



**Prof. Ram Meghe Institute Of Technology
And Research Badnera -Amravati**

**An Autonomous Institute Affiliated to
Sant Gadge Baba Amravati University,
Amravati, Maharashtra (India)**

**PROGRAMME SCHEME & SYLLABI
2026-2027**

**B.Tech.
Artificial Intelligence and
Data Science**



**Prof. Ram Meghe Institute Of Technology And Research,
Badnera - Amravati.**

**Published By
Principal**

Prof. Ram Meghe Institute Of Technology And Research, Badnera - Amravati.

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
(An Autonomous Institute)

Four Year Under Graduate Degree Program in Bachelor of Technology

Choice Based Credit System (Semester Pattern)

Branch : Artificial Intelligence (AI) and Data Science

SEMESTER: I

SEMESTER: I																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours/ Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal Marks		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
											Max. Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																		
1	1SF01	Applied Mathematics - I	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40				
2	1SF02	Applied Physics	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40				
3	1SF03	Engineering Graphics	2			ESC	2	2	2 Hrs 30 Min	60	30	10	100	40				
4	1SF04	Programming for Problem Solving	2			ESC	2	2	2 Hrs 30 Min	60	30	10	100	40				
5	1SF05	Professional Communication Skills*	1	1		HSSM	2	2				50	50	25				
6	1SAKNX01	Multimedia and Web Designing	3			ESC	3	3	2 Hrs 30 Min	60	30	10	100	40				
7	1SF06	Design Thinking **	1			ESC	1	1				50	50	25				
Practicals																		
08	1SF07	Applied Physics Lab			2	BSC	2	1							25	25	50	25
09	1SF08	Engineering Graphics Lab			2	VSEC	2	1							25	25	50	25
10	1SF09	Programming for Problem Solving Lab			2	ESC	2	1							25	25	50	25
11	1SAKNX02	Multimedia and Web Designing Lab			2	ESC	2	1							25	25	50	25
12	1SF10	NSS/Sports/Yoga/Cultural/Community Service #			2	LLC	2	1							50		50	25
Total			15	1	10		26	21					600				250	
															Total		850	

* Assessment will be based on Test and Assignments

** Assessment will be based on Case Studies and Assignments

Assessment will be based on participation in associated activities of not less than 30 hours

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Four Year Under Graduate Degree Program in Bachelor of Technology

Choice Based Credit System (Semester Pattern)

Branch : Artificial Intelligence (AI) and Data Science

SEMESTER: II																			
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme										
			Hours/ Week			Group	Total Hours/ Week	Credits	THEORY						PRACTICAL				
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal Marks		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks	
											Max. Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.			
Theory																			
01	2SF01	Applied Mathematics - II	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40					
02	2SACEMN02	Engineering Chemistry	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40					
03	2SF03	Basics of Electrical Engineering	2			ESC	2	2	2 Hrs 30 Min	60	30	10	100	40					
04	2SF04	Biology for Engineers	2			BSC	2	2	2 Hrs 30 Min	60	30	10	100	40					
05	2SF05	Universal Human Values*	2			HSSM	2	2				50	50	25					
06	2SAEKNX01	Introduction to Python	3			ESC	3	3	2 Hrs 30 Min	60	30	10	100	40					
07	2SF06	Indian Knowledge Systems *	2			HSSM	2	2				50	50	25					
Practicals																			
08	2SACEMN07	Engineering Chemistry Lab			2	BSC	2	1							25	25	50	25	
09	2SF08	Basic of Electrical Engineering Lab			2	ESC	2	1							25	25	50	25	
10	2SAEKNX02	Introduction to Python Lab			2	ESC	2	1							25	25	50	25	
11	2SF09	Workshop/Digital Fabrication Lab			2	VSEC	2	1							25	25	50	25	
Tota			17		8		25	21					600				200		
																Total	800		

* Assessment will be based on Unit Tests and Assignments

Exit Option: To qualify for UG Certificate in Artificial Intelligence and Data Science

Title	Credit
1. Two relevant MOOC/NPTEL courses as decided by BOS	4
AND	
1. Internship (Min 60 hrs)	4
Total	8

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
(An Autonomous Institute)
Four Year Under Graduate Degree Program in Bachelor of Technology
Choice Based Credit System (Semester Pattern)
Branch : Artificial Intelligence (AI) and Data Science

SEMESTER: III																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours / Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
						Max. Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.							
Theory																		
01	3SA01	Discrete Mathematics	2			PCC	2	2	2 Hrs 30 Min	60	30	10	100	40				
02	3SA02	Data Structures	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
03	3SA03	Programming Methodology	2			PCC	2	2	2 Hrs 30 Min	60	30	10	100	40				
04	3SA04	Analog and Digital Electronics	2			PCC	2	2	2 Hrs 30 Min	60	30	10	100	40				
05	3SAOE1	Open Elective Course - 1 (OE - 1)	3			OE	3	3	2 Hrs 30 Min	60	30	10	100	40				
06	3SA05	Financial Literacy*	2			EEMC	2	2	--	--	--	50	50	25				
07	3SA06	Environmental Science*	2			VEC	2	2	--	--	--	50	50	25				
Practicals																		
08	3SA07	Data Structures Lab			2	PCC	2	1							25	25	50	25
09	3SA08	Programming Methodology Lab			2	PCC	2	1							25	25	50	25
10	3SA09	Analog and Digital Electronics Lab			2	PCC	2	1							25	25	50	25
11	3SA10	CEP/FP: Innovation and Creativity			4	ELC	4	2							25	25	50	25
Total			16		10		26	21					600				200	
															Total		800	

* Assessment will be based on Unit Tests, Assignments and Teacher assessment during the semester.

Open Elective Course-1: (i) 3SAOE1A Social Science (ii) 3SAOE1B Ancient Management Paradigms (iii) 3SAOE1C Introduction to Constitutional Law

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Choice Based Credit System (Semester Pattern)
Branch : Artificial Intelligence (AI) and Data Science

SEMESTER: IV																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours / Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
						Max. Marks MSE/ MSIE	Max. Marks TA	Int.	Ext.									
Theory																		
01	4SA01	Artificial Intelligence	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
02	4SA02	Operating Systems	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
03	4SA03	Theory of Computation	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
04	MDM1	Multidisciplinary Minor - 1 (MDM - 1)	3			MDM	3	3	2 Hrs 30 Min	60	30	10	100	40				
05	4SAOE2	Open Elective Course - 2 (OE - 2)	3			OE	3	3	2 Hrs 30 Min	60	30	10	100	40				
06	4SA04	Business Communication*	2			AEC	2	2	--	--	--	50	50	25				
07	4SA05	Entrepreneurship and Start-ups*	2			EEMC	2	2	--	--	--	50	50	25				
Practicals																		
08	4SA06	Artificial Intelligence Lab			2	PCC	2	1							25	25	50	25
09	4SA07	Operating Systems Lab			2	PCC	2	1							25	25	50	25
10	4SA08	Computer Skill Laboratory - 1			2	PCC	2	1							25	25	50	25
11	4SA09	Report Writing and Presentation Skill			4	VSEC	4	2							50	--	50	25
Total			19		10		29	24					600				200	
																Total	800	

* Assessment will be based on Unit Tests and Assignments.

Open Elective Course - 2: (i) 4SAOE2A Intellectual Property Right (ii) 4SAOE2B Introduction to Cyber Law (iii) 4SAOE2C Stress Management

Exit Option: To qualify for Diploma in Artificial Intelligence and Data Science

Title	Credit
Two relevant MOOC/NPTEL courses as decided by BOS	4
AND	
Internship (Min 60 hrs)	4

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Branch : Artificial Intelligence (AI) and Data Science

SEMESTER: V																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours / Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
						Max. Marks MSE/ MSIE	Max. Marks TA	Int.	Ext.									
Theory																		
01	5SA01	Data Analytics and Visualization	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
02	5SA02	Computer Network	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
03	5SA03	Compiler Design	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
04	5SA04	Programme Elective Course - 1 (PEC - 1)	3			PEC	3	3	2 Hrs 30 Min	60	30	10	100	40				
05	MDM2	Multidisciplinary Minor - 2 (MDM - 2)	3			MDM	3	3	2 Hrs 30 Min	60	30	10	100	40				
06	5SAOE3	Open Elective Course - 3 (OE - 3)	3			OE	3	3	2 Hrs 30 Min	60	30	10	100	40				
Practicals																		
07	5SA05	Data Analytics and Visualization Lab			2	PCC	2	1							25	25	50	25
08	5SA06	Computer Network Lab			2	PCC	2	1							25	25	50	25
09	5SA07	Compiler Design Lab			2	PCC	2	1							25	25	50	25
10	5SA08	Computer Skill Laboratory - 2			2	PEC	2	1							25	25	50	25
Total			18		8		26	22					600				200	
															Total		800	

PEC - 1 : (i) 5SA04PE1A Data and Internet Security (ii) 5SA04PE1B Probability and Statistics (iii) 5SA04PE1C Expert System Design

Open Elective Course - 3: (i) 5SAOE3B Business Intelligence (ii) 5SAOE3C Project Management (iii) 5SAOE3D Aptitude for Engineers

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SEMESTER: VI																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours / Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
						Max. Marks MSE/ MSIE	Max. Marks TA		Int.	Ext.								
Theory																		
01	6SA01	Data Science	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
02	6SA02	Design and Analysis of Algorithms	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
03	6SA03	Database Management Systems	2			PCC	2	2	2 Hrs 30 Min	60	30	10	100	40				
04	6SA04	Programme Elective Course - 2 (PEC - 2)	3			PEC	3	3	2 Hrs 30 Min	60	30	10	100	40				
05	6SA05	Programme Elective Course - 3 (PEC - 3)	3			PEC	3	3	2 Hrs 30 Min	60	30	10	100	40				
06	MDM3	Multidisciplinary Minor - 3 (MDM - 3)	3			MDM	3	3	2 Hrs 30 Min	60	30	10	100	40				
07	6SDMP	Disaster Management and Preparedness	2			VEC	2											
Practicals																		
07	6SA06	Data Science Lab			2	PCC	2	1							25	25	50	25
08	6SA07	Design and Analysis of Algorithms Lab			2	PCC	2	1							25	25	50	25
09	6SA08	Database Management Systems Lab			2	PCC	2	1							25	25	50	25
10	6SA09	Computer Skill Laboratory - 3			4	VSEC	4	2							25	25	50	25
Total			19		10		29	22					600				200	
															Total		800	

PEC - 2 : (i) 6SA04PE2A Cyber Security (ii) 6SA04PE2B Programming with Large Dataset (iii) 6SA04PE2C Applied Artificial Intelligence

PEC - 3 : (i) 6SA05PE3A Network Security (ii) 6SA05PE3B Data Mining and Data Warehousing (iii) 6SA05PE3C Artificial Neural Network

Exit Option: To qualify for B. Voc. (Artificial Intelligence and Data Science)

Title	Credit
Two relevant MOOC/NPTEL courses as decided by BOS	4
AND	
Internship (Min 60 hrs)	4

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SEMESTER: VII																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours / Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
											Max. Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																		
01	7SA01	Cloud Computing	2			PCC	2	2	2 Hrs 30 Min	60	30	10	100	40				
02	7SA02	Machine Learning	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
03	7SA03	Programme Elective Course - 4 (PEC - 4)	3			PEC	3	3	2 Hrs 30 Min	60	30	10	100	40				
04	7SA04	Programme Elective Course - 5 (PEC - 5)	2			PEC	2	2	2 Hrs 30 Min	60	30	10	100	40				
05	MDM4	Multidisciplinary Minor - 4 (MDM - 4)	3			MDM	3	3	2 Hrs 30 Min	60	30	10	100	40				
Practicals																		
06	7SA05	Machine Learning Lab			2	PCC	2	1							25	25	50	25
07	7SA06	Computer Skill Laboratory - 4			2	PEC	2	1							25	25	50	25
08	7SA07	Research Methodology			4	ELC	4	2							50	--	50	25
09	7SA08	Project			12	ELC	12	6							100	100	200	100
Total			13		20		33	23					500				350	
															Total		850	

PEC - 4: (i) 7SA03PE4A Cryptography (ii) 7SA03PE4B Big Data Analytics and Hadoop (iii) 7SA03PE4C Generative Artificial Intelligence

PEC - 5: (i) 7SA04PE5A Digital Forensic (ii) 7SA04PE5B Natural Language Processing (iii) 7SA04PE5C Blockchain with AI

7SA07 Research Methodology: Assessment will be in Two parts. 1) Practical Work and Evaluation (25 Marks) and 2) Seminar Report Preparation and Presentation (25 Marks).

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SEMESTER: VIII																		
Sr. No.	Course Code	Course Name	Teaching Scheme					Examination Scheme										
			Hours/ Week			Group	Total Hours/ Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
											Max. Marks INTERNAL ASSESSMENT	Max. Marks TA			Int.	Ext.		
Theory																		
01	8SA01	Deep Learning	3			PCC	3	3	2 Hrs 30 Min	60	30	10	100	40				
02	8SA02	Programme Elective Course - 6 (PEC - 6)	3			PEC	3	3	2 Hrs 30 Min	60	30	10	100	40				
Practical																		
03	8SA03	Internship / On Job Training (OJT) / Apprenticeship			24	ELC	24	12							150	150	300	150
Total			6		24		30	18					200				300	
															Total		500	

PEC - 6 : (i) 8SA02PE6A Basics of Ethical Hacking (ii) 8SA02PE6B Ethics in Data Science (iii) 8SA02PE6C Safe and Responsible use of AI

**Internal Assessment Marks (Total 30 Marks) will be calculated on the basis of MCQ Test Online (15 Marks) UNIT-1 and UNIT-2 and Case Study (15 Marks) based on subject's syllabus*

Sem	SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI	SEM VII	SEM VIII	Total
Credits	21	21	21	24	22	22	23	18	172

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HONORS																		
SEMESTER	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours / Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
					Max. Marks MSE/ MSIE	Max. Marks TA	Int.	Ext.										
Theory																		
IV	4SAH	Advanced Programming for Data Science	3	-	-	Honors	3	3	2 Hrs 30 Min	60	30	10	100	40	-	-	-	-
V	5SAH	Advanced Data Science and Analytics	3	-	-	Honors	3	3	2 Hrs 30 Min	60	30	10	100	40	-	-	-	-
VI	6SAH	Business and Web Analytics	3	-	-	Honors	3	3	2 Hrs 30 Min	60	30	10	100	40	-	-	-	-
VII	7SAH	Data Engineering	3	-	-	Honors	3	3	2 Hrs 30 Min	60	30	10	100	40	-	-	-	-
VIII	8SAH1	Deep Learning and its Applications	3	-	-	Honors	3	3	2 Hrs 30 Min	60	30	10	100	40	-	-	-	-
Practicals																		
VIII	8SAH2	Minor Project	-	-	6	Honor	6	3	-	-	-	-	-	-	50	50	100	50
Total			15		6		21	18					500				100	
															Total		600	

	MDM BASKETS OF COURSES FOR ALL Departments						
	MDM Basket/ Track Name	Sr. No.	Course Code	Course Name	Semester	Students from following Departments can Register	Offered by Department of
	Artificial Intelligence	1	4SAMDM1	Artificial Intelligence and Expert Systems	IV	CE, CSE, EXTC, IT, CSE(IoT), ME	Artificial Intelligence and Data Science
		2	5SAMDM2	Applied Artificial Intelligence	V		
		3	6SAMDM3	Generative Artificial Intelligence	VI		
		4	7SAMDM4	Safe and Responsible Artificial Intelligence Systems	VII		
	Data Science	1	4SAMDM5	Programming for Data Science	IV	CE, CSE, EXTC, IT, CSE(IoT), ME	
		2	5SAMDM6	Business Intelligence and Analytics	V		
		3	6SAMDM7	Data Engineering	VI		
		4	7SAMDM8	Ethics in Data Science	VII		
	Civil Engineering	1	4SCMDM1	Introduction to Environmental Engineering	IV	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	Civil Engineering
		2	5SCMDM2	Introduction to Water Resource Engineering	V		
		3	6SCMDM3	Introduction to Transportation Engineering	VI		
		4	7SCMDM4	Basics of Structural Analysis	VII		
	Construction Technology	1	4SCMDM5	Building Planning	IV	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	
		2	5SCMDM6	Construction Materials	V		
		3	6SCMDM7	Basics of Surveying	VI		
		4	7SCMDM8	Basics of Geotechnical Engineering	VII		
	Computer Science and Engineering	1	4SKMDM1	Fundamentals of Data Structures	IV	CE, EXTC, CSE(IoT), ME	Computer Science and Engineering
		2	5SKMDM2	Introduction to Algorithms	V		
		3	6SKMDM3	Database Management System	VI		
		4	7SKMDM4	Basics of Enterprise Resource Planning	VII		
	Software Engineering	1	4SKMDM5	Software Requirements Engineering	IV	AI&DS, CE, EXTC, IT, CSE(IoT), ME	
		2	5SKMDM6	Software Architecture	V		
		3	6SKMDM7	Software Project Management	VI		
		4	7SKMDM8	Software Testing and Quality Assurance	VII		
	Electronics and Communication Engineering	1	4SEMDM1	Electronic Instrumentation	IV	AI&DS, CE, CSE, IT, CSE(IoT), ME	Electronics and Telecommunication Engineering
		2	5SEMDM2	Electronic Devices and Circuits	V		
		3	6SEMDM3	Analog and Digital Communication	VI		
		4	7SEMDM4	Electronic Circuit Design	VII		
	Telecommunication Engineering	1	4SEMDM5	Basic Electronic Communication Systems	IV	AI&DS, CE, CSE, IT, ME	
		2	5SEMDM6	Introduction to Wireless Communication	V		
		3	6SEMDM7	Introduction to Mobile Computing	VI		
		4	7SEMDM8	Satellite and Optic Fiber Communication	VII		

	MDM BASKETS OF COURSES FOR ALL Departments						
	MDM Basket/ Track Name	Sr. No.	Course Code	Course Name	Semester	Students from following Departments can Register	Offered by Department of
	Information Technology	1	4SNMDM1	Data Transmission and Information Technology	IV	AI&DS, CE, CSE, EXTC, CSE(IoT), ME	Information Technology
		2	5SNMDM2	Data Communication Networks	V		
		3	6SNMDM3	E-Commerce	VI		
		4	7SNMDM4	Management Information Systems	VII		
	Cyber Security	1	4SNMDM5	Introduction to Cyber Security	IV	CE, EXTC, CSE(IoT), ME	
		2	5SNMDM6	Fundamentals of Cryptography	V		
		3	6SNMDM7	Basics of Ethical Hacking	VI		
		4	7SNMDM8	Blockchain Technology	VII		
	Mechanical Engineering	1	4SMMDM1	Energy Engineering	IV	AI&DS, CE, CSE, EXTC, IT, CSE(IoT)	Mechanical Engineering
		2	5SMMDM2	Automobile Engineering and Electric Vehicles	V		
		3	6SMMDM3	Industrial Engineering	VI		
		4	7SMMDM4	Industrial Automation	VII		
	Robotics and Automation Engineering	1	4SMMDM5	Mechatronics	IV	AI&DS, CE, CSE, EXTC, IT, CSE(IoT)	
		2	5SMMDM6	Rapid Prototyping	V		
		3	6SMMDM7	Automation Engineering	VI		
		4	7SMMDM8	Robotics and industrial Application	VII		
	Internet of Things	1	4SXMDM1	Fundamentals of IoT	IV	AI&DS, CE, CSE, EXTC, IT, ME	Computer Science & Engineering(IoT)
		2	5SXMDM2	Sensors and Actuators	V		
		3	6SXMDM3	Single Board Computers	VI		
		4	7SXMDM4	Industrial Internet of Things	VII		

DOUBLE MINOR (SPECIALIZATION) BASKETS OF COURSES FOR ALL DEPARTMENTS							
	Double Minor / Specialization Minor Basket Track Name	Sr. No	Course Code	Course Name	Semester	Students from following Departments can Register	Offered by Department of
	Advanced Programming	1	3SASM	Programming Language for Data Science	III	CSE, CE, EXTC, IT, CSE(IoT), ME	Artificial Intelligence and Data Science
		2	4SASM	Advanced Java Programming	IV		
		3	5SASM	Mobile Application Development	V		
		4	6SASM	Introduction to Gaming	VI		
		5	7SASM	Introduction to Software Development Platform (GitHub)	VII		
		6	8SASM	Databases and SQL for Data Science	VIII		
	Construction Management and Environmental Engineering	1	3SCSM	Environmental Pollution and Control	III	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	Civil Engineering
		2	4SCSM	Water Treatment Engineering	IV		
		3	5SCSM	Waste Water Treatment Engineering	V		
		4	6SCSM	Project Management and Planning	VI		
		5	7SCSM	Construction Material Management	VII		
		6	8SCSM	Construction Quality Management	VIII		
	Web Technology	1	3SKSM	Introduction of HTML	III	AI&DS, CE, EXTC, IT, CSE(IoT), ME	Computer Science and Engineering
		2	4SKSM	Javascript	IV		
		3	5SKSM	Web Engineering	V		
		4	6SKSM	Cloud Technology	VI		
		5	7SKSM	Distributed Database	VII		
		6	8SKSM	User Experience Design	VIII		
	Embedded System	1	3SESM	Fundamentals of Digital Electronics	III	AI&DS, CE, CSE, IT, ME	Electronics and Telecommunication Engineering
		2	4SESM	Digital System Design	IV		
		3	5SESM	Introduction to Microprocessors	V		
		4	6SESM	Microcontroller and Applications	VI		
		5	7SESM	Advanced Microcontrollers	VII		
		6	8SESM	Embedded System and RTOS	VIII		
	Information Processing	1	3SNSM	Fundamentals of Information Technology	III	CE, CSE, EXTC, CSE(IoT), ME	Information Technology
		2	4SNSM	Database Processing	IV		
		3	5SNSM	Network Processing	V		
		4	6SNSM	Data Mining and Warehousing	VI		
		5	7SNSM	Data Visualaization	VII		
		6	8SNSM	Big Data Processing	VIII		
	Manufacturing Techniques	1	3SMSM	Manufacturing Processes-I	III	AI&DS, CE, CSE, EXTC, IT, CSE(IoT),	Mechanical Engineering
		2	4SMSM	Manufacturing Processes -II	IV		
		3	5SMSM	Modern Manufacturing Techniques	V		
		4	6SMSM	Production Management	VI		
		5	7SMSM	Productivity Techniques	VII		
		6	8SMSM	Computer Integrated Manufacturing	VIII		
	Industrial IoT	1	3SXSM	Introduction to Internet of Things	III	AI&DS, CE, CSE, EXTC, IT, ME	Computer Science & Engineering(IoT)
		2	4SXSM	Industrial Sensors and Actuators	IV		
		3	5SXSM	Edge and Fog Computing	V		
		4	6SXSM	Embedded System for Internet of Things	VI		
		5	7SXSM	Application of IoT in Healtcare and Agriculture	VII		
		6	8SXSM	Internet of Things Security	VIII		

	Honors Baskets of Courses for all Departments				
	Name of Department	Sr. No.	Course Code	Course Name	Semester
	Artificial Intelligence and Data Science	1	4SAH	Advanced Programming for Data Science	IV
		2	5SAH	Advanced Data Science and Analytics	V
		3	6SAH	Business and Web Analytics	VI
		4	7SAH	Data Engineering	VII
		5	8SAH1	Deep Learning and its Applications	VIII
		6	8SAH2	Minor Project	VIII
	Civil Engineering	1	4SCH	Air Pollution and Control	IV
		2	5SCH	Structural Dynamics	V
		3	6SCH	Geographic Information Systems	VI
		4	7SCH	Advanced Foundation Engineering	VII
		5	8SCH1	Finite Element Method	VIII
		6	8SCH2	Minor Project	VIII
	Computer Science and Engineering	1	4SKH	Data Science and Analytics	IV
		2	5SKH	Natural Language Processing and Text Analytics	V
		3	6SKH	Artificial Neural Network	VI
		4	7SKH	Optimization Techniques for Data Analytics	VII
		5	8SKH1	Computer Vision	VIII
		6	8SKH2	Minor Project	VIII
	Electronics and Telecommunication Engineering	1	4SEH	PLC & SCADA	IV
		2	5SEH	Electronics Circuit Design	V
		3	6SEH	Cognitive Radio	VI
		4	7SEH	Biomedical Signal Processing	VII
		5	8SEH1	VLSI Design Verification and Testing	VIII
		6	8SEH2	Minor Project	VIII
	Information Technology	1	4SNH	Advanced Data Science	IV
		2	5SNH	Artificial Neural Network	V
		3	6SNH	Advanced Artificial Intelligence	VI
		4	7SNH	Advanced Machine Learning	VII
		5	8SNH1	Advanced Speech and Natural Language Processing	VIII
		6	8SNH2	Minor Project	VIII

	Honors Baskets of Courses for all Departments				
	Name of Department	Sr. No.	Course Code	Course Name	Semester
	Mechanical Engineering	1	4SMH	Energy Audit	IV
		2	5SMH	Computer Aided Design	V
		3	6SMH	Advance Heat Transfer	VI
		4	7SMH	3D Printing and Application	VII
		5	8SMH1	Design of Transmission System	VIII
		6	8SMH2	Minor Project	VIII
	Computer Science & Engineering(IoT)	1	4SXH	IoT Architectures and Protocols	IV
		2	5SXH	Internet of Things Security	V
		3	6SXH	Embedded Systems and IoT	VI
		4	7SXH	Machine Learning For IoT	VII
		5	8SXH1	Data Science in IoT	VIII
		6	8SXH2	Minor Project	VIII

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				Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati															
							(An Autonomous Institute)												
							Four Year Under Graduate Degree Program in Bachelor of Technology												
							Choice Based Credit System (Semester Pattern)												
							Branch: All Branches												
SPECIALIZATION MINOR (SM) BASKET OF COURSES (DOUBLE MINOR) for 4th Sem																			
Semester: IV																			
Sem	Course Code	Course Name	Teaching Scheme						Examination Scheme										
			Hours / Week			SM Applicable to	Total Hrs/ Week	Credits	Theory					Practical					
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max Marks Paper ESE/	Max Marks MSE/	Max. Marks TA	Total	Overall Min Passing Marks	Max Marks		Total	Min Passing Marks	
Theory																			
III	4SASM	Advanced Java Programming	3	--	--	CSE, CE, EXTC, IT, CSE(IoT), ME	3	3	2 Hrs 30 Min	60	30	10	100	40	--	--	--	--	--
III	4SCSM	Water Treatment Engineering	3	--	--	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	3	3	2 Hrs 30 Min	60	30	10	100	40	--	--	--	--	--
III	4SKSM	Javascript	3	--	--	AI&DS, CE, EXTC, IT, CSE(IoT), ME	3	3	2 Hrs 30 Min	60	30	10	100	40	--	--	--	--	--
III	4SESM	Digital System Design	3	--	--	AI&DS, CE, CSE, IT, ME	3	3	2 Hrs 30 Min	60	30	10	100	40	--	--	--	--	--
III	4SNSM	Database Processing	3	--	--	CE, CSE, EXTC, CSE(IoT), ME	3	3	2 Hrs 30 Min	60	30	10	100	40	--	--	--	--	--
III	4SXSM	Industrial Sensors and Actuators	3	--	--	AI&DS, CE, CSE, EXTC, IT, ME	3	3	2 Hrs 30 Min	60	30	10	100	40	--	--	--	--	--
III	4SMSM	Manufacturing Processes -II	3	--	--	AI&DS, CE, CSE, EXTC, IT, CSE(IoT)	3	3	2 Hrs 30 Min	60	30	10	100	40	--	--	--	--	--
		Total	3		0		3	3					100						
															Total		100		

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Semester I

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
(An Autonomous Institute)

Four Year Under Graduate Degree Program in Bachelor of Technology

Choice Based Credit System (Semester Pattern)

Branch : Artificial Intelligence (AI) and Data Science

SEMESTER: I

SEMESTER: I																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours/ Week	Credits	THEORY						PRACTICAL			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal Marks		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
											Max. Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																		
1	1SF01	Applied Mathematics - I	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40				
2	1SF02	Applied Physics	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40				
3	1SF03	Engineering Graphics	2			ESC	2	2	2 Hrs 30 Min	60	30	10	100	40				
4	1SF04	Programming for Problem Solving	2			ESC	2	2	2 Hrs 30 Min	60	30	10	100	40				
5	1SF05	Professional Communication Skills*	1	1		HSSM	2	2				50	50	25				
6	1SAKNX01	Multimedia and Web Designing	3			ESC	3	3	2 Hrs 30 Min	60	30	10	100	40				
7	1SF06	Design Thinking **	1			ESC	1	1				50	50	25				
Practicals																		
08	1SF07	Applied Physics Lab			2	BSC	2	1							25	25	50	25
09	1SF08	Engineering Graphics Lab			2	VSEC	2	1							25	25	50	25
10	1SF09	Programming for Problem Solving Lab			2	ESC	2	1							25	25	50	25
11	1SAKNX02	Multimedia and Web Designing Lab			2	ESC	2	1							25	25	50	25
12	1SF10	NSS/Sports/Yoga/Cultural/Community Service #			2	LLC	2	1							50		50	25
Total			15	1	10		26	21					600				250	
															Total		850	

* Assessment will be based on Test and Assignments

** Assessment will be based on Case Studies and Assignments

Assessment will be based on participation in associated activities of not less than 30 hours

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
1SF01	Applied Mathematics I	03	00	00	03

Course Requisite:

1. Basic idea of differential and integral calculus.
2. Fundamental knowledge of trigonometric functions.
3. Essential knowledge of Differential Equation.

Course Learning Objectives:

1. To familiarize with techniques in calculus.
2. To evaluate partial derivatives of explicit, implicit functions, maxima and minima values of the functions.
3. To solve differential equation of certain type of differential equations and its applications.
4. To determine infinite series and their convergence and divergence.

Course Outcomes:

Students will be able to:

1. Make use of derivatives for finding nth derivatives and to solve indeterminate forms.
2. Extend the basic ideas of the calculus of functions of single variables to functions of several variables and its concept.
3. Find maximum and minimum value of a function.
4. Solve certain types of differential equations by various methods.
5. Utilize it for engineering problems of electrical circuit.
6. Determine infinite series and their convergence and divergence.

	Subject: Applied Mathematics I	L
Unit I	Differential Calculus I: Successive differentiation, Leibnitz's theorem on the nth derivative of a product, Indeterminate forms.	7
Unit II	Differential Calculus II: Partial differentiation, Euler's theorem on homogeneous function.	6
Unit III	Jacobian: Jacobian of explicit functions and implicit functions with properties, functional dependence, maxima and minima of function of two independent variables.	7
Unit IV	Ordinary differential equations of first order and first degree: Non- homogeneous differential equation, Linear differential equation, reducible to Linear differential equation, Exact differential equation and reducible to Exact differential equation.	7
Unit V	Differential equations of first order and higher degree: Solvable for p, solvable for x and solvable for y, Application to Orthogonal Trajectories and Electrical circuits by Kirchoff's law.	6
Unit VI	Infinite Series: Tests for convergence by p-series test, Comparison test, Ratio test, Rabbe's test and Root test.	7
	Total	40

Text Books:

1. Wartikar P.N. & Wartikar J.N.- A Text Book of Applied Mathematics Vol.-I & II, Pune V.G. Prakashan, Pune.
2. Grewal B.S. - Higher Engineering Mathematics, 40/e, Khanna Publishers.

Reference Books:

1. Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
2. Ramana B.V. - Higher Engineering Mathematics, (TMH).
3. Singh R.R. & Bhatt M. - Engineering Mathematics, (TMH).
4. Dass H. K. – Advance Engineering Mathematics, S. Chand.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
1SF02	Applied Physics	03	00	00	03

Course Prerequisites:

- 1) Elementary idea about electric charge, electricity & magnetism.
- 2) Basic knowledge of material science.
- 3) Fundamental knowledge of optics.

Course Learning Objectives:

- 1) To impart the essential knowledge and applications of ballistics of charged particles in electric and magnetic fields.
- 2) To impart the fundamentals of optics, fibre optics and laser physics and their various applications in engineering fields.
- 3) To impart the knowledge of crystallography, fluid dynamics and cathode ray oscilloscope and their applications.
- 4) To enhance the imagination and creativity in students by performing practical experiments on related topics.

Course Outcomes:

Students will be able to,

- 1) Apply the concepts of electric and magnetic fields in mass spectrograph and Cathode Ray Oscilloscope.
- 2) The students will gain the basic ideas about crystallography and will be able to identify different types of crystal structures in solids.
- 3) The students will be able to utilize the knowledge of interference and diffraction.
- 4) The Students will gain the knowledge of LASER, its types and applications.
- 5) The Students will acquire the knowledge of fibre optics, its types and applications.
- 6) The Students will gain the knowledge of fluid dynamics and its applications.

	Subject: (1SF02) Applied Physics	L
UNIT I	Electron Ballistics: Motion of charged particle in uniform transverse electric and transverse magnetic fields, velocity selector (energy filter), Bainbridge mass spectrograph, Hall effect, cathode ray oscilloscope : working and its block diagram.	8
UNIT II	Crystallography: Crystal structure, Unit cell, Cubic crystal structure: SC, BCC and FCC, Unit cell characteristics: Effective number of atoms per unit cell, atomic radius, coordination number, atomic packing fraction, Miller indices, Bravais lattice Inter-planar distance between adjacent planes.	6
UNIT III	Interference and Diffraction of Light: Fundamental condition of interference, thin film interference due to reflected light, Newton's rings experiment and its applications, Fresnel and Fraunhofer diffraction, plane transmission diffraction grating.	7
UNIT IV	Laser Physics: Absorption, spontaneous and stimulated emission of radiation, population inversion, pumping, metastable state, characteristics and applications of laser, Ruby laser, He-Ne Laser.	6
UNIT V	Fibre Optics: Snell's law, total Internal reflection, construction of optical fibre, acceptance angle and acceptance cone, numerical aperture, types of optical fibre, attenuation, fibre optic communication system.	7
UNIT VI	Fluid Dynamics: Viscosity, Stoke's law, streamline and turbulent flow of liquid, Poiseuille's equation, Continuity equation, Bernoulli's theorem.	6
	Total	40

Text Books:

- 1) R.K.Gaur & S.L.Gupta: Engineering Physics, Dhanpat Rai & Sons.
- 2) Hitendra K. Malik & A.K.Singh: Engineering Physics, Tata McGraw Hill
- 3) M.N. Avadhanulu & P.G. Kshirsagar: Engineering Physics, S.Chand Pub., 2008

Reference Books:

- 1) Orazio Svelto: Principle of Lasers, Springer
- 2) Frank L.Pedrotti, Leno M. Pedrotti, Leno S. Pedrotti: Introduction to optics.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
1SF03	Engineering Graphics	02	00	00	02

Course Prerequisites:

1. Knowledge of basic math concepts and terms.
2. Ability to visualize objects in three dimensions.
3. Computer literacy.

Course Learning Objectives:

1. To acquire and apply engineering graphics knowledge for communicating ideas, information and instructions.
2. To understand the representations of 3D objects and their projections.
3. To understand the representations of orthographic and isometric views of objects.
4. To introduce & apply different drafting commands of CAD software.

Course Outcomes:

At the end of course, Learner will be able to:

1. Use the drawing instruments effectively to dimension the given figures and describe the methods of projection.
2. Construct the various types of plane in different orientation.
3. Apply knowledge of projection to construct different view of regular solid objects
4. Identify the pictorial views of the object.
5. Recognize the pictorial views of the object and construct isometric scale, isometric projection & views
6. Develop the lateral surfaces of primitive solids by using CAD Software.

	Subject: (1SF03) Engineering Graphics	L
Unit I	Basics of Engineering Drawing and Projection: Introduction to drawing instrument and their uses, concept of dimensioning and scales, geometric construction. Projection of Point, Projection of Line.	04
Unit II	Projection of Plane: Projection of different types of planes such as triangular plane, square plane, rectangular plane, pentagonal plane, hexagonal plane, circular plane etc. by using change of position method and auxiliary plane method.	04

Unit III	Projection of Solids: Projection of solids for Prism, Pyramid, Cone and Cylinder.	05
Unit IV	Orthographic Projection: Construction of elevation, plan and side view of given object by using first and third angle projection methods.	05
Unit V	Isometric Views and Projection: Construction of isometric scale, isometric views and projection.	06
Unit VI	Fundamental of CAD Software: Drafting environment and drafting screen, coordinate systems, drafting and dimensioning commands, editing commands, drafting of basic geometrical shapes, display commands, CAD software customization.	06
	Total	30

Text Books:

1. Bhatt N. D. & Panchal V. M. Engineering Drawing, 49th Edn., Charotar Pub. House, Anand, Gujrat, 2007.
2. Shah P. J. – Engineering Drawing, S. Chand Publication, 2008.
3. Dhawan R. K. – Engineering Drawing, S. Chand Publication, (5th edition, 2008).
4. Ingole D.S. – Engineering Graphics, Nirali Publication, Pune (1st Edition 2020).
5. Tickoo Sham – AutoCAD, BPB Publications.

B.Tech. First Year (All Branches)

Course code	Course Title	L	T	P	C
1SF04	Programming for Problem Solving	02	00	00	02

Course Prerequisites: Basic Computer Knowledge and Logical Thinking.

Course Learning Objectives: Throughout the course, students will be expected to demonstrate their understanding of the Programming for Problem Solving

1. Develop a solid understanding of the fundamental concepts of programming and problem-solving, including the input-process-output cycle, algorithms, and program design principles such as top-down and bottom-up approaches.
2. Acquire proficiency in the C programming language, including the ability to write and execute basic C programs, effectively use input-output functions, work with variables, data types, and operators, and understand the concept of program execution.
3. Demonstrate competence in using control constructs such as decision-making statements and looping statements to create efficient and structured programs.

Course Outcomes: After Successful completion of this course, the student will be able to:

1. Understand the basic concepts of computer organization, program design and Algorithms.
2. Explain the basic structure and fundamentals of C programming.
3. Compare and contrast the decision-making constructs and looping statements in C programming.
4. Understand the concept of arrays and string functions in C language.
5. Demonstrate the ability to write and use the concept of functions.
6. Apply the concepts of pointer declaration, assignment and arithmetic operation.

	Subject: (1SF04) Programming for Problem Solving	L
Unit-1	Introduction: Characteristics of Computer, Organization of Computer, Input – Process Output Cycle Various Types of Memory (Primary Memory & Secondary Memory), Introduction to C language, Basic structure.	05
Unit-2	C Fundamentals: Program Execution First C Program, Input Output using scanf() and printf(), Data type, Variables, Keywords, Operators and their precedence.	05
Unit-3	C Control construct: Decision making using if, if-else,if-else-if and switch. Looping using for, while, do while, Jumps Statements (break, continue, goto, return), Basic Programs.	05

Unit-4	Array and Strings: Introduction to Array, 1-D array: Declaration & Initialization, 2-D array: Declaration & Initialization, Strings: Declaration & Initialization, String functions.	05
Unit-5	Functions: Function: Pre defined functions; User defined functions, Multi-function Program, Elements of user defined functions, Return value and their types, Function calls, Function Declaration.	05
Unit-6	Pointers: Definition and uses of pointers, pointer declaration, pointer assignment, pointer arithmetic, Pointers and Functions: Call by value and call by reference.	05
	Total	30

Text Book:

1. R. S. Salaria: Programming for Problem Solving, Khanna Publication.
2. E Balagurusamy: Computing Fundamentals and C Programming- Tata McGraw Hill, Second Edition

Reference Books:

1. Herbert Schildt- C Complete reference (Tata McGraw Hill)
2. Yashwant Kanetkar- Let us C- Seventh Edition

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
1SF05	Professional Communication Skills	01	01	00	02

Course Prerequisites:

- 1) Basic knowledge of vocabulary and grammar of English.
- 2) Basic knowledge of LSWR skills.

Course Learning Objectives:

1. Introduce communication skills and improve vocabulary.
2. Enhance the Employability skills and develop problem solving attitude.
3. Develop confidence and help them attend interviews successfully.
4. Develop the importance of team building and networking.

Course Outcomes:

Students will be able to

1. Use words correctly in a sentence.
2. Become a competent communicator.
3. Express and present their ideas relevant to the given topic.
4. Develop critical thinking skills, decision making ability and team spirit.
5. Develop skills needed for approaching different types of interviews.
6. Become ethical confident individual professionally and socially.

	Subject: (1SF05) Professional Communication Skills	L
Unit I	Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers	5
Unit II	Unseen passage, vocabulary building (Synonyms & Antonyms, Prefix and Suffix, Error Analysis, one word substitute), developing story on given outline.	5

Unit III	Self-Introduction-organizing the material - introducing the topic – extempore speech – Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—Visual presentation	5
Unit IV	Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic — questioning and clarifying –GD strategies- activities to improve GD skills	5
Unit V	Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview & panel interview – FAQs related to job interviews	5
Unit VI	Recognizing differences between groups and teams- networking professionally- respecting social protocols-understanding career management-developing a long- term career plan-making career changes.	5
	Total	30

Text Books:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
2. Interact English Lab Manual for Undergraduate Students, OrientBlackSwan: Hyderabad, 2016.
3. M.Ashraf Rizvi, Effective technical communication. Tata McGraw-Hill Publishing Company Limited. New Delhi.

Reference Books:

1. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015.
2. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014.
3. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.
4. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011.

Term Work (50 marks):

- 1) **Oral Communication:** Self introduction, Extempore, Group discussion, Presentation, Role plays and Mock interview (Students should complete any two oral activities).
- 2) **Non verbal communication:** Body language, facial expressions, tone of voice.
- 3) **Written communication:** Test (short answers, developing story, expanding an idea, comprehending unseen passage) and Assignments based on the syllabus.

Marking Scheme: -

- 1) Oral activity I: 10 marks
- 2) Oral activity II: 10 marks
- 3) Written test based on syllabus: 10 marks
- 4) Assignments based on syllabus: 10 marks
- 5) Personal Interview: 10 marks

B.Tech. First Year

Course Code	Course Title	L	T	P	C
1SAKNX01	Multimedia and Web Designing	03	00	00	03

Course Prerequisite: Nil.

Course Learning Objectives:

Throughout the course, students will be expected to demonstrate their understanding of Multimedia and Web Design by being able to do each of the following:

1. Understand the fundamental concepts and components of multimedia, its historical development and current trends.
2. Learn multimedia authoring tools and techniques to create and manipulate graphics, images, and multimedia content.
3. Understand web technologies, including web architecture, protocols, web server-client communication, and the creation of web pages using HTML and CSS.

Course Outcomes:

After Successful completion of this course, the student will be able to:

1. Describe the key components of multimedia technology recognizing its past, present, and future.
2. Identify different multimedia authoring tools, techniques and use graphics and image data representations.
3. Illustrate the architecture of the web, examine its history, and discuss the major issues in web solution development.
4. Explain the basics of HTTP and the concepts of persistent and non-persistent connections.
5. Utilize the elements and attributes of HTML
6. Compare and contrast the advantages and compatibility of CSS

	Subject: (1SAKNX01) Multimedia and Web Designing	L
Unit-1	Introduction to multimedia: Introduction and Multimedia Data Representations, Introduction to Multimedia, Components of Multimedia, Multimedia: Past and Present Early History of Multimedia, Hypermedia, Multimedia Software Tools, Multimedia in the Future.	07
Unit-2	Multimedia Authoring and Data Representations: - Multimedia Authoring and Tools: Multimedia Authoring, VRML. Graphics and Image Data Representations: Graphics/Image Data Types, 1-Bit Images, 8-Bit Gray-Level, Images, Image Data Types.	07
Unit-3	Introduction to the Web: - History of web, Protocol governing the web, Web architecture, Major issues in Web solution development, Web servers, Web browsers, Internet Standards, TCP/IP protocol suites, IP Address, MIME.	07
Unit-4	Hypertext Transfer Protocol [HTTP]: - Introduction to HTTP, Web Server and Client, Web Resources, URL and its Anatomy, Message Format, Persistent and non-persistent Connections, Web caching, Proxy.	07

Unit-5	Hypertext Markup language [HTML]: - History of HTML, HTML basics, Elements, attributes and tags of HTML, Various Types of Tags: (Basic Tags, Advanced Tags, Images, Meta Tag) Planning of web page, Model Structure of web site, Designing web pages, Multimedia content.	07
Unit-6	Cascading Style Sheet [CSS]: - Introduction, advantages, Adding Cascading Style Sheet (CSS), Browser compatibility, Cascading Style Sheet (CSS) and page layout, Selectors, Grouping, Type Selectors.	07
	Total	42

Text Books:

1. Ze-Nian, Li, Mark S. Drew —Fundamentals of Multimedial (Pearson Education)
2. Roy Uttam K: Web Technologies, Oxford University Press, 2010.

Reference Books:

1. Rajan Parekh —Principles of Multimedial (Tata McGraw-Hill)
2. S.J.Gibbs & D.C.Tsichritzis —Multimedia Programmingl, Addison Wesley 1995
3. Mohler J.L. & Duff J.M.: Desiginig Interactive Web Sites, CENGAGE Learning.
4. Joel Sklar: Text Book of Web Design, CENGAGE Learning.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
1SF06	Design Thinking	01	00	00	01

Course Prerequisites: Nil

Course Learning Objectives:

1. To familiarize students with design thinking concepts and principles.
2. To ensure students can practice the methods, processes and tools of design thinking.
3. To ensure students can apply the design thinking approach and have ability to model real world situations.

Course Outcomes:

Students will be able to –

1. Understand design thinking principles and concepts.
2. Practice the methods, processes, and tools of design thinking.
3. Describe the role and purpose of the observation phase.
4. Explain the purpose and structure of the point-of-view phase.
5. Illustrate the purpose, flow, and importance of the ideate phase.
6. Clarify the role and purpose of the prototype phase.

	Subject: (1SF06) Design Thinking	L
Unit I	Fundamentals of Design Thinking: Principles of Design Thinking, the process of Design Thinking, how to plan a Design Thinking project	2
Unit II	Understanding the Design Problem: Search field determination, Problem clarification, Understanding of the problem, Problem analysis, Reformulation of the problem	3
Unit III	Observing the Problem: Observation Phase, Empathetic design, Tips for observing, Methods for Empathetic Design	2
Unit IV	Defining the Problem: Point-of-View Phase, Characterization of the target group, Description of customer needs	3
Unit V	Finding and Selecting Ideas: Ideate Phase, The creative process and creative principles, Creativity techniques, Evaluation of ideas	2
Unit VI	Prototyping: Prototype Phase, Lean Startup Method for Prototype Development, Visualization and presentation techniques	2
	Total	14

Text Books:

- 1) Christian Mueller-Roterberg, Handbook of Design Thinking, Research Gate November 2018.
- 2) Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Amazon books.

Reference Books: Dr. D. Ravindran, Introduction to Design Thinking, Notion Press.

Term Work (50 marks)

Students should complete the following activities

- 1) Participate in a design challenge to solve the real-world problem using design thinking principles.
- 2) Analyze case studies on design thinking application in various industries.
- 3) Design a project that applies design thinking principles to a specific problem or opportunity.

Marking Scheme: -

- 1) Participation in a design challenge -10
- 2) Case Study-10
- 3) Designing of a project-10
- 4) Assignments-10
- 5) Attendance in theory classes- 10

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
1SF07	Applied Physics Lab	00	00	02	01

Course Prerequisites:

- 1) Identify and handle various equipment like vernier caliper, micrometer screw gauge, multimeter, spectrometer.
- 2) Basic knowledge of graphical representation of observed values.

Course Learning Objectives:

- 1) To gain practical knowledge by applying experimental methods to correlate with the theory.
- 2) Apply the analytical techniques and graphical analysis to the experimental data.
- 3) To develop basic understanding of various experimental principles involved.

Course Outcomes:

Students will be able to,

- 1) Develop experimental skills to impart practical knowledge in real time.
- 2) Understand principle, concept, working and applications of areas in physics and compare the results obtained with theoretical calculations.
- 3) Conduct experiment and record experimental data, Analyse the obtained data and Draw conclusions from the Laboratory exercise based on the analysed data.

	Subject: (1SF07) Applied Physics Lab
Expt. 1	Study of CRO I: To measure A.C voltage, D.C voltage and frequency using CRO.
Expt. 2	Study of CRO II: To determine frequency of unknown signal by using Lissajous patterns.
Expt. 3	To determine wavelength of monochromatic light by using Newton's Ring experiment.
Expt. 4	To determine wavelength of monochromatic light by using Plane transmission diffraction grating.
Expt. 5	Determination of grating element of diffraction grating, using LASER beam.
Expt. 6	Study of various crystal structures.
Expt. 7	To determine Miller Indices of crystal planes.
Expt. 8	To plot the V-I characteristics of LED and to find its striking potential.
Expt. 9	To measure the intensity and divergence of given LASER beam.

Expt. 10	To determine the coefficient of viscosity using Stoke's law.
Expt. 11	Study of Hall effect in semiconductor.
	Total (Minimum 8 particles are to be performed)

Text Books:

- 1) Dr. Ruby Das & C. S. Robinson: Engineering Physics Practical, Laxmi Publications.
- 2) Dr. B. Shriniwas Rao: Engineering Physics Practical, Laxmi Publication.

Reference Books:

- 1) William David Cooper: Electronic Instrumentation and Measurement Techniques, Eastern Economy Edition publications.

B.Tech. First Year

Course Code	Course Title	L	T	P	C
1SF08	Engineering Graphics Lab	00	00	02	01

Course Prerequisite:

1. Knowledge of basic math concepts and terms.
2. Ability to visualize objects in three dimensions.
3. Computer literacy.

Course Learning Objectives:

1. To understand the concepts of drawing as a language of communication of Engineers
2. To improve the visualization skills for better understanding of solids using CAD software.
3. To acquire skills to interpret and convert multi-views drawing into single view and vice-versa.

Course Outcomes:

At the end of course, Learner will be able to –

1. Illustrate the projection of points, lines and surfaces
2. Understand the concept of orthographic and isometric projection
3. Construct different types of solids in different positions by using CAD software

List of Practical:

Every student will submit a set of at least FIVE drawing sheets (from 1 to 6 listed below) and perform at least TWO practical (from 7 to 9 listed below) using CAD software.

Examination will consist of viva-voce based on the syllabus.

1. Projection of straight line
2. Projection of plane
3. Projection of solids
4. Orthographic projection
5. Isometric projection/view
6. Free hand sketches of simple machine elements, like
 - (a) Screw threads ISI profile
 - (b) Types of nuts, bolts, studs, set screws, washers, locking arrangement of nuts & bolts
 - (c) Foundation bolts – Rag, eye, lewis types
7. Drafting of basic 2D geometrical shapes using CAD software
8. Drafting of basic 3D geometrical shapes using CAD software
9. Drafting of 2D and 3D objects using surface modelling commands

B.Tech. First Year

Course Code	Course Title	L	T	P	C
1SF09	Programming for Problem Solving Lab	00	00	02	01

Course Prerequisite: Nil

Course Learning Objectives: Throughout the course, students will be expected to demonstrate their understanding of Programming for Problem Solving Lab by being able to do each of the following:

1. Set up and use a C programming development environment (IDE, compiler, etc.) to write, compile, and run programs.
2. Understand and apply fundamental programming constructs such as variables, control structures, functions, arrays, strings, and pointers in C.
3. Develop algorithmic thinking using flowcharts or pseudocode to solve problems through a structured, top-down approach.

Course Outcomes:

After successfully completing the course, students will be able to-

1. Develop and execute basic C programs to solve simple problems using appropriate programming constructs.
2. Analyze and apply control flow mechanisms and data structures (arrays, strings, functions, and pointers) to implement efficient C programs.
3. Demonstrate problem-solving skills through the application of algorithmic logic and programming techniques

List of Experiment:

Minimum 8 to 10 practical's are to be conducted based on subject **1SF04 Programming for Problem Solving**

List of Experiments/ Practical's:

Minimum 8 experiments are to be performed.

1. Set up a C programming environment (compiler, IDE, etc.).
2. Write a simple program to display "Hello, World!".
3. Solve a simple problem using a top-down approach and develop a program accordingly.
4. Use flowcharts or pseudo code to represent the algorithm for a specific problem.
5. Write program to illustrate precedence of operator
6. Write programs that demonstrate the use of if, if-else, and switch statements for decision making.
7. Create and manipulate 1-D, 2-D arrays (declaration, initialization, accessing elements).
8. Explore string manipulation functions (strcpy, strcat, strlen, etc.)
9. Write programs using user-defined functions to solve specific tasks
10. Understand and use return values and their types.
11. Explore the concept of call by value using pointers.
12. Explore the concept of call by reference using pointers

B.Tech. First Year

Course Code	Course Title	L	T	P	C
1SAKNX02	Multimedia and Web Designing Lab	00	00	02	01

Course Prerequisite: Nil.

Course Learning Objectives:

1. To introduce students to the fundamentals of HTML and web technologies, enabling them to create basic web pages using HTML tags and structure.
2. To learn the Cascading Style Sheets (CSS) for enhancing the presentation of web pages and improving user interface design.
3. To provide hands-on experience in building static websites and integrating multimedia elements to reinforce practical knowledge through mini projects.

Course Outcomes (CO):

After successful completion of this lab course, the student will be able to:

1. Demonstrate the ability to write and execute basic HTML code to create structured web pages including text, links, lists, and tables.
2. Apply CSS to style HTML elements and enhance the visual presentation of web content.
3. Develop a mini project showcasing a functional and visually appealing static website that integrates multimedia.

Perform any 8 Practical's from following list of practicals:

1. Introduction to Hyper Text Mark-up Language (HTML) and how to create HTML file using notepad
2. Demonstrate the use of some of basic html tags
3. Design a web page and include link to redirect on another webpage.
4. Write a HTML Program to demonstrate various List tags.
5. Write a HTML program to design static webpage which should allow to enter user's personal data

6. Write a HTML program to demonstrate the use of various Image tags
7. Write a HTML Program to create a table using table tags of HTML
8. Make a form in html web page which takes all the details of person
9. Design a web page using HTML Style sheet.
10. Create html page which make a use of Internal/ External CSS file. A CSS File must use following CSS Selector
11. Create a HTML web page which uses CSS Border, Background, Padding
12. Create a web page which embed image, video and Links in Table
13. Create a HTML page which showcase images in gallery
14. Create a Mini project for
 - a. Students Notice Board
 - b. Result Display Board
 - c. Personal information ValetAny other relavant

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
1SF10	NSS/Sports/Yoga/Cultural/Community Service	00	00	02	01

Course Prerequisites:

1. Basic physical and mental fitness.
2. Willingness to volunteer time.

Course Learning Objectives:

1. To develop a sense of responsibility, discipline and social values through participation in community base activity.
2. To enhance physical, mental and emotional wellbeing while fostering teamwork.
3. To strengthen, problem solving, decision making and organizing skill by addressing real world issues in the community.

Course Outcomes:

Students will be able to –

1. Demonstrate and understand community service and social responsibility through the participation in NSS activities.
2. Demonstrate proficiency in basic yoga posture and breathing techniques.
3. Develop leadership, creativity, self-expression and time management skills through the participation in sports activities, music, dance, drama or fine art.

	Subject: (1SF10) NSS/Sports/Yoga/Cultural/Community Service
ACTIVITY-I	NSS- Cleanliness drive, Blood donation, Tree plantation, Health and hygiene awareness program, Plastic waste management.
ACTIVITY-II	SPORTS- Introduction to Sports, Importance of health and fitness, Brief information of any one outdoor game, Brief information of any one indoor game, Article writing on any recent match of your choice.
ACTIVITY-III	YOGA- Introduction to yoga, Importance of yoga, Suryanamaskar (12 yoga postures) with benefits, Importance of balanced diet, Meditation for mental health.
ACTIVITY-IV	CULTURAL- Skit, Mime & Street play, Light music (singing), Any one dance form, Poster/Rangoli (any theme).
ACTIVITY-V	COMMUNITY SERVICE- Visit to blind home, Visit to Old age home, Visit to Orphanage, Distribution of clothes, medicine to needy people.

Text Book:

- 1) —National Service Scheme: A Handbook for Volunteers by Dr. A. R. Anuradha.
- 2) —Sports and Physical Education by Dr. S. K. Sharma.

Reference Book:

- 1) —The Yoga Sutras of Patanjali by Swami Sivananda.

Term Work (50 marks):

1. Field visits to 'Old age home', Orphanage or Ashram shala to run activities such as cleaning the premises, tree plantation, donating medicines, cloths etc., to develop the values of selfless service.
2. Participation in yoga sessions to promote physical and mental fitness and also to get aware about yoga.
3. Participation in outdoor and indoor games to promote physical
4. Participation in various cultural activities for the development of skills and to encourage creativity and talent.
5. Participation in community services such as making water bowls for birds, tree plantation, distribution of food to underprivileged families, etc.

Marking Scheme:

1. Field visit: 10
2. Participation in yoga: 10
3. Participation in outdoor and indoor games: 10
4. Participation in various cultural activities: 10
5. Participation in community services: 10

Semester II

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
(An Autonomous Institute)

Four Year Under Graduate Degree Program in Bachelor of Technology

Choice Based Credit System (Semester Pattern)

Branch : Artificial Intelligence (AI) and Data Science

SEMESTER: II																			
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme										
			Hours/ Week			Group	Total Hours/ Week	Credits	THEORY						PRACTICAL				
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal Marks		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks	
											Max. Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.			
Theory																			
01	2SF01	Applied Mathematics - II	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40					
02	2SACEMN02	Engineering Chemistry	3			BSC	3	3	2 Hrs 30 Min	60	30	10	100	40					
03	2SF03	Basics of Electrical Engineering	2			ESC	2	2	2 Hrs 30 Min	60	30	10	100	40					
04	2SF04	Biology for Engineers	2			BSC	2	2	2 Hrs 30 Min	60	30	10	100	40					
05	2SF05	Universal Human Values*	2			HSSM	2	2				50	50	25					
06	2SAEKNX01	Introduction to Python	3			ESC	3	3	2 Hrs 30 Min	60	30	10	100	40					
07	2SF06	Indian Knowledge Systems *	2			HSSM	2	2				50	50	25					
Practicals																			
08	2SACEMN07	Engineering Chemistry Lab			2	BSC	2	1							25	25	50	25	
09	2SF08	Basic of Electrical Engineering Lab			2	ESC	2	1							25	25	50	25	
10	2SAEKNX02	Introduction to Python Lab			2	ESC	2	1							25	25	50	25	
11	2SF09	Workshop/Digital Fabrication Lab			2	VSEC	2	1							25	25	50	25	
Tota			17		8		25	21					600				200		
																Total	800		

* Assessment will be based on Unit Tests and Assignments

Exit Option: To qualify for UG Certificate in Artificial Intelligence and Data Science

Title	Credit
1. Two relevant MOOC/NPTEL courses as decided by BOS	4
AND	
1. Internship (Min 60 hrs)	4
Total	8

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SF01	Applied Mathematics II	03	00	00	03

Course Requisite:

- 1) Basic Knowledge of Matrix and Complex number.
- 2) Elementary Integral Calculus.

Course Learning Objectives:

- 1) To deal with system of equations and solutions of Eigen value problem.
- 2) To express real valued periodic function in terms of sines and cosines
- 3) To Use Complex number theory in engineering application such as signal processing.
- 4) To familiarize with techniques in double and triple integrals and its applications.

Course Outcomes:

Students will be able to:

1. Make use of system of equations in matrix forms.
2. Find the periodic functions as an infinite series.
3. Apply De Moivre's theorem in various concepts of complex number.
4. Use new technique DUIS and to evaluate Beta and Gamma function.
5. Evaluate double integrals over bounded regions.
6. Evaluate triple integral and its applications.

	Subject: Applied Mathematics II	L
Unit I	Matrices: Rank of a matrix, Consistency of linear system of equations by matrix method, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof).	7
Unit II	Fourier series: Fourier expansion of function in $(C, C+2L)$, half range Fourier series.	6
Unit III	Complex Numbers: Roots of complex number by deMoivre's theorem, Hyperbolic and inverse hyperbolic functions, Separation of real and imaginary parts, Logarithm of complex numbers.	7
Unit IV	Integral Calculus I: Differentiation under integral sign, Beta Function and Gamma Function.	7
Unit V	Integral Calculus II: Double integration, change of order of integration, transformation to polar coordinates, Evaluation of area by double integration.	8
Unit VI	Integral Calculus III: Triple integration, Transformation to spherical polar coordinates, Volume of solid by triple integration.	7
Total		42

Text Books:

1. Wartikar P.N. & Wartikar J.N.- A Text Book of Applied Mathematics Vol.-I & II, Pune V.G. Prakashan, Pune.
2. Grewal B.S. - Higher Engineering Mathematics, 40/e, Khanna Publishers.

Reference Books:

1. Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
2. Ramana B.V. - Higher Engineering Mathematics, (TMH).
3. Singh R.R. & Bhatt M. - Engineering Mathematics, (TMH).
4. Dass H. K. – Advance Engineering Mathematics, S. Chand.
5. Ordinary And Partial Differential Equations By Dr. M. D. Raisinghania, S.Chand & Company Ltd
6. Advanced Engineering Mathematics by R. K. Jain, S. R. K. Iyengar, Satteluri R. Iyengar, Alpha Science International, 2007.

B.Tech. First Year

Course Code	Course Title	L	T	P	C
2SACEMN02	Engineering Chemistry	03	00	00	03

Course Prerequisites:

1. Understanding of fundamental chemical concepts, such as atomic structure, chemical bonding, and chemical reactions.
2. Familiarity with materials science concepts, such as crystal structures, material properties, and phase diagrams.
3. Basic understanding of physical principles, such as thermodynamics, electromagnetism, and quantum mechanics.
4. Fundamentals of redox reactions and electrochemistry.
5. Knowledge of chemical reaction.
6. Basic knowledge of qualitative and quantitative analysis.

Course Learning Objectives:

1. Develop an understanding of conducting polymers, nanomaterials, alloys, and cement engineering, including their synthesis, properties, and applications.
2. Understand the principles of conventional and non-conventional energy sources, energy storage devices, and generation devices, including batteries, solar cells, and fuel cells.
3. Develop knowledge of e-waste management, wastewater management, corrosion mechanisms, and methods of corrosion control.
4. Gain hands-on experience with computational chemistry software packages and apply computational chemistry to structure-based drug design, materials modeling, and environmental modeling.

Course Outcomes:

1. Students will be able to analyze and apply knowledge of engineering materials: Including conducting polymers, nonmaterial and alloys to solve real-world problems.
2. Students will be able to understanding the types of cement, raw materials, manufacturing processes, and physical properties of Portland cement.
3. Students will get the knowledge of sources and storage systems: Including conventional and non-conventional energy sources, energy storage devices, and generation devices.

4. Students will be able to manage waste and control corrosion: Understanding e-waste management, wastewater management, corrosion mechanisms, and methods of corrosion control.
5. Students will be able to apply knowledge of computational chemistry tools and techniques: used in structure-based drug design, materials modeling, and environmental modeling.
6. Students will be able to analyse concepts from materials science, energy, corrosion, waste management, and computational chemistry to address real-world challenges.

	Subject: Engineering Chemistry	L
UNIT I	Engineering Materials: ➤ Electrically Conducting Polymers: Introduction, synthesis, properties and applications of Polyacetylene and Polyaniline. ➤ Photo-conducting Polymers: Introduction, properties and applications of Poly(N-vinyl carbazole) and Poly(N-benzyl glutamate). ➤ Nanomaterials: Introduction, size-dependent properties and applications in Li-ion batteries and photovoltaics. ➤ Alloys: Introduction, classification, properties and applications of important ferrous and non-ferrous alloys.	8
UNIT II	Cement Engineering: ➤ Introduction, types of cement, raw materials and manufacturing of Portland cement by wet process. ➤ Chemical constituents of cement and their functions. ➤ Physical properties of Portland cement: soundness, heat of hydration, setting and hardening.	6
UNIT III	Energy Sources, Storage and Generation Devices: ➤ Introduction and classification of energy sources: conventional and non-conventional. ➤ Batteries: Principle and types; construction, working and application of Dry cell, Mercury cell, Ni-Cd battery and Lithium-ion battery. ➤ Photovoltaic cell and fuel cell: construction, working and application.	6
UNIT IV	Corrosion & Its Control: ➤ Introduction to corrosion. Dry and wet corrosion and their mechanisms. Types of wet corrosion: pitting, waterline, stress and galvanic corrosion. ➤ Methods of corrosion control: cathodic protection (sacrificial anode and impressed current methods) and protective coatings (galvanizing and tinning).	6
UNIT V	Waste Management: ➤ E-waste: Introduction, sources, composition, environmental effects, principles and technologies for e-waste management and resource recovery. ➤ Waste water management: Introduction, characteristics, analysis and purification of wastewater.	7

UNIT VI	Computational Chemistry: ➤ Introduction and importance of computational chemistry. ➤ Molecular drawing, visualization and file conversion using ChemDraw or ISIS Draw, PyMOL and Open Babel. ➤ Demonstration of molecular modeling and structure optimization using ➤ free/open-source computational chemistry tools. Applications in drug design, materials science, atmospheric chemistry and water quality analysis.	7
	Total	40

Text Books:

1. Dara, S. S. and Umare, S. S., Engineering Chemistry, S. Chand Publishing.
2. Jain, P. C. and Jain, M., Engineering Chemistry, Dhanpat Rai & Sons.
3. Krishnamurthy, N. and Vallinayagam, P., Engineering Chemistry, PHI Learning.
4. Rath, P., Engineering Chemistry, Cengage Learning.

Reference Books:

1. Maheswaramma, K. S. and Chugh, M., Engineering Chemistry, Pearson Education.
2. Agarwal, S., Engineering Chemistry: Fundamentals and Applications.
3. Prasad, M. A. B. V. and Krishna, S. V. S. R., E-Waste Management, 2012.
4. Frank Jensen, Introduction to Computational Chemistry, 3rd Edition, Wiley.
5. Andrew R. Leach, Molecular Modelling: Principles and Applications, Pearson.
6. Christopher J. Cramer, Essentials of Computational Chemistry: Theories and Models, Wiley

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SF03	Basics of Electrical Engineering	02	00	00	02

Pre-requisites:

1. Concepts of Electrostatics and Current Electricity.
2. Fundamentals of Magnetic effect of electric current, magnetism and Electromagnetic Induction.

Course Learning Objectives:

1. To introduce students with different terminologies in electrical engineering and network simplification methods of resistances.
2. To understand DC and AC Circuit analysis.
3. To understand magnetic circuits and Electromagnetic induction.
4. To understand single phase Transformer and Safety in electrical installation.

Course Outcomes:

After completion of this course the student shall be able to:

1. Understand fundamentals of Electrical Engineering and be adequately trained to solve Network of resistances by using transformation techniques.
2. Demonstrate DC circuits by finding different parameters like voltage, currents, resistance using laws and theorems.
3. Explain different properties of electromagnets and phenomenon of electromagnetic induction in magnetic circuits.
4. Illustrate the different terms of AC and analyze single phase AC circuits.
5. Explain Three phase A.C circuits
6. Explain single phase Transformer and Safety in electrical installation.

	Subject: (2SF03) Basics of Electrical Engineering	L
UNIT I	Fundamentals of Electrical Engineering: Basic concepts of Current, Voltage, Power, energy and relationship between them. Resistance, Resistivity, Conductance, Conductivity, Network simplification of Resistances (Series, Parallel, Delta-Star and Star-Delta transformation)	05
UNIT II	DC Circuit Analysis: Types of Sources, Current and voltage division principle, Source Transformation, Ohm's Law, Kirchoff's Laws (KCL and KVL), Superposition Theorem, Thevenin's Theorem.	05
UNIT III	Magnetic circuits and Electromagnetic Induction: Basic concepts of Flux, flux density, MMF, Reluctance, Permeance, Magnetic field intensity and their relationship. Series Magnetic circuits, B-H curve, Principle of electromagnetic induction, Types of Magnetically induced EMF, Concept of self and mutual Inductance	05
UNIT IV	A.C. Fundamentals: Generation of sinusoidal alternating voltages and currents, Different terminologies associated with AC circuit. Behavior of AC circuit containing Pure R, L, and C. Phasor representation in rectangular & polar form, Impedance and admittance concept. Series R-L, R-C and R-L-C circuit, Resonance in Series R-L-C circuit, Power in single phase circuit: - Concepts of active, reactive and apparent power, Power factor.	05
UNIT V	Polyphase Circuits: Generation of Three phase voltages, current and power, Star connected and delta connected balanced circuits, Relationship between line current, phase current and line voltage, phase voltage, analysis of balanced three phase circuits Power measurement in Three phase circuit.	05
UNIT VI	Single phase Transformer: Single-phase transformer construction and working (Ideal and practical), Types of Transformers, EMF equation of Transformer, Efficiency & Regulation of transformer, condition for maximum efficiency. Electrical Safety: Safety precautions in electrical installation, Earthing, Types of Earthing (Plate and Pipe Earthing)	05
	Total	30

Text Books:

1. B. L. Thereja, Basic electrical engineering, S. Chand Publications.
2. D.P. Kothari, I.J. Nagrath, —Basic Electrical Engineering, TMH Publishing Co. Ltd., New Delhi, 3rd edition
3. Leonard S. Bobrow, —Fundamentals of Electrical Engineering, 2nd Edition, Oxford Press.
4. Kulshreshtha D.C., — Basic Electrical Engineering, First Ed., TMH

Reference Books:

1. Leonard S. Bobrow, —Fundamentals of Electrical Engineering, 2nd Edition, Oxford Press. R
2. A.E. Fitzgerald, D.E. Higginbotham, —Basic Electrical Engineering, McGraw Hill Book Co., New York, 2nd edition
3. Dr.S.L.Uppal, —Electrical Wiring, Estimating and Costing, Khanna Publishers.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SF04	Biology for Engineers	02	00	00	02

Pre-requisites: Nil

Course Learning Objectives:

1. To acquire the knowledge of basic concepts of biology and the need of the subject in Engineering.
2. To study the human organs and their analogy with engineering applications.
3. To be acquainted with the latest trends in bio-engineering.
4. To become familiar with the concept of Bio-mimicry and understand how nature has inspired innovations in technology.

Course outcomes:

1. Understand basic biological concepts and define the terminologies.
2. Understand various organs in body, their function; it's analogy with engineering applications.
3. Acquire knowledge of medical tools and machineries used in the treatment.
4. Understand the concepts of 3D printing and its biomedical applications and trends in bio-engineering
5. Understand the concepts like biosensors, biofuels and biochips.
6. Understand the concept of Bio-mimicry and nature inspired technology

	Subject: (2SF04) Biology for Engineers	L
UNIT I	Introduction to Basic Biology: Cell: What is a Cell, Cell theory, Cell shapes, structure of a Cell, Cell cycle chromosomes, The Plant Cell and animal Cell, protoplasm, prokaryotic and eukaryotic Cell, Plant Tissue and Animal Tissue. Carbohydrates, proteins, Amino acid, nucleic acid (DNA and RNA) and their types	04
UNIT II	Human Organ Systems and Bio Designs – 1 Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics.). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signaling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).	04

UNIT III	Human Organ Systems and Bio Designs – 2 Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems).	05
UNIT IV	Trends in Bioengineering-1 Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D Printed tooth, Dental implants, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis	05
UNIT V	Trends in Bioengineering-2 Cloning in microbes, plants and animals, Basics of biosensors, biochips, Bio fuels. Tissue engineering And its application, transgenic plants and animals	06
UNIT VI	Nature-Bioinspired Materials and Mechanisms: Bio-mimicry, Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).	06
	Total	30

Reference Books:

1. Human Physiology, Stuart Fox, Krista Rompolski, McGraw-Hill eBook. 16th Edition, 2022
2. Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
3. Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
4. Biomedical Instrumentation, Leslie Cromwell, Prentice Hall 2011.
5. Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
6. Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies, D. Floreano and C. Mattiussi, MIT Press, 2008.
7. Bioremediation of heavy metals: bacterial participation, by C R Sunilkumar, N Geetha A C Udayashankar Lambert Academic Publishing, 2019.
8. 3D Bioprinting: Fundamentals, Principles and Applications by Ibrahim Ozbolat, Academic Press, 2016.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SF05	Universal Human Values (UHV)	02	00	00	02

Course Prerequisites: NIL

Course Learning Objectives:

1. To facilitate in students the understanding of Universal Human Values.
2. To imbibe professional Ethics in students.
3. To aware students about their role in all aspects of life, including their place in the family, society and nature.

Course Outcomes:

Students will be able to

1. Understand the need for value education and its significance in personal and societal development.
2. Understand the harmony between the 'I' and the body and its significance for overall well- being.
3. Identify and appreciate the values in human-human relationships, emphasizing trust (Vishwas) and respect (Samman).
4. Develop a holistic perception of harmony at all levels of existence.
5. Communicate effectively about the importance of harmony in nature, promoting awareness and inspiring others to adopt sustainable practices.
6. Recognize the relevance of a humanistic constitution and humanistic universal order.

	Subject: (2SF05) Universal Human Values	L
UNIT I	Process for Value Education: Understanding nature and scope for Value Education Self-Exploration–concept and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being	5
UNIT II	Understanding Harmony in the Human Being - Harmony in Myself: Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ – Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body	5
UNIT III	Understanding Harmony in the Family and Society- Harmony Human - Human Relationship: Understanding harmony in the Family- the basic unit of human interaction understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas.	5
UNIT IV	Building the Universal Harmonious Order: Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society	5

	being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitvaas comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!	
UNIT V	Understanding Harmony in the Nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self- regulation in nature Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence	5
UNIT VI	Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.	5
	Total	30

Text Books: R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Books:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA.
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Susan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991.
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagaraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.

Term Work (50 marks):

1. Analyze case studies on universal human values, such as ethical dilemmas or social issues.
2. Participate in group discussions on universal human values, including debates and presentations.
3. Visit community centers or NGOs working to uplift communities to demonstrate the values of selfless service.
4. Reading an article or literature on the people who were involved in selfless activities and prepare the report to express a view on the article.

Marking Scheme: -

- 1) Case Study: 10 Marks
- 2) Group Discussion: 10 Marks
- 3) Visit to community Centre: 10 Marks
- 4) Report on Article Reading: 10 Marks
- 5) Attendance -10 Marks

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SAEKNX01	Introduction to Python	03	00	00	03

Course Prerequisite: Basic Knowledge of Computer.

Course Learning Objectives: Throughout the course, students will be expected to demonstrate their understanding of Introduction to Python by being able to do each of the following:

1. Develop a strong foundational understanding of the Python programming language, including its basic concepts, data types, operators, and control flow structures.
2. Gain proficiency in working with strings, functions, and various data structures such as lists, tuples, and dictionaries.
3. Acquire skills in file handling, data manipulation using Pandas and NumPy, and object-oriented programming principles.

Course Outcomes: After Successful completion of this course, the student will be able to:

1. Define the basic concepts of Python, including variables, data types, and operators.
2. Explain different string manipulation techniques and functions.
3. Use python program flow to explore logic.
4. Create module to understand modularity.
5. Implement the concepts and procedures of file handling in Python for real-world scenarios.
6. Demonstrate the application of object-oriented programming principles in Python.

	Subject: (2SAEKNX01) Introduction to Python	L
Unit-1	An Introduction to Python: Characteristics of Python, Why Python, Print statement, Comments, Python Variables, Data types, Operators in Python, Global and local variables, Basic Programs.	07

Unit-2	Data Structures in Python: Python Data Structures (List, Tuples, Dictionaries, Sets), Function related to data structure, Basic String Operations in Python (String Manipulation, Accessing Strings, Basic Operations, String slices), Simple Input and Output, Output formatting, Basic Programs	07
Unit-3	Python Program Flow: Indentation, if statement, and its related statements, while loop, for loop, range statement, break and continue, Assert, Examples of Looping.	07
Unit-4	Functions and Modules: Function: Functions, defining a function, Calling a function, Types of functions, Function Arguments, Create a Module, Standard Modules, Exception Handling	07
Unit-5	Working with Data in Python: Modes of file handling (Opening and closing file, Reading and writing files), Date and Time with its functions, Introduction to Modules and packages.	07
Unit-6	Classes and Objects: Overview of OOP, Class Definition, Creating Objects, Objects as Arguments, Objects as Return Values, Built-in Class Attributes, Inheritance, Overloading, Overriding, Programs.	07
	Total	42

Text Book:

1. Martin C Brown, —Python: The Complete Referencel, McGraw Hill.
2. J. Mueller and L. Massaron, Python for data science. 2nd edition. Hoboken, NJ, John Wiley & Sons, Inc, 2019.

Reference Books:

1. Larry Lutz, — Python for Beginners: Step By Step Guide to Learning Python Programming, CreateSpace Independent Publishing Platform, First edition, ISBN: 1717410588, 9781717410580, 2018.
2. Nicholas Ayden, — Python Programming, Independently Published, First Edition, ISBN: 1707051933,9781707051939, 2019.
3. Michal Jaworski, Tarek Ziadé, — Expert Python Programming, Packt Publishing Ltd., Third Edition, ISBN: 9781789808896, 2019.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SF06	Indian Knowledge Systems	02	00	00	02

Course Prerequisites: Nil

Course Learning Objectives:

In this course students will know and understand contribution of ancient Indian scientists through

1. Introduction to contribution of Indian scientist in various fields of Science and Technology and Astronomy
2. Introduce to contribution of Indian scientist in Chemistry, Metallurgy and Mathematics.
3. Introduction to contribution of Indian scientist in Medical Sciences and Life Sciences.

Course Outcomes:

Students will be able to –

1. Discuss contribution of Indian Scientists in various fields of scientists and technology.
2. Narrate contribution of Indian Scientists in the field of Astronomy.
3. Discuss contribution of Indian Scientists in the field of Chemistry and Metallurgy.
4. Discover contribution of Indian Scientists in the field of Mathematics.
5. Collect contribution of Indian Scientists in the field of Medical Science and Ayurveda.
6. Discuss contribution of Indian Scientists in the field of Plant and Animal Science.

	Subject: (2SF06) Indian Knowledge Systems	L
UNIT I	India's Contribution to Science and Technology: Pre-Independence contribution. Brief information about various fields of contributions.	4
UNIT II	Contribution in Astronomy: The Beginnings of Indian Astronomy, The Early Historical Period, The Siddhāntic Era, The Kerala School, Other Post-Siddhāntic Developments.	4
UNIT III	Contribution to Chemistry and Metallurgy: Early Chemical Techniques, Atomism in Vaiśeṣika, Chemistry in Early Literature, Classical Age, Laboratories and Apparatus Metallurgy before and during the Harappan Civilization, Iron Metallurgy and its applications, Zinc Metallurgy	4
UNIT IV	Contributions to Mathematics: First Steps , contributions from: early historical period, the classical period, the classical period: post Aryabhata, contributions of Shri P C Mahalanobis, Shri Shrinivasa Ramajujan.	5

UNIT V	Contributions to Medical Science and Ayurveda as way of life, health and well being The tradition of surgery, Inoculation for smallpox, Microbioilogy and Paracitology, Communicable diseases and epidemics, An evolving pharmacopoeia, Cross-cultural interactions, What is Ayurveda? Integrative approach to healthcare, Integrative approach to healthcare, Principles of Ayurvedic healing, Five elements, three Doshas and Treating diseases to restore health	5
UNIT VI	Contributions to Plant and Animal Science Plant Science in Ancient India, Animal Science in Ancient India, Indian Traditional Knowledge on Environmental Conservation.	4
	Total	26

Text Book:

- 1) Indian Contributions to Science compiled by Vijnana Bharati

Reference Books:

- 1) History of Science and technology in India by Dr. Binod bihari satpathy
- 2) Hindu achievements In exact science by Benoy Kumar Sarkar
- 3) Science in Ancient India by Subhash C. Kak

Term Work: (50 Marks)

- 1) Interaction with traditional practitioners (Vaidyas, artists, craftsmen) and prepare a report after the interaction.
- 2) Drawing or designing based on traditional Indian art (Madhubani, Warli, etc).
- 3) Project on traditional agriculture, water harvesting system, mathematics in ancient India etc.
- 4) Research paper on specific topics in IKS, such as the significance of Ayurveda in modern healthcare, chemistry in ancient era etc.

Marking scheme:

- 1) Report on the interaction: 10 marks
- 2) Drawing or designing on traditional Indian art: 10 marks
- 3) Project on traditional activities: 10 marks
- 4) Research paper on specific topic of IKS: 10 marks
- 5) Attendance in theory classes: 10 marks

B.Tech. First Year

Course Code	Course Title	L	T	P	C
2SACEMN07	Engineering Chemistry Lab	00	00	02	01

Course Prerequisites:

1. Knowledge of chemistry lab precautions, prohibitions and safety aids.
2. Knowledge of basic laboratory techniques, such as handling chemicals, using glassware, and operating simple laboratory equipment.
3. Knowledge of qualitative and quantitative analysis.

Course Learning Objectives:

1. To understand the principles and methods of synthesizing and characterizing materials, including nanomaterials and polymers.
2. To learn how to apply experimental techniques to analyze the properties of materials, such as conductivity, pH, and viscosity.
3. To develop skills in designing and fabricating simple devices, such as batteries and solar cells, using semiconductor materials.
4. To apply knowledge of materials science and engineering to solve problems in areas such as wastewater treatment, corrosion, and recycling.

Course Outcomes:

Students will be able to

1. Apply knowledge of materials science and engineering to synthesize and characterize materials, including nanomaterials and polymers.
2. Analyze and solve problems related to materials properties, such as conductivity, pH, and viscosity, using experimental techniques and computational tools.
3. Design and fabricate simple devices, such as batteries and solar cells, and assess their performance using semiconductor materials and computational chemistry software

EXPT.	Subject: Engineering Chemistry Lab
1.	Synthesis of Urea Formaldehyde Resin.
2.	Determination of H ⁺ ion concentration by conductivity meter.
3.	Determination of pH of unknown solution using pH meter.
4.	Determination of percentage of CaO in a given cement sample.
5.	Determination of alkalinity of water sample.
6.	Preparation of silica nanomaterial by sol-gel method.
7.	Determination of hardness of water by EDTA method.
8.	Determination of Dissolved Oxygen (DO) in water sample.
9.	Determination of viscosity of lubricating oil using Redwood Viscometer No. 1.
10.	Determination of viscosity of lubricating oil using Redwood Viscometer No. 2.
11.	Determination of mass of zinc coating on galvanized iron article.
12.	Construction of a simple galvanic cell and measurement of EMF.
13.	Study of galvanic corrosion using two dissimilar metals
	Minimum 08-10 experiments should be conducted from the above list of experiments.

Reference Books:

1. Dara, S. S. and Umare, S. S., Engineering Chemistry, S. Chand & Co. Ltd.
2. Fried, J. R., Polymer Science and Technology.
3. Fontana, M. G., Corrosion Engineering.
4. Skoog, D. A. and West, D. M., Analytical Chemistry.

Text Books:

1. Dara, S. S., Experiments and Calculations in Engineering Chemistry, S. Chand & Co. Ltd.
2. Bhasin, S. K. and Rani, S., Laboratory Manual on Engineering Chemistry, Dhanpat Rai Publishing Co.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SF08	Basic of Electrical Engineering Lab	00	00	02	01

Course Prerequisite: Nil.

Course Learning Objectives:

1. To analyze DC Circuits.
2. To analyze single phase and three phase AC circuits.
3. To understand single phase transformers.

Course Outcomes:

After completion of this course the student shall be able to:

1. Estimate different electrical parameter like voltage, current in DC circuits using basic laws and theorems.
2. Determine various parameters of AC circuits and find relation between them in single phase AC circuits.
3. Analyze relation between electrical parameter of balanced three phase AC circuits and transformers.

List of Experiments:

Minimum 08 Practical's are to be conducted out of the following:

1. To validate Kirchoff's Current Law for DC Circuits.
2. To validate Kirchoff's Voltage Law for DC Circuits
3. To verify Thevenin theorems for DC Circuits.
4. To verify Superposition theorem for DC Circuits.
5. To analyze RLC Series circuit and to plot its phasor diagram.
6. To verify relationships between line and phase values for Star connected load.
7. To verify relationships between line and phase values for Delta connected load.
8. To conduct load test on single phase transformer and pre-determine its efficiency and regulation.
9. Open circuit and short circuit test on Single phase transformer.
10. Demonstration of Earthing.

B.Tech. Second Semester (Artificial Intelligence and Data Science)

Course Code	Course Title	L	T	P	C
2SAEKNX02	Introduction to Python Lab	00	00	02	01

Course Learning Objectives: Throughout the course, students will be expected to demonstrate their understanding of Introduction to Python Lab by being able to do each of the following:

1. To introduce the fundamentals of Python programming including syntax, control structures, functions, and data types relevant to problem-solving.
2. To develop skills for working with Python libraries and modules that support data structures, file handling, and object-oriented programming.
3. To enable students to write, test, and debug Python programs for solving problems.

Course Outcomes:

After successfully completing the course, students will be able to-

1. Apply foundational knowledge of Python programming to design and conduct experiments aligned with specified objectives.
2. Use computer hardware, software tools, and relevant resources for the execution of Python-based practical tasks.
3. Analyze outputs, interpret results, formulate findings, and draw appropriate conclusions based on the objectives of the given practical.

List of Experiment:

Minimum 8 to 10 practical's are to be conducted based on subject 2SAEKNX01 Introduction to Python.

List of Experiments/ Practical's:

The following is a probable list of experiments/practical's; however, the teacher may prepare or design and conduct other relevant practical's based on the syllabus.

1. Introduction and Installation of Python.
2. Write a python program to find largest of three numbers.
3. Write a python script that prints prime numbers less than 20.
4. Write python program in which a function is defined and calling that function prints Hello World
5. Write python program to store data in list and then try to print them.
6. Write python program to print list of numbers using range and for loop
7. Write python program to demonstrate working with dictionaries in python.

8. Write python program to demonstrate working with tuples in python.
9. Write python program to create, concatenate and print the string and accessing substring from given string.
10. Write python program to load data from dataset and analyze the data.
11. Write python program to subtract five days from current date.
12. Write python program to convert string to date-time.

Software Tools:

Python (Basic Programming: math, random, datetime; Data Handling: pandas, NumPy; Visualization matplotlib, seaborn; File Handling and OS: os, sys, shutil, Json; Data Analysis and visualization Libraries: Pandas, NumPy, Matplotlib, Seaborn, Plotly, Bokeh).

Python Interpreter Tool: Python (CPython) Version: 3.8 or above

Integrated Development Environments (IDEs): VS Code (Visual Studio Code), PyCharm Community Edition, Thonny, Jupyter Notebook, Anaconda Distribution.

B.Tech. First Year (All Branches)

Course Code	Course Title	L	T	P	C
2SF09	Workshop/Digital Fabrication Lab	00	00	02	01

Course Learning Objectives:

1. To make familiar with different tools, equipment and to understand their basic purposes.
2. To develop skills and get hands on experience of marking, measuring, cutting, machining, shaping and forming processes.
3. To learn and develop skills for different joining processes.
4. To make the students well versed with basic electrical, electronics and computer components.
5. To learn the modern manufacturing techniques such as CNC, Robotic Operations and 3D printing.

Course Outcomes:

At the end of this course, the students will be able to

1. Understand manufacturing processes, tools & equipment_s, which are commonly employed in industries.
2. Apply craftsmanship & fabricate the components using various manufacturing techniques.
3. Understand the modern electrical, electronics & computer components & their applications

Group A

- 1) **Fitting** : Introduction to different tools , equipment_s and operations in Fitting Shop. Prepare one job in the Fitting shop, involving operations like marking, filing, hacksaw cutting, drilling and tapping etc.
- 2) **Sheet Metal** : Introduction to Sheet Metal tools and equipment_s, their uses, different sheet metal joints and operations in Sheet Metal. Prepare one job in the Sheet Metal shop.
- 3) **Welding** : Introduction to Welding, welding tools and equipment_s, their uses. Brief introduction to different welding processes, different welding joints. Prepare one job in the Welding shop.

- 4) **Smithy** : Introduction to different tools , equipments and Smithy operations like upsetting, drawing ,bending, forming etc. Prepare one job in the smithy shop.
- 5) **Carpentry** : Introduction to different wood working tools , equipment_s and machines , types of joints and operations performed in Carpentry Shop. Prepare one job in the Carpentry shop.
- 6) **Machining** :- Introduction and practice of basic machining operations on Drilling , Lathe and shaper machine tools.

Group B

- 1) To identify the computer hardware parts, understand working of these parts, & Assemble demonstrate its working
- 2) Identification of various electrical & electronic components & tools used in domestic/industrial applications
- 3) Development of circuit schematic using EDA tools
- 4) 3D printing demonstration
- 5) Robotic operations demonstration
- 6) CNC operations demonstrations

Note- Students have to perform any 4 practical from group A & any 3 practical from group B