for computational tasks and data handling.

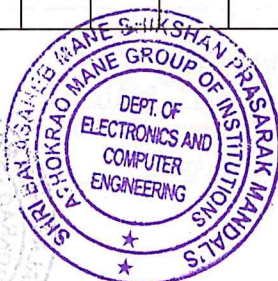
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Understand and apply fundamental concepts of Python programming including syntax, variables, operators, and expressions.	A
CO2	Develop Python programs using control structures, functions, and recursion to solve computational problems effectively.	AN
CO3	Apply Python data structures and object-oriented programming concepts to design structured and modular programs.	AN
CO4	Utilize file handling techniques and basic Python libraries such as NumPy and Matplotlib to perform data processing and visualization.	A

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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	-	-	-	-	-	-	2	2	1
CO2	2	2	2	2	2	-	-	-	-	-	-	2	2	2
CO3	2	2	3	2	2	-	-	-	-	-	-	3	2	2
CO4	2	3	2	2	2	-	-	-	-	-	-	2	2	2



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Course Content		
Unit No.	Contents	Hrs.
1	Introduction to Python: Features of Python, applications, installation, Python interpreter, writing and executing Python programs, variables, keywords, identifiers, indentation, comments.	7
2	Data Types and Operators: Built-in data types (int, float, string, boolean), type conversion, input/output functions, operators (arithmetic, relational, logical, assignment, bitwise).	6
3	Control Structures and Functions: Conditional statements (if, if-else, nested if), looping statements (for, while), break, continue, pass, functions, arguments, return values, recursion.	6
4	Data Structures: Lists, tuples, sets, dictionaries, operations on data structures, list comprehensions, string manipulation methods.	8
5	Object-Oriented Programming in Python: Classes and objects, constructors, inheritance, polymorphism, encapsulation, method overloading and overriding, exception handling.	8
6	File Handling and Libraries: File operations (read, write, append), handling CSV/text files, introduction to Python standard libraries (math, random, datetime), Basic overview of NumPy and Matplotlib.	7

Textbook:

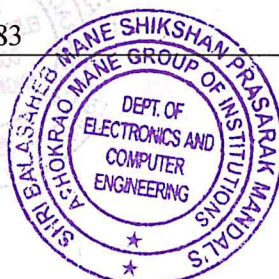
1. Programming with Python, Reema Thareja, 1st Edition, Oxford University Press, 2019.
2. Python Programming: A Modern Approach, Vamsi Kurama, 1st Edition, Pearson Education, 2021.

Reference Books:

1. Reema Thareja, *Python Programming using Problem Solving Approach*, Oxford University Press.
2. Guido van Rossum, *The Python Tutorial*, Python Software Foundation.
3. Allen B. Downey, *Think Python*, O'Reilly Media

MOOC/NPTEL Platform:

1. NPTEL: Computer Networks by Dr. Narayan Patidar, Devi Ahilya Vishwavidyalaya, Indore
https://onlinecourses.swayam2.ac.in/cec21_cs04/preview
2. NPTEL: Computer Networks and Internet Protocol, IIT Kharagpur by Prof. Soumya Kanti Ghosh, Prof. Sandip Chakraborty
3. <https://nptel.ac.in/courses/106105183>





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Title of the Course Name: Professional Skill Development	L	T	P	Credits
Course Code: 25EC305	2	--	--	2
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks-	25	--	25	--

Pre-Requisite: Fundamentals of communication, interpersonal skills

Course Objectives: The course aims:

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.

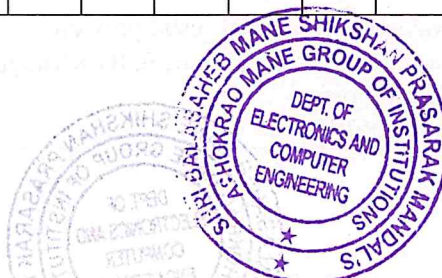
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Analyze personal strengths, beliefs, and self-perception to develop self-awareness, self-esteem, and confidence through reflection and inner dialogue practices.	AN
CO2	Create a clear personal vision and long-term goals by transforming abstract aspirations into structured and achievable plans.	C
CO3	Apply goal-setting, task breakdown, and time-management techniques to effectively plan and execute personal and academic activities.	A
CO4	Evaluate personal progress using reflection, feedback, and process-improvement methods to build resilience and continuous improvement habits.	E

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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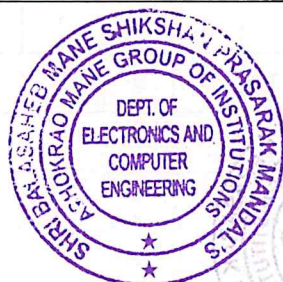
Course Content

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)	5
6	Final Presentation Presentation of personal growth portfolio Reflection on mindset, behavior, and outcomes	5

Text Books:

Reference books:

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





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Title of the Course Name: Universal Human Values	L	T	P	Credits
Course Code: 25EC306	2	--	--	2
Evaluation Scheme-	ISE-I	MSE	ISE-I	ESE
Marks-	10	30	10	50

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.

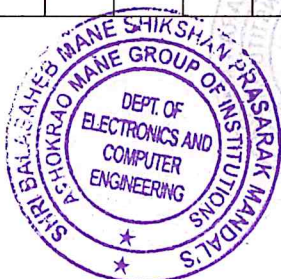
Course Outcomes: At the end of the course, students will be able to:

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

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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Course Content

Unit No.	Unit title and Content	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.	5
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.	5
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.	5
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.	5
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 in environmental protection.	4
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.	4

Text Books:

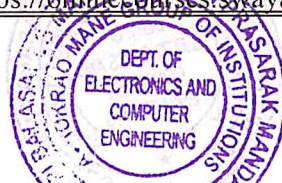
1. Gaur, R. R., Sangal, R., and Bagaria, G. P., *A Foundation Course in Human Values and Professional Ethics*, Excel Books, New Delhi.
2. Tripathi, A. N., *Human Values*, New Age International Publishers.

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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Title of the Course Name: Mini Project -1	L	T	P	Credits
Course Code: 25EC307	--	--	2	1
Evaluation Scheme	ISE-I	MSE	ISE-II	ESE
Marks	25	--	25	--

Pre-Requisite: Nil

Course Objectives: The course aims:

1. Apply theoretical knowledge gained in core engineering subjects to design and develop a working software or hardware solution for a defined problem.
2. Enhance problem-solving, analytical, and critical thinking skills through structured project execution.
3. Gain hands-on experience in design, development, testing, and documentation of software/hardware systems.
4. Develop teamwork, communication, project management, and professional ethics essential for engineering practice.

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

CO	Course Outcomes	Bloom's Level
CO1	Identify, analyze, and define a technical problem by applying engineering fundamentals and domain knowledge.	AN
CO2	Design and implement a software or hardware-based mini project using appropriate tools, platforms, and methodologies.	E,C
CO3	Test, validate, and evaluate the performance and limitations of the developed system.	AP
CO4	Document the project work systematically and present technical solutions effectively through reports and presentations.	AP,AN

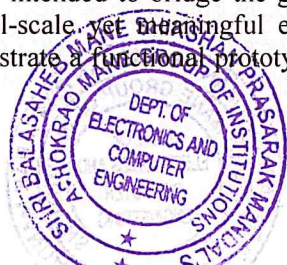
U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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

Course Guidelines

The Software/Hardware Mini Project is intended to bridge the gap between theory and practice by encouraging students to work on small-scale, yet meaningful engineering problems. Students are expected to design, develop, and demonstrate a functional prototype or application individually or in small teams under faculty supervision.



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- Performance evaluation and result analysis

3. Reporting Phase

a. Documentation:

Prepare a detailed project report containing:

- Title, objectives, and scope
- Block diagrams, flowcharts, or system architecture
- Implementation details
- Results and discussion
- Challenges faced and solutions adopted
- Conclusion and future scope

b. Presentation & Demonstration:

- Each team will present and demonstrate their project
- Presentation duration: 5–7 minutes per team
- Evaluation by faculty panel

C. Evaluation Criteria

Projects will be evaluated based on the following parameters:

1. **Problem Definition & Relevance** – Clarity and technical depth
2. **Design & Implementation** – Correctness and completeness of solution
3. **Innovation** – Creativity and originality in approach
4. **Teamwork** – Coordination, role distribution, and contribution
5. **Documentation & Presentation** – Quality, clarity, and professionalism

D. Guidelines for Conduct

1. Professional Behavior:

- Maintain discipline, punctuality, and ethical conduct.

2. Safety:

- Follow laboratory and electrical safety norms while working on hardware projects.

3. Originality:

- Plagiarism in code, design, or reports is strictly prohibited.

E. Best Practices

1. Follow a structured development approach (SDLC / Agile).
2. Maintain proper version control and backups.
3. Document progress regularly in a project diary/logbook.
4. Seek continuous feedback from faculty mentors.
5. Ensure the project is feasible within the given time and resources.

Reference Books

1. Pressman, R. S. *Software Engineering: A Practitioner's Approach*. McGraw-Hill.
2. Sommerville, I. *Software Engineering*. Pearson Education.
3. Mazidi, M. A., et al. *The 8051 Microcontroller and Embedded Systems*. Pearson.
4. Raj Kamal. *Embedded Systems: Architecture, Programming and Design*. McGraw-Hill.
5. Gamma, E., et al. *Design Patterns: Elements of Reusable Object-Oriented Software*. Addison-Wesley.

Online Resources

1. IEEE Project Repository: <https://ieeexplore.ieee.org>
2. GitHub: <https://github.com>
3. NPTEL Project-Based Courses: <https://nptel.ac.in>
4. Arduino & Embedded Resources: <https://www.arduino.cc>
5. Stack Overflow: <https://stackoverflow.com>



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The project emphasizes learning-by-doing, innovation, and practical exposure to engineering workflows such as requirement analysis, system design, implementation, testing, and reporting. The motto of the mini project is “Learning through Implementation.”

Projects may include, but are not limited to, application development, embedded systems, automation tools, IoT-based solutions, data-driven applications, and simulation models. Through this course, students gain confidence, technical competence, and readiness for major projects or industry internships.

A. Project Scope

The Mini Project should focus on solving a well-defined technical problem using software, hardware, or a combination of both. Projects may fall under the following themes:

1. Software-Based Projects:

- Web or mobile application development
- Data analysis and visualization tools
- Database-driven applications
- Simulation or modeling software

2. Hardware-Based Projects:

- Embedded systems using microcontrollers or microprocessors
- Sensor-based monitoring systems
- Automation or control systems

3. Software-Hardware Integrated Projects:

- IoT-based applications
- Smart devices and monitoring systems
- Assistive or automation solutions

4. Emerging Technologies:

- Artificial Intelligence / Machine Learning prototypes
- Cloud-based or edge computing applications
- Cybers ecurity or networking tools

B. Step-by-Step Execution Plan

1. Planning Phase

a. Team Formation:

- Form a team of 3–4 students with complementary skills.
- Each member should actively contribute to planning, execution, and documentation.

b. Project Selection:

- Identify a problem statement relevant to the chosen domain.
- Define clear objectives, scope, and expected outcomes.

c. Proposal Submission:

Submit a one-page project proposal including:

- Title of the project
- Problem statement and objective
- Proposed solution and methodology
- Tools, technologies, and components required
- Project timeline
- Obtain approval from the assigned faculty guide

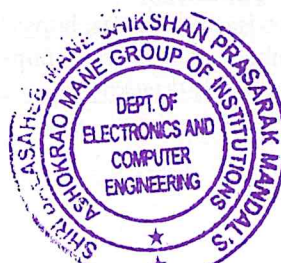
2. Execution Phase

a. Phase 1 Activities:

- Requirement analysis and system design
- Literature survey and technology study
- Initial development and prototyping
- Regular progress reviews with faculty mentor

b. Phase 2 Activities:

- Full implementation and integration
- Testing, debugging, and refinement





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Title of the Course Name: Digital System Design	L	T	P	Credits
Course Code: 25EC401	3	--	--	3
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks	10	30	10	50

Pre-Requisite: Basic knowledge of number systems

Course Objectives: The course aims:

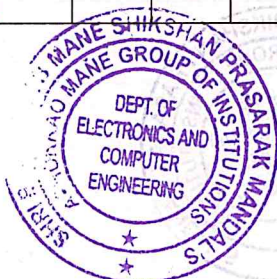
1. To understand number systems, logic gates, and Boolean algebra.
2. To analyze and simplify combinational logic circuits.
3. To design and implement sequential logic circuits.
4. To explore applications of flip-flops, counters, and shift registers.

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

CO	Course Outcomes	Bloom's Level
CO1	Apply principles of Boolean algebra and logic minimization techniques to analyze and design digital circuits using logic gates and Karnaugh maps.	U,R
CO2	Compare and evaluate digital logic families and IC characteristics, and select appropriate logic families for specific digital system applications.	R,A
CO3	Design and analyze combinational and sequential circuits such as adders, multiplexers, flip-flops, registers, and counters for digital system implementation.	AN
CO4	Explain the role of programmable logic devices, semiconductor memories, and modern digital systems in embedded systems, IoT applications, and reconfigurable computing.	R

CO-PO Mapping

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





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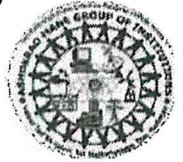
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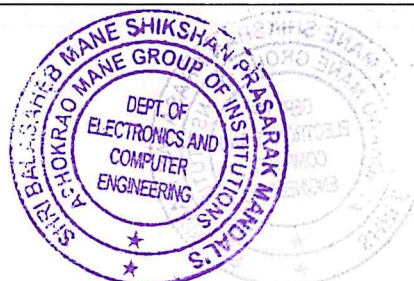
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Course Content		
Unit No.	Contents	Hrs
1	Logic Gate & Boolean Algebra Review of Logic Gates, Definitions of Boolean Algebra, Basic Theorems, Properties of Boolean Algebra, Boolean functions, Canonical and Standard forms, K-Maps upto 4 variables, Gate level minimization, Circuits/Applications using gates	7
2	Digital Logic Families Classification of logic families, Characteristics of digital ICs-Speed of operation, power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements. TTL Logic Family-Operation of TTL NAND gate, active pull up, open collector output. CMOS Logic Family- CMOS inverter, NAND, NOR gates. Interfacing CMOS and TTL. Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I2L and DCTL.	7
3	Programmable Logic Devices and Semiconductor Memories Programmable logic devices: Detail architecture, Study of PROM, PAL, PLA. General Architecture of FPGA and CPLD. Semiconductor memories: memory organization and operation, expanding memory size, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM.	7
4	Combinational Circuits Introduction to Combinational Circuits, Adders, subtractor, Parallel Binary Adder, Parallel binary subtractor, Encoder & Decode, Multiplexers & Demultiplexers, BCD to 7-Segment Display Decoder.	7
5	Sequential Circuits 1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Excitation Table for flip flops and Conversion of flip flops. Shift registers, Bidirectional Shift Register, Universal Shift Register, Asynchronous (Ripple) Counters & Synchronous Counters.	8
6	Modern Digital Systems & Applications Digital systems in embedded applications, Role of digital logic in IoT devices, Hardware–software co-design concept, Introduction to reconfigurable computing, Basics of digital system security, Emerging trends in digital electronics.	7





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Title of the Course Name: Digital System Design Lab Course Code: 25EC410	L	T	P	Credits
	--	--	2	1
Evaluation Scheme-	ISE	MSE	--	ESE
Marks-	50	--	--	50

Course Objectives: The course aims:

1. To understand and verify the operation of basic logic gates and Boolean algebra principles.
2. To design and implement combinational logic circuits using standard ICs.
3. To analyze and design sequential circuits using flip-flops, registers, and counters.
4. To study digital logic families, memory elements, and programmable logic devices through practical implementation

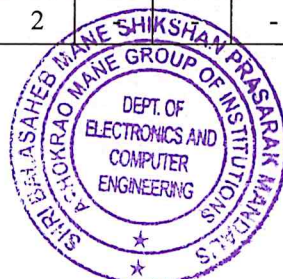
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Apply Boolean algebra and minimization techniques to implement digital logic circuits.	AP
CO2	Design and test combinational circuits such as adders, multiplexers, decoders, and display drivers.	C
CO3	Analyze and implement sequential circuits using flip-flops, registers, and counters.	AN
CO4	Examine characteristics of digital logic families, memories, and programmable logic devices.	U

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping

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



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Text Books:

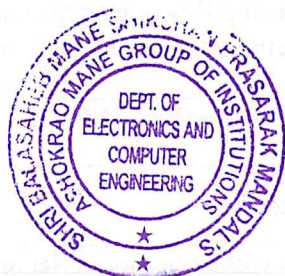
1. 1.A.Anant kumar-*Fundamentals of digital electronics*.
2. 2.M. Morris Mano – *Digital Logic and Computer Design*, Pearson
3. 3.Ronald J. Tocci – *Digital Systems: Principles and Applications*, Pearson

1. Reference Books:

1. R.P. Jain – *Modern Digital Electronics*, McGraw Hill
2. 2.Thomas L. Floyd – *Digital Fundamentals*, Pearson

MOOC/NPTEL Platform:

1. NPTEL: Digital Circuits – Prof. S. Srinivasan
2. SWAYAM: Digital Logic – Prof. Indranil Sengupta





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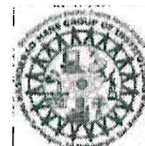
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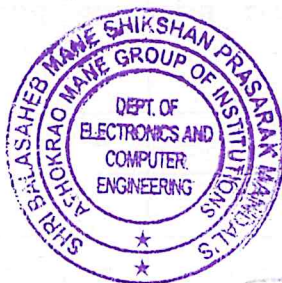
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Sr.No.	List of Experiments
1	Verification of truth tables of basic logic gates using ICs.
2	Implementation and verification of Boolean expressions using logic gates.
3	Design and verification of Half Adder circuit.
4	Design and verification of Full Adder circuit.
5	Design and verification of Multiplexer circuits.
6	Design and verification of Demultiplexer circuits.
7	Design and verification of Encoder and Decoder circuits.
8	Design of 4-bit Shift Register (SISO / SIPO / PISO / PIPO).
9	Verification of the truth table of J-K Flip-Flop.
10	Operation and verification of Asynchronous and Synchronous Counters.
11	Design and verification of Ring Counter / Johnson Counter.
12	Study of Digital Logic Families (TTL & CMOS) and introduction to Memory and PLD concepts.

Note: Minimum 10 Practical's / Experiments will be Completed



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Title of the Course Name: Computer Algorithms	L	T	P	Credits
Course Code: 25EC402	3	--	--	3
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks	10	30	10	50

Pre-Requisite: Data Structures, Discrete Mathematics, Programming Fundamentals

Course Objectives: The course aims:

1. To understand the fundamentals of algorithm design and analysis.
2. To analyze algorithm efficiency using time and space complexity.
3. To apply algorithm design techniques for solving real-world problems.
4. To develop skills in designing optimal algorithms for various problem domains.

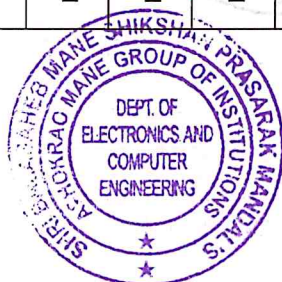
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Analyze the correctness and efficiency of algorithms.	AN
CO2	Apply basic algorithm design techniques (divide & conquer, greedy, dynamic programming).	AP
CO3	Design and implement algorithms for graph problems and optimization tasks.	C
CO4	Solve computational problems by selecting appropriate algorithmic strategies	E

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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Course Content

Unit No.	Unit title and Content	Hrs
1	Introduction to Algorithms: Definition, Properties of Algorithms, Expressing Algorithm, Flowchart, Algorithm Design Techniques, Performance Analysis of Algorithms, Types of Algorithms Analysis, Order of Growth, Asymptotic Notations, Recursion, Recurrences Relation, Substitution Method, Iterative Method, Recursion Tree, Master Theorem, Changing Variable.	8
2	Divide and Conquer: Introduction, Binary Search, Merge Sort, Quick Sort, Strassen's, Matrix Multiplication.	6
3	Backtracking: Backtracking Concept, N–Queens Problem, Four–Queens Problem, Eight–Queen Problem, Hamiltonian Cycle, Sum of Subsets Problem, Graph Coloring Problem, Branch and Bound: Introduction, Traveling Salesperson Problem, 15-Puzzle Problem, Comparisons between Backtracking and Branch and Bound.	8
4	Greedy Algorithms: Introduction to Greedy Technique, Greedy Method, Optimal Merge Patterns, Huffman Coding, Knapsack Problem, Activity Selection Problem, Job Sequencing with Deadline, Minimum Spanning Tree, Single-Source Shortest Path Algorithm.	8
5	Dynamic Programming: Introduction, Characteristics of Dynamic Programming, Component of Dynamic Programming, Comparison of Divide-and-Conquer and Dynamic Programming Techniques, Longest Common Subsequence, matrix multiplication, shortest paths: Bellman-Ford, Floyd Warshall, Application of Dynamic Programming – OBST, Multistage Graph	8
6	NP Completeness: Introduction, the Complexity Class P, the Complexity Class NP, Polynomial-Time Reduction, the Complexity Class NP-Complete.	4

Text Books:

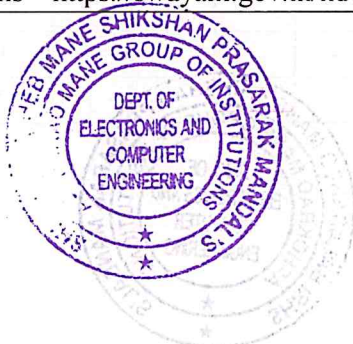
1. T. Cormen, *Introduction to Algorithms*, PHI Publication, 4th Edition, 2022.
2. Thomas H. Cormen et al. – *Introduction to Algorithms*, MIT Press.
3. Ellis Horowitz, Sartaj Sahni – *Fundamentals of Computer Algorithms*, Galgotia Publications.

Reference Books:

1. Aho, Ullman, *Data Structure and Algorithms*, Addison-Wesley Publication, 1st Edition, 1983.
1. 2. Michel Goodrich, Roberto Tamassia, *Algorithm Design – Foundation, Analysis & Internet Examples*, Wiley Publication, 2nd Edition, 2006.

MOOC/NPTEL Platform:

1. NPTEL: Design and Analysis of Algorithms – <https://nptel.ac.in/courses/106/104/106104019/>
2. SWAYAM: Algorithms – https://swayam.gov.in/nd1_noc19_cs36/





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Title of the Course Name: Computer Algorithms Lab Course Code: 25EC411	L	T	P	Credits
	--	--	2	1
Evaluation Scheme-	ISE	MSE	--	ESE
Marks-	50	--	--	50

Pre-Requisite: Data Structures, Discrete Mathematics, Programming Fundamentals

Course Objectives: The course aims:

1. To provide hands-on experience in implementing fundamental algorithms using various algorithm design techniques such as Divide & Conquer, Greedy, Dynamic Programming, Backtracking, and Branch & Bound.
2. To develop the ability to analyze time and space complexity of algorithms through experimentation and performance comparison.
3. To enable students to evaluate correctness, efficiency, optimality, and feasibility of algorithmic solutions for different computational problems.
4. To enhance problem-solving and programming skills by designing optimized and real-time algorithmic solutions using appropriate tools and programming environments.

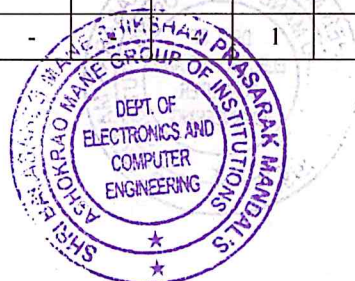
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Implement fundamental algorithms using various design strategies such as Divide & Conquer, Greedy, Dynamic Programming, Backtracking, and Branch & Bound.	A
CO2	Analyze the time and space complexity of implemented algorithms using asymptotic notations and performance evaluation techniques	AN
CO3	Demonstrate correctness, efficiency, and optimality of algorithms through execution, testing, and comparative analysis.	E
CO4	Develop optimized algorithmic solutions for real-time computational problems using suitable programming methodologies and tools.	C

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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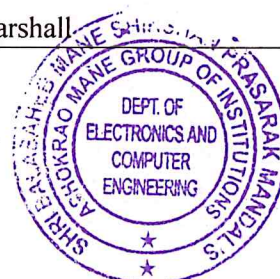
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Sr. No.	List of Experiments
1	Implementation of Algorithm Analysis Techniques <ul style="list-style-type: none">• Implement programs to compute time complexity and compare algorithm performance.• Practice asymptotic notation usage (Best, Average, Worst Case).
2	Implementation of Heap and Heap Sort <ul style="list-style-type: none">• Construct Max Heap / Min Heap• Perform Heap Sort and analyze complexity.
3	Divide and Conquer – Binary Search & Merge Sort <ul style="list-style-type: none">• Implement Binary Search using recursion• Implement Merge Sort and analyze time efficiency.
4	Divide and Conquer – Merge Sort <ul style="list-style-type: none">• Implement Merge Sort• Analyze and verify time complexity
5	Implementation of Quick Sort <ul style="list-style-type: none">• Recursive and iterative implementations• Compare performance with Merge Sor
6	Strassen's Matrix Multiplication Algorithm <ul style="list-style-type: none">• Implement Divide-and-Conquer matrix multiplication• Compare with conventional matrix multiplication
7	Backtracking – N-Queens Problem <ul style="list-style-type: none">• Implement N-Queens problem using backtracking
8	Backtracking – Sum of Subsets / Hamiltonian Cycle <ul style="list-style-type: none">• Implement Sum of Subsets problem• OR Hamiltonian Cycle detection
9	Graph Coloring using Backtracking <ul style="list-style-type: none">• Implement graph coloring algorithm• Analyze constraints and complexity
10	Greedy Algorithms <ul style="list-style-type: none">• Implement Huffman Coding• OR Job Sequencing• OR Activity Selection problem
11	Minimum Spanning Tree Algorithms <ul style="list-style-type: none">• Implement Kruskal's Algorithm• Implement Prim's Algorithm• Compare complexity
12	Dynamic Programming Techniques <ul style="list-style-type: none">• Implement Longest Common Subsequence (LCS)• OR Matrix Chain Multiplication• OR Shortest Path (Bellman-Ford / Floyd-Warshall)

Note: Minimum 10 Practical's / Experiments will be Completed.



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Title of the Course Name: Operating System Course Code: 25EC403	L	T	P	Credits
	3	1	--	4
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks	10	30	10	50

Pre-Requisite: Basic knowledge of Computer Organization, Programming Fundamentals (C/C++)

Course Objectives: The course aims:

1. To introduce fundamental concepts, structure, and functions of operating systems.
2. To develop understanding of process management, scheduling, synchronization, and deadlocks.
3. To familiarize students with memory management, virtual memory, file systems, and I/O management.
4. To provide knowledge of system protection, security mechanisms, and features of modern operating systems.

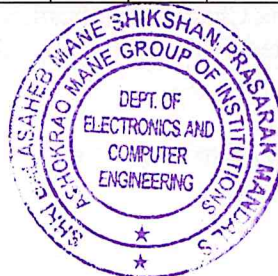
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Explain the architecture, components, and services of operating systems.	UN
CO2	Analyze process scheduling, synchronization mechanisms, and deadlock handling techniques.	AN
CO3	Apply memory management and file system concepts to solve related computational problems.	AP
CO4	Evaluate OS protection, security policies, and features of modern operating systems.	E

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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Course Content		
Unit No.	Contents	Hrs.
1	Introduction to Operating Systems: Definition and objectives of OS, Functions of OS, Types of operating systems (Batch, Multiprogramming, Time-sharing, Real-time, Distributed), OS structure: Monolithic, Layered, Microkernel, System calls, OS services	8
2	Process Management: Process concept, Process states, Process Control Block (PCB), Context switching, Threads, Inter-process communication (IPC), CPU scheduling concepts, Scheduling criteria, Scheduling algorithms: FCFS, SJF, Priority Round Robin	7
3	Process Synchronization & Deadlocks: Critical section problem, Mutex, Semaphores, Classical synchronization problems (Producer–Consumer, Readers–Writers), Deadlock: characterization, prevention, avoidance, detection and recovery	7
4	Memory Management: Memory management requirements, Contiguous and non-contiguous memory allocation, Paging, Segmentation, Virtual memory, Demand paging, Page replacement algorithms (FIFO, LRU, Optimal), Thrashing	7
5	File Systems & I/O Management: File concept, File access methods, Directory structures, File allocation methods, Free space management, Disk scheduling algorithms (FCFS, SSTF, SCAN), I/O hardware and software, Buffering and caching	7
6	Protection, Security & Modern OS: Goals of protection and security, Authentication and authorization, Access control, Threats and vulnerabilities, Case study of Linux/Windows OS, Introduction to mobile and real-time operating systems	7

Text Books:

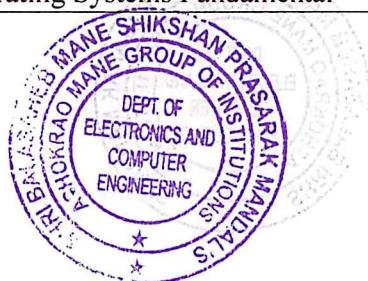
1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, Wiley
2. William Stallings, *Operating Systems: Internals and Design Principles*, Pearson

Reference Books:

1. Andrew S. Tanenbaum, *Modern Operating Systems*, Pearson
2. D.M. Dhamdhare, *Operating Systems – A Concept Based Approach*, McGraw Hill
3. Harvey M. Deitel, *Operating Systems*, Pearson

MOOC/NPTEL Platform:

1. NPTEL – Operating Systems
2. SWAYAM – Operating Systems Fundamental



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Title of the Course Name: Wireless and Mobile Communication	L	T	P	Credits
Course Code: 25MDM404I	3	--	--	3
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks	10	30	10	50

Pre-Requisite: Analog and Digital Communication

Course Objectives:

1. To introduce students to multiple access techniques used in wireless systems.
2. To familiarize students with the structure and evolution of wireless networks.
3. To explain signaling systems and wireless data services.
4. To provide knowledge of protocols and databases used in wireless networking.

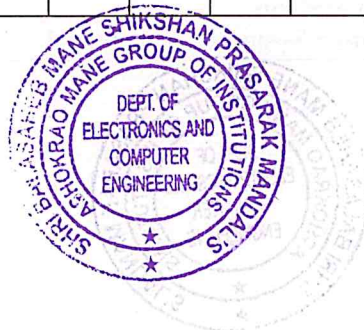
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcome	Bloom's Level
CO1	Explain the principles of multiple access techniques including FDMA, TDMA, CDMA, SDMA, and capacity considerations in cellular systems.	U
CO2	Describe the fundamentals of wireless networks, their types, architectures, and key components such as MSC, HLR, and VLR.	U
CO3	Analyze signalling systems, wireless data services (SMS, MMS, GPRS, LTE), and mobility management in modern cellular networks.	AN
CO4	Evaluate the evolution of mobile communication systems from 2G to 4G, including mobile IP, wireless protocols, and network optimization techniques.	E

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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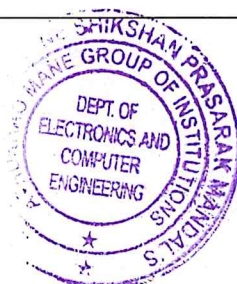
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Course Content		
Unit No.	Contents	Hrs.
1	Evolution of Modern Mobile Communication Personal communication systems, Wireless local area networks, Wireless broadband access systems, Wireless wide area networks, Cellular systems and design fundamentals.	8
2	Fundamentals of Wireless Networking: Introduction to Wireless Networks Types: Infrastructure & Ad-hoc, Differences: Wireless vs. Fixed Telephone Network, Development of Wireless Networks ,Fixed Network Transmission Hierarchy-T1, T3, SONET, SDH basics, Traffic Routing in Wireless Networks- MSC, HLR, VLR roles	7
3	Signaling and Wireless Data Services: Wireless Data Services,SMS, MMS, GPRS, EDGE, 3G, LTE,Common Channel Signaling (CCS),Integrated Services Digital Networks (ISDN),Signaling System No. 7 (SS7),Functions and architecture,Example: Global Cellular Network Interoperability,Personal Communication Services/Networks (PCS/PCNs)	7
4	Multiple Access Techniques : Introduction to Multiple Access Techniques, Frequency Division Multiple Access (FDMA),Time Division Multiple Access (TDMA),Code Division Multiple Access (CDMA) / Spread Spectrum Access-DSSS, FHSS basics, Space Division Multiple Access (SDMA),Packet Radio Systems, Capacity of Cellular Systems-Frequency reuse, sectoring, cell splitting	7
5	2G and 3G Cellular Systems GSM Architecture, Air interface, Protocols and Signaling , GPRS Architecture , Signaling , Mobility and location management , Interfaces and Protocols , Overview of IS95 – UMTS Architecture , Interfaces and Protocols ,Mobility Management , Handover and security procedure	7
6	Evolution of Modern Mobile Communication Personal communication systems, Wireless local area networks, Wireless broadband access systems, Wireless wide area networks, Cellular systems and design fundamentals. Mobile IP – Packet delivery process – Routing optimization – Mobile ad-hoc networks and routing protocols – Mobile TCP – Wireless Application Protocols.	7



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Text Books:

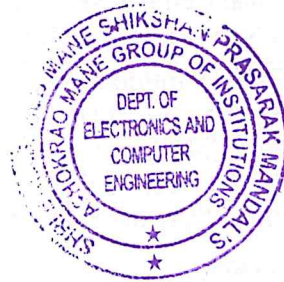
1. T. S. Rappaport – *Wireless Communications: Principles and Practice*, Pearson
2. Andreas F. Molisch – *Wireless Communications*, Wiley
3. William Stallings – *Wireless Communications & Networks*, Pearson

Reference Books:

1. Simon Haykin & Michael Moher – *Modern Wireless Communications*, Pearson
2. Vijay Garg – *Wireless Communications and Networking*, Elsevier
3. Upena Dalal – *Wireless Communication*, Oxford University Press

MOOC/NPTEL Platform:

1. **NPTEL Course: *Fundamentals of Wireless Communication*** by Prof. Vivek Ashok Bohara (IIT-Delhi)
link- https://onlinecourses.nptel.ac.in/noc25_ee107/preview
2. **NPTEL Course: *Introduction to Wireless and Cellular Communications*** By Prof. R. David Koilpillai | IIT Madras
Link-https://onlinecourses.nptel.ac.in/noc25_ee109/preview



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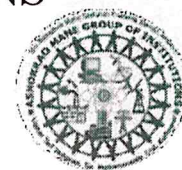
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Title of the Course Name: Industrial Analytics	L	T	P	Credits
Course Code: 25MDM404J	3	--	--	3
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks	10	30	10	50

Pre-Requisite: Basic knowledge of Mathematics, Fundamentals of Programming, Basic Statistics

Course Objectives: The course aims:

1. To understand the fundamentals of data analytics and its industrial relevance.
2. To develop skills in data collection, cleaning, and pre-processing.
3. To apply statistical and analytical techniques for data interpretation.
4. To learn data visualization techniques for effective decision-making.

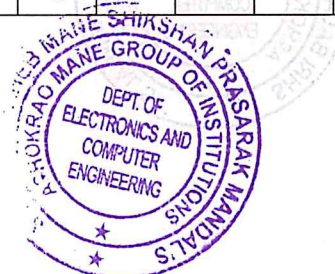
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Explain the fundamentals, lifecycle, and applications of data analytics, including types of data and the role of a data analyst in industry.	U
CO2	Apply data collection and preprocessing techniques such as cleaning, transformation, normalization, and integration to prepare datasets for analysis	AP
CO3	Analyze datasets using descriptive statistics, probability concepts, hypothesis testing, and exploratory data analysis techniques to derive meaningful insights	AN
CO4	Visualize and interpret data using appropriate charts, dashboards, and analytics tools, and relate findings to real-world industrial case studies while considering ethical aspects.	AN,AP

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

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	-	2	1	1
CO2	2	2	2	2	3	-	-	-	-	-	1	2	2	1
CO3	2	2	2	3	2	-	-	-	-	-	-	2	2	2
CO4	2	2	2	2	2	1	-	2	-	2	1	2	3	2



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Course Content

Unit No.	Contents	Hrs.
1	Introduction to Data Analytics: Definition, need and scope of data analytics, types of data (structured, unstructured, semi-structured), data analytics lifecycle, role of data analyst in industry, applications in electronics and computer engineering.	8
2	Data Collection and Preprocessing: Data sources, data acquisition methods, data cleaning, handling missing values, data transformation, normalization, data integration, introduction to datasets used in industry.	7
3	Exploratory Data Analysis and Statistics: Descriptive statistics, probability distributions, correlation and covariance, hypothesis testing, exploratory data analysis (EDA), summary statistics, industrial data examples.	7
4	Data Visualization Techniques: Principles of effective visualization, charts and graphs (bar, line, pie, histogram, scatter), dashboards, storytelling with data, visualization tools overview (Excel, Python libraries, Tableau – concepts).	7
5	Industry-Oriented Data Analytics Applications: Analytics in manufacturing, electronics, IoT, healthcare, finance, and smart systems, predictive analytics basics, case studies, ethical issues and data security.	7
6	Tools and Case Studies: Introduction to Python for data analytics, basic data analysis workflow, real-world industrial datasets, mini case studies, future trends in data analytics and visualization.	7

Reference Books:

1. Han, Kamber, and Pei, *Data Mining: Concepts and Techniques*, Morgan Kaufmann
2. Wes McKinney, *Python for Data Analysis*, O'Reilly Media
3. Cairo, A., *The Functional Art: An Introduction to Information Graphics and Visualization*, New Riders

MOOC/NPTEL Platform:

1. <https://nptel.ac.in/courses/106106179> – Introduction to Data Analytics
2. <https://nptel.ac.in/courses/106106212> – Data Science for Engineer





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Title of the Course Name: Sensors Technology	L	T	P	Credits
Course Code: 25OE405E	3	--	--	3
Evaluation Scheme	ISE-I	MSE	ISE-I	ESE
Marks	10	30	10	50

Pre-Requisite: Basic Electrical Engineering, Applied Physics, Electronic Devices

Course Objectives: The course aims:

1. Understand the fundamental concepts, lifecycle, and scope of data analytics, including types of data and its applications in engineering and industry.
2. Develop the ability to collect, preprocess, and manage data using appropriate techniques for cleaning, transformation, normalization, and integration.
3. Analyze data using statistical methods and exploratory data analysis techniques to extract meaningful insights and support decision-making.
4. Apply data visualization tools and analytics techniques to interpret, present, and communicate analytical results effectively while considering ethical and security aspects.

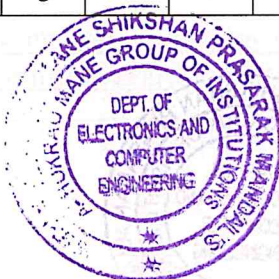
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Describe the classification, working principles, and characteristics of various sensors and transducers.	U
CO2	Explain and compare the operation and applications of mechanical, thermal, electrical, optical, magnetic, chemical, and biosensors.	AN
CO3	Apply appropriate signal conditioning and interfacing techniques for different sensors using analog and digital circuits.	A
CO4	Analyze and evaluate the role of smart sensors, MEMS, and IoT-based sensor systems for real-time industrial, environmental, and healthcare applications.	U,AN

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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Course Content

Unit No.	Contents	Hrs.
1	Introduction to Sensors: Definition of sensor and transducer, classification of sensors, sensing principles, static and dynamic characteristics of sensors: accuracy, precision, sensitivity, resolution, linearity, hysteresis, response time, loading effect, sensor errors.	7
2	Mechanical and Thermal Sensors: Displacement sensors: potentiometric, LVDT, capacitive sensors; Force and pressure sensors: strain gauge, piezoelectric sensors; Temperature sensors: RTD, thermistor, thermocouple, semiconductor temperature sensor.	7
3	Electrical, Optical and Magnetic Sensors: Light sensors: LDR, photodiode, phototransistor; Proximity and motion sensors; Magnetic sensors: Hall-effect, magneto-resistive sensors; Speed and position sensors.	7
4	Chemical and Biosensors: Gas sensors, humidity sensors, pH sensors; Principles of biosensors, types of biosensors, enzyme-based sensors, applications of chemical and biosensors.	7
5	Signal Conditioning and Sensor Interfacing: Need for signal conditioning, amplification, filtering, isolation; Analog signal conditioning circuits; ADC and DAC basics; Interfacing sensors with microcontrollers and embedded systems	7
6	Smart Sensors and Emerging Technologies: Smart sensors and MEMS sensors; Optical and fiber optic sensors; IoT-based sensor systems; Applications of sensors in automation, healthcare, industrial and environmental monitoring	7

Text Book:

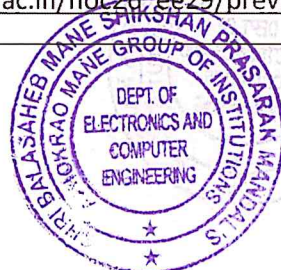
1. D. Patranabis, *Sensors and Transducers*, 2nd Edition, PHI Learning Pvt. Ltd., 2018.
2. Clarence W. de Silva, *Sensors and Actuators*, 2nd Edition, CRC Press, 2015.

Reference Books:

1. Raghuwanshi & Raghuwanshi, *Sensors and Transducers*, Pearson Education.
2. S. Salivahanan, *Sensors and Transducers*, McGraw Hill

MOOC/NPTEL Platform:

1. https://onlinecourses.nptel.ac.in/noc25_ee108/preview?utm_source=chatgpt.com
2. https://onlinecourses.nptel.ac.in/noc26_ee29/preview?utm_source=chatgpt.com





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Title of the Course Name: Entrepreneurship Development	L	T	P	Credits
Course Code: 25EC406	1	--	--	1
Evaluation Scheme-	ISE-I	MSE	ISE-II	ESE
Marks-	25	--	25	--

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.

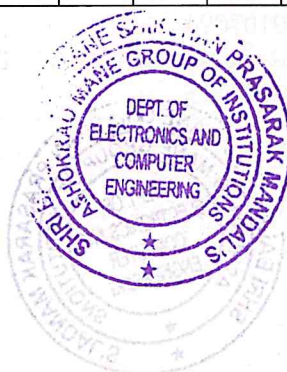
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Understand entrepreneurship concepts, startup ecosystem, and ethical responsibilities in engineering enterprises.	U
CO2	Analyze market opportunities and feasibility of technology-driven business ideas.	AN
CO3	Develop a basic business plan considering sustainability, project planning, and teamwork.	C

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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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, Intrapreneurship, 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.	4
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:

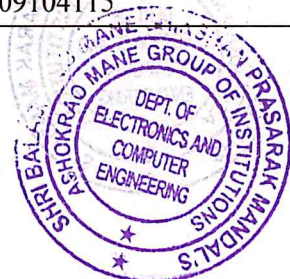
1. Vasant Desai, *Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing.
2. S.S. Khanka, *Entrepreneurial Development*, S. Chand.
3. P. Saravanavel, *Entrepreneurship Development*, Ess Pee Kay Publishing House.

Reference Books:

1. C.B. Gupta & N.P. Srinivasan, *Entrepreneurial Development*, Sultan Chand & Sons.
2. Hisrich, Peters & Shepherd, *Entrepreneurship*, McGraw Hill.
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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Title of the Course Name: Quantitative Aptitude and Logical Reasoning - I	L	T	P	Credits
Course Code: 25EC407	1	--	--	1
Evaluation Scheme-	ISE-I	MSE	ISE-II	--
Marks-	25	--	25	--

Pre-Requisite: Nil

Course Objectives: The course aims:

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.

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

CO	Course Outcomes	Bloom's Level
CO1	Recall key concepts of Mathematics for placements and business applications.	R
CO2	Apply quantitative methods to solve structured numerical problems in exams and entrepreneurial contexts.	A
CO3	Analyse logical reasoning problems to identify patterns and enhance reasoning skills.	AN
CO4	Evaluate alternative solution approaches for efficiency and create integrated solutions supporting innovation and adaptability.	E

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

CO-PO Mapping:

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



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Course Content		
Unit No.	Contents	Hrs.
1	<p>Foundations of Quantitative Aptitude :</p> <p>Number Systems- Basics, Base System, Exponents, Numerical Analogy- Basics, Relation between two numbers.</p> <p>Percentage-numericalPercentage Understand Conversion, Single change, Successive change, Product Stability, Applications of percentage.</p> <p>Ratios and Fractions-Comparison of Ratio & fraction, Properties of Ratio & Proportion, Mean Proportion., Joint ratio.</p>	3
2	<p>Averages, Profit & Loss, and Interest Calculations:</p> <p>Average -Average, Allegations Weighted average, Concept of average speed & allegation, Applications of Average & mixture allegation.</p> <p>Profit & Loss - Same selling price different Cost Price, Same cost price different selling price, Concept of false scale.</p> <p>Simple and Compound Interest-Basics, Difference between SI CI, Conversion Periods, Depreciation.</p>	3
3	<p>Advanced Quantitative Methods :</p> <p>LCM and HCF-LCM and HCF, Factors, Cyclicity, Different Methods to find LCM- HCF, HCF-LCM relation, Applications of HCF-LCM.</p> <p>TRW-Time, Rate and Work-Unitary Method, LCM Method, Calculation of remuneration.</p> <p>Pipes & Cisterns-Concept of negative work, LCM Method.</p>	3
4	<p>Logical Reasoning Essentials :</p> <p>Blood Relations -Symbols, generation of tree diagram, types of questions-pointing towards person, tree based, coded blood relation.</p> <p>Coding Decoding -Letter-Letter, Letter- Number, Number-Number, Letter-Symbol, Mixed Coding.</p> <p>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.</p>	3
5	<p>Pattern Recognition and Analytical Series :</p> <p>Series Completion - Types of series, Number series pattern, Letter series, Alphanumeric series.</p> <p>Pattern, Step Completion - Image completion, Mirror images, Water images, input-Output.</p> <p>Syllogism- Basics, Types of Statements, Different diagram for different statements, Types of Questions-Based on Conclusion, Based on Statements.</p>	3

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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Title of the Course Name: Constitution of India	L	T	P	Credits
Course Code: 25EC408	2	--	--	2
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	25	--	25	--

Pre-Requisite: Basic knowledge of Indian History

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 the 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.

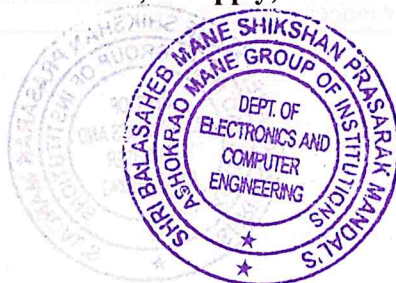
Course Objectives: The course aims:

1. Introduction to the historical and legal foundations of the Indian Constitution and its key features. To Create awareness about Fundamental Rights, Duties, and Directive Principles.
2. Understanding of the structure and functioning of Union, State, and local governments. To Develop understanding of constitutional provisions relevant to citizens and engineers.
3. Familiarization with fundamental rights, duties, directive principles, and constitutional bodies.
4. Promotion of responsible citizenship and active participation in a democratic society.

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

CO	Course Outcomes	Bloom's Level
CO1	Understand and explain the historical and legal foundations of the Indian Constitution along with its key features.	U
CO2	Describe the structure, functions, and governance mechanisms of Union, State, and local governments, including the roles of constitutional bodies, Fundamental Rights, Duties, and Directive Principles.	U
CO3	Demonstrate an understanding of responsible citizenship and actively participate in a democratic society through constitutional values and practices.	AP

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create



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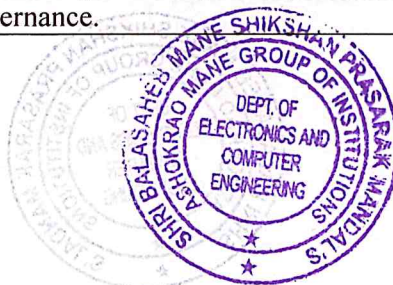
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CO-PO Mapping:

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

Course Content

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.	5
2	Fundamental Rights and Duties Fundamental Rights: Definition, types, and limitations, Directive Principles of State Policy (DPSP), Fundamental Duties of Indian citizens, Relationship between Fundamental Rights and DPSP.	5
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).	5
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



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Text Books:

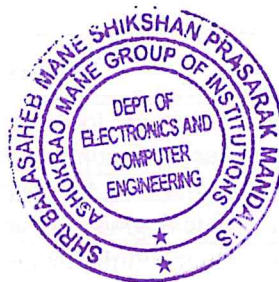
1. M. Laxmikanth, Indian Polity, McGraw-Hill Education
2. D.D. Basu, Introduction to the Constitution of India, LexisNexis
3. J.N. Pandey, Constitutional Law of India, Central Law Agency

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
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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Title of the Course Name: Skill Enhancement	L	T	P	Credits
Course Code: 25EC409	--	--	2	1
Evaluation Scheme:	ISE-I	MSE	ISE-II	ESE
Marks:	25	--	25	--

Pre-Requisite: Fundamentals of communication, interpersonal skills

Course Objectives: The course aims:

1. Gain hands-on experience with essential technical tools for documentation, data handling, and professional presentations.
2. Develop basic programming skills and logical thinking required for solving engineering problems.
3. Understand and apply simulation tools and hardware platforms for basic electronics and system-level experimentation.
4. Enhance technical communication, teamwork, and practical problem-solving skills through mini tasks and presentations.

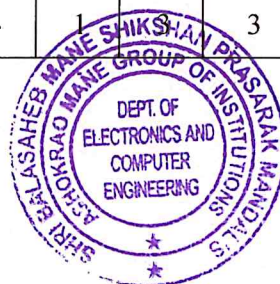
Course Outcomes: At the end of the course, students will be able to:

CO	Course Outcomes	Bloom's Level
CO1	Use technical productivity tools such as MS Word, Excel, and PowerPoint to prepare engineering documents, charts, and presentations.	A
CO2	Develop basic programs and logical solutions using flowcharts and C/Python for simple engineering applications.	A
CO3	Perform basic circuit simulation and hardware interfacing experiments using appropriate simulation tools and microcontroller platforms.	A
CO4	Demonstrate effective technical communication, teamwork, and practical skills through presentations, group discussions, and mini task execution.	AN

U=Understand, R=Remember, A=Apply, AN=Analyze, E=Evaluate, C=Create

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	3	2
CO2	2	3	2	-	2	-	-	-	-	1	-	3	2	1
CO3	3	2	2	1	3	-	-	-	-	-	-	3	3	1
CO4	1	1	1	-	1	-	-	1	-	3	2	1	2	3



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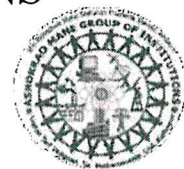
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Course Content		
Sr. No.	List of Experiment	Hrs.
1	Technical Tools & Productivity Skills: Hands-on use of MS Word, Excel, PowerPoint for technical documentation, report writing, charts, and presentations	4
2	Basic Programming & Logic Building: Programs on logic building, flowcharts, basic C/Python programs for engineering applications	4
3	Electronics Simulation & Tools: Introduction to simulation tools (Proteus/Multisim/Tinkercad), basic circuit simulation and analysis	4
4	Hardware & Interfacing Basics: Breadboard practice, sensor interfacing basics, simple microcontroller/Arduino-based experiments	4
5	Technical Communication & Mini Task: Technical presentation, group discussion, viva, and execution of a small skill-based mini task	4

Reference Resources:

1. Raghuwanshi – Practical Skills for Engineers
2. Arduino and Electronics Tutorials – Official Documentation
3. NPTEL – Programming, Soft Skills, and Electronics Labs

MOOC / NPTEL Platform:

Soft Skills – Prof. T. Ravichandran (IIT Kanpur)

Programming Basics – NPTEL

Electronics Lab Simulations – NPTEL

