



**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
2024-2025**

**B. Tech Computer Science &
Engineering (IoT)**



**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: Computer Science & Engineering (IoT)
SEMESTER: I (GROUP-B)

Sr No	Course Code	Course Name	Teaching Scheme							Examination Scheme									
			Hours / Week			Group	Total Hrs/ Week	Credits		Theory						Practical			
			Lecture	Tutorial	P/D					Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max Marks		Total	Min Passing Marks
												Max Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																			
1	2SF01	Applied Mathematics - II	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
2	2SF02	Applied Chemistry	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
3	2SF03	Basics of Electrical Engineering	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
4	2SF04	Biology for Engineers	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
5	2SF05	Universal Human Values*	2	--	--	--	2	2		--	--	--	50	50	25	--	--	--	--
6	2SAEKNX01	Introduction to Python	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
7	2SF06	Indian Knowledge Systems *	2	--	--	--	2	2		--	--	--	50	50	25	--	--	--	--
Practicals																			
8	2SF07	Applied Chemistry Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
9	2SF08	Basic of Electrical Engineering Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
10	2SAEKNX02	Introduction to Python Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
11	2SF09	Workshop/Digital Fabrication Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
		Total	17		8		25	21						600				200	
* Assessment will be based on Unit Tests and Assignments																Total		800	

* Assessment will be based on Unit Tests and Assignments

Exit Option: To qualify for Certificate in
Computer Science and Engineering IoT

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

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Four Year Under Graduate Degree Program in Bachelor of Technology

Choice Based Credit System (Semester Pattern)

Branch: Computer Science & Engineering (IoT)

SEMESTER: II (GROUP-B)

Sr No	Course Code	Course Name	Teaching Scheme							Examination Scheme									
			Hours / Week			Group	Total Hrs/ Week	Credits		Theory						Practical			
			Lecture	Tutorial	P/D					Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		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	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
2	1SF02	Applied Physics	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
3	1SF03	Engineering Graphics	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
4	1SF04	Programming for Problem Solving	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
5	1SF05	Professional Communication Skills*	1	1	--	--	2	2		--	--	--	50	50	25	--	--	--	--
6	1SAKNX01	Multimedia and Web Designing	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
7	1SF06	Design Thinking **	1	--	--	--	1	1					50	50	25	--	--	--	--
Practicals																			
8	1SF07	Applied Physics Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
9	1SF08	Engineering Graphics Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
10	1SF09	Programming for Problem Solving Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
11	1SAKNX02	Multimedia and Web Designing Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
12	1SF10	NSS/Sports/Yoga/Cultural/Community Service #	--	--	2	--	2	1		--	--	--	--	--	--	50	--	50	--
			15	1	10		26	21						600				250	
* Assessment will be based on Test and Assignments																Total		850	

** 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
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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																		
1	3SX01	Discrete Mathematics	2	--	--	BSC	2	2	3	60	30	10	100	40	--	--	--	--
2	3SX02	Analog & Digital Electronics	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
3	3SX03	Object Oriented Programming using Java	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
4	3SX04V	Communication & Industrial Network	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
5	3SXOE	OE-1	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--
6	3SX05	Engineering Economics*	2	--	--	EEMC	2	2	--	--	--	50	50	25	--	--	--	--
7	3SX06	Environmental Science**	2	--	--	VEC	2	2	--	--	--	50	50	25	--	--	--	--
Practicals																		
8	3SX07	Analog and Digital Electronics Lab	--	--	2	PCC	2	1	--	--		--	--	--	25	25	50	25
9	3SX08	Object Oriented Programming Lab	--	--	2	PCC	2	1	--	--		--	--	--	25	25	50	25
10	3SX09	Communication & Industrial Network Lab	--	--	2	PCC	2	1	--	--		--	--	--	25	25	50	25
11	3SX10	**CEP / FP	--	--	4	ELC	4	2	--	--		--	--	--	50	--	50	25
		Total	18		10		28	23					700	--			200	
															Total		900	

3SXOE-1: (A) Social Science (B) Human Resource Management (C) Industrial Management and Quality Control (IMQC)

* Assesment will be based on Internal Assessments.

** Assesment will be based on Field Visit and/or Assignments.

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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																		
1	4SX01	Digital Communication System & Signal Processing	3	--	--	PCC	3	3	3	60	30	10	100	40	--		--	--
2	4SX02	Microcontroller & Applications	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
3	4SX03	Data Structures & Algorithms	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
4	4SXMDM1	MDM-1	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--
5	4SXOE	OE-2	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--
6	4SX04	Introduction to IoT	2	--	--	VSEC	2	2	3	60	30	10	100	40	--	--	--	--
7	4SX05	Entrepreneurship & Project Management**	2	--	--	EEMC	2	2	--	--	--	50	50	25	--	--	--	--
Practicals																		
8	4SX06	Digital communication system & signal processing lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
9	4SX07	Microcontroller & Applications lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
10	4SX08	Data Structures & Algorithms lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
11	4SX09	Android Application Development Lab	--	--	2	VSEC	2	1	--	--	--	--	--	--	25	25	50	25
		Total	19	--	8		26	23					650				200	
4SXOE-2:- (A) Intellectual Property Rights (B) Introduction to Cyber Law (C) Fundamentals of Agricultural Economics															Total		850	

** Assesment will be based on Internal Tests and Assignments

Exit Option: Two suitable skill-based courses (excluding from list of courses undertaken in First to Fourth semesters) to qualify for Diploma

Title	Credit
Two relevant MOOC/NPTEL courses as decided by BOS	8
OR	
1. Internship (Min 120 hrs)	8

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Branch :Computer Science & Engineering (IoT)

SEMESTER: V																			
Sr No	Course Code	Course Name	Teaching Scheme						Examination Scheme										
									THEORY								PRACTICAL		
			Hours / Week			Group	Total Hours /Week	Credits	Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks	
			Lecture	Tutorial	P/D						Max. Marks MSE/	Max. Marks TA			Int.	Ext.			
Theory																			
1	5SX01	Smart Sensors & Actuators	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
2	5SX02	Operating System using C++	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
3	5SX03	Embedded System & RTOS	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
4	5SX04	PEC1	2	--	--	PEC	2	2	3	60	30	10	100	40	--	--	--	--	
5	5SX05	PEC2	2	--	--	PEC	2	2	3	60	30	10	100	40	--	--	--	--	
6	5SXMDM2	MDM-2	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--	
7	5SXOE	OE-3	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--	
Practicals																			
8	5SX06	Smart Sensors & Actuators Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
9	5SX07	Operating System Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
10	5SX08	Embedded System & RTOS Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
		Total	19	--	6		25	22					700				150		
															Total		850		

5SX04PEC-1 :-5SX04PEA - Introduction to Cyber Security5SX04PEB- Cryptography & Network Security5SX04PEC- Ethical Hacking

5SX05PEC-2 :-5SX05PEA- Satellite Internet of Things5SX05PEB - Wireless Communication5SX05PEC- Digital System Design

OE-3 :- (A) Waste to Energy (B) Aptitude for Engineers (C) Farming System in Agriculture

Branch :Computer Science & Engineering (IoT)

Title	Credits
Two relevant MOOC/NPTEL courses as decided by BOS	8
OR	
1. Internship (Min 120 hrs)	8

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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																		
1	7SX01	Human Machine Interaction	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
2	7SX02	PEC5	3	--	--	PEC	3	3	3	60	30	10	100	40	--	--	--	--
3	7SX03	PEC6	3	--	--	PEC	3	3	3	60	30	10	100	40	--	--	--	--
4	7SX04	Computer Vision	2	--	--	VSEC	2	2	3	60	30	10	100	40	--	--	--	--
5	7SXMDM4	MDM-4	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--
Practicals																		
7	7SX05	Human Machine Interaction lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
8	7SX06	Computer Vision Lab	--	--	2	VSEC	2	1	--	--	--	--	--	--	25	25	50	25
9	7SX07	Major Project	--	--	12	ELC	12	6	--	--	--	--	--	--	100	100	200	100
		Total	14	--	16		30	22					500				300	
															Total		800	

7SX02PEC-5 :-
7SX03PEC-6 :-

7SX02PEA- Natural Language Processing (NLP)
7SX03PEA- Big Data Analytics 7SX03PEB Deep Learning

7SX02PEB- Data Mining
7SX03PEC Augmented Reality/Virtual Reality

7SX02PEC- Block Chain

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SEMESTER: VIII																		
Sr No	Course Code	Course Name	Teaching Scheme						Eaamination 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.	Eat.		
Theory																		
1	8SX01	Industry 4.0 & IoT Application #	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
2	8SX02	PEC7 #	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
Practicals																		
3	8SX03	Internship/Research Internship /OJT/ Apprenticeship	--	--	24	ELC	24	12	--	--	--	--	--	--	150	150	300	150
		Total	6		24		30	18					200				300	
															Total		500	

#:- Mode of Teaching will be Online for Theory

8SX02PEC-7 :- 8SX02PEA- Pattern Recognition

8SX02PEB- Business Intelligence & Analytics

8SX02PEC- Fundamentals of Quantum Computing

Sem	I	II	III	IV	V	VI	VII	VIII	Total
Credit	21	21	23	23	22	22	22	18	172

MDM and SM BASKETS OF COURSES FOR ALL PROGRAMS WITHOUT EXCEPTIONS

Department	MDM Track/ Double Minor	Code, Subject in Sem III	Code, Subject in Sem IV and Exception	Code, Subject in Sem V and Exception	Code, Subject in Sem VI and Exception	Code, Subject in Sem VII and Exception	Code, Subject in Sem VIII
AIDS	Track 1: Artificial Intelligence		4SAMDM1: Artificial Intelligence and Expert Systems	5SAMDM2: Applied Artificial Intelligence	6SAMDM3: Generative Artificial Intelligence	7SAMDM4: Safe and Responsible Artificial Intelligence Systems	
	Track 2: Data Science		4SAMDM5: Programming for Data Science	5SAMDM6 Business Intelligence and Analytics	6SAMDM7 Data Engineering	7SAMDM8 Ethics in Data Science	
	Double Minor: Advanced Programming	3SASM: Advanced Programming for Data Science	4SASM: Advanced Java Programming	5SASM: Mobile Application Development	6SASM: Introduction to Gaming	7SASM: Introduction to Software Development Platform (GitHub)	8SASM: Databases and SQL for Data Science
Civil	Track 1: Civil Engineering		4SCMDM1: Introduction to Environmental Engineering	5SCMDM2: Introduction to Water Resource Engineering	6SCMDM3: Introduction to Transportation Engineering	7SCMDM4: Basics of Structural Analysis	
	Track 2: Construction Technology		4SCMDM5: Building Planning	5SCMDM6: Construction Materials	6SCMDM7: Basics of Surveying	7SCMDM8: Basics of Geotechnical Engineering	
	Double Minor: Construction Management and Environmental Engineering	3SCSM: Environmental Pollution and Control	4SCSM: Water Treatment Engineering	5SCSM: Waste Water Treatment Engineering	6SCSM: Project Management and Planning	7SCSM: Construction Material Management	8SCSM: Construction Quality Management
	Track 1: CSE		4SKMDM1: Fundamentals of Data Structures	5SKMDM2: Introduction to Algorithms	6SKMDM3: Database Management System	7SKMDM4: Basics of Enterprise Resource Planning	

CSE	Track 2: Software Engineering		4SKMDM5: Software Requirements Engineering	5SKMDM6: Software Architecture	6SKMDM7: Software Project Management	7SKMDM8: Software Testing and Quality Assurance	
	Double Minor: Web Technology	3SKSM: Introduction of HTML	4SKSM: Javascript	5SKSM: Web Engineering	6SKSM: Cloud Technology	7SKSM: Distributed Database	8SKSM: User Experience Design
EXTC	Track 1: Electronics and Communication Engineering		4SEMDM1: Electronic Instrumentation	5SEMDM2: Electronic Devices and Circuits	6SEMDM3: Analog and Digital Communication	7SEMDM4: Electronic Circuit Design	
	Track 2: Telecommunication Engineering		4SEMDM5: Basic Electronic Communication Systems	5SEMDM6: Introduction to Wireless Communication	6SEMDM7: Introduction to Mobile Computing	7SEMDM8: Satellite and Optic Fiber Communication	
	Double Minor: Embedded System	Fundamentals of Digital Electronics	4SESM: Digital System Design	5SESM: Introduction to Microprocessors	6SESM: Microcontroller and Applications	7SESM: Advanced Microcontrollers	8SESM: Embedded System and RTOS
IT	Track 1: Information Technology		4SNMDM1: Data Transmission and Information Technology	5SNMDM2: Data Communication Networks	6SNMDM3: E-Commerce	7SNMDM4: Management Information Systems	
	Track 2: Cyber Security		4SNMDM5: Introduction to Cyber Security	5SNMDM6: Fundamentals of Cryptography	6SNMDM7: Basics of Ethical Hacking	7SNMDM8: Blockchain Technology	
	Double Minor: Information Processing	3SNSM: Fundamentals of Information Technology	4SNSM: Database Processing	5SNSM: Network Processing	6SNSM: Data Mining and Warehousing	7SNSM: Data Visualaization	8SNSM: Big Data Processing
MECH	Track 1: Mechanical Engg		4SMMDM1: Energy Engineering	5SMMDM2: Automobile Engineering and Electric Vehicles	6SMMDM3: Industrial Engineering	7SMMDM4: Industrial Automation	
	Track 2: Robotics & Automation Engg		4SMMDM5: Mechatronics	5SMMDM6: Rapid Prototyping	6SMMDM7:Automation Engineering	7SMMDM8:Robotics & Industrial Application	

	Double Minor: Manufacturing Techniques	3SMSM : Manufacturing Processes -I	4SMSM : Manufacturing Processes- II	5SMSM : Modern Manufacturing Techniques	6SMSM : Production Management	7SMSM : Productivity Techniques	8SMSM : Computer Integrated Manufacturing
CSE(IOT)	Track 1: Internet of Things		4SXMDM1: Fundamentals of IoT	5SXMDM2: Sensors and Actuators	6SXMDM3: Single Board Computers	7SXMDM4: Industrial Internet of Things	
	Double Minor: Industrial IoT	3SXSM: Introduction to Internet of Things	4SXSM: Industrial Sensors and Actuators	5SXSM: Edge and Fog Computing	6SXSM: Embedded System for Internet of Things	7SXSM: Application of IoT in healthcare and Agriculture	8SXSM: Internet of Things Security

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	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		
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 Telecommunicati on 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 Healthcare 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	Advanced Machine Learning	V
	3	6SNH	Advanced Artificial Intelligence	VI
	4	7SNH	Advanced Deep Learning	VII
	5	8SNH1	Advanced Speech and Natural Language Processing	VIII
	6	8SNH2	Minor Project	VIII
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

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
HONOURS BASKET (Dept. of Computer Science and Engineering(IoT))

Semester	Course Code	Course Name	Teaching Scheme						Examination Scheme										
			Hours / Week			Honours Applicable to	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	4SXH	IoT Architectures and Protocols	3	--	--	Industrial Internet of Things	3	3	3	60	30	10	100	40	--	--	--	--	
V	5SXH	Internet of Things Security	3	--	--	Industrial Internet of Things	3	3	3	60	30	10	100	40	--	--	--	--	
VI	6SXH	Embedded Systems and IoT	3	--	--	Industrial Internet of Things	3	3	3	60	30	10	100	40	--	--	--	--	
VII	7SXH	Machine Learning For IoT	3	--	--	Industrial Internet of Things	3	3	3	60	30	10	100	40	--	--	--	--	
VIII	8SXH1	Data Science in IoT	3	--	--	Industrial Internet of Things	3	3	3	60	30	10	100	40	--	--	--	--	
Practicals																			
VIII	8SXH2	Minor Project	--	--	6	Industrial Internet of Things	6	3	--	--	--	--	--	--	50	50	100	50	

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: Computer Science & Engineering (IoT)
SEMESTER: I (GROUP-B)

Sr No	Course Code	Course Name	Teaching Scheme							Examination Scheme									
			Hours / Week			Group	Total Hrs/ Week	Credits		Theory						Practical			
			Lecture	Tutorial	P/D					Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max Marks		Total	Min Passing Marks
												Max Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																			
1	2SF01	Applied Mathematics - II	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
2	2SF02	Applied Chemistry	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
3	2SF03	Basics of Electrical Engineering	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
4	2SF04	Biology for Engineers	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
5	2SF05	Universal Human Values*	2	--	--	--	2	2		--	--	--	50	50	25	--	--	--	--
6	2SAEKNX01	Introduction to Python	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
7	2SF06	Indian Knowledge Systems *	2	--	--	--	2	2		--	--	--	50	50	25	--	--	--	--
Practicals																			
8	2SF07	Applied Chemistry Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
9	2SF08	Basic of Electrical Engineering Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
10	2SAEKNX02	Introduction to Python Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
11	2SF09	Workshop/Digital Fabrication Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
		Total	17		8		25	21						600				200	
* Assessment will be based on Unit Tests and Assignments																Total		800	

* Assessment will be based on Unit Tests and Assignments

Exit Option: To qualify for Certificate in
Computer Science and Engineering IoT

Title	Credit
Two relevant MOOC/NPTEL courses as decided by BOS	4
AND	
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.	6
Unit VI	Integral Calculus III: Triple integration, Transformation to spherical polar coordinates, Volume of solid by triple integration.	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
2SF02	Applied Chemistry (AC)	03	00	00	03

Course Prerequisites:

1. Fundamentals of redox reactions and electrochemistry.
2. Knowledge of chemical reaction.
3. Basic knowledge of qualitative and quantitative analysis.

Course Learning Objectives:

1. To enable students to manufacture functional materials on the basis of chemical forces.
2. To provide the knowledge of characteristics and application of cement, fuels and lubricants.
3. To impart knowledge of characteristics of water and methods for the removal of impurities from water.
4. To summarize students with operating principles, working processes and applications of energy conversion, storage devices and also with corrosion and corrosion control methods.

Course Outcomes:

Students will be able to

1. Apply the knowledge of chemical forces to design functional materials.
2. Apply the knowledge of useful engineering materials such as cement and lubricant.
3. Describe properties of hard water, its disadvantages and various processes for removal of water impurities.
4. Describe properties of chemical fuels, analysis methods and its applications.
5. Identify various types of corrosion, mechanism and control methods to protect metals.
6. Describe operating principles working processes and applications of energy conversion and storage devices.

	Subject: Applied Chemistry (AC)	L
UNIT I	Engineering Materials and Their Properties: Introduction, Classification of Engineering materials, Chemical Forces in materials- Primary forces and Secondary forces, Properties of materials, Role of chemical forces in alteration of magnitude of the properties such as Density, Melting Point, Solubility, Strength, Stiffness, Elasticity and Plasticity. Real life examples where these interactions played major role to enhanced their properties: - vulcanized rubber and plasticized PVC.	6
UNIT II	Cement Engineering: Introduction, Types of cement, Raw materials used for the manufacturing of Portland cement, Manufacturing of Portland cement by wet process. Functions of chemical constituents of cement: Tri-calcium aluminate, Tri-calcium silicate, Di-calcium silicate, Tetra-calcium alumino ferrite, magnesia, sulphur trioxide, iron oxide, alkalis, free lime, alumina. Physical Properties of Portland cement: Heat of hydration, Fitness, Soundness, Strength, Setting and hardening.	6

UNIT III	Water Characteristics & Their Effects on Boiler: Introduction. Characteristics of water: - Hardness, pH, alkalinity, DO, TDS and Chloride ion concentration. Disadvantages of characteristics of water in Boiler: - Scale & sludge, Priming & Foaming, Caustic embrittlement and Boiler corrosion. Methods of analysis: - EDTA method, Iodometric method and conductometric titration. Methods for removal of impurities: Sedimentation, Neutralization, Zeolite process, De-Ionization process and Reverse osmosis. Calculation of hardness by data obtained from EDTA and zeolite processes.	8
UNIT IV	Fuel and Lubricant: Introduction, Types of Fuels, Properties of Fuels: Ignition Temperature, Calorific value. Types of calorific value. Solid Fuel: Coal, classification of coal, analysis of coal: ultimate analysis. Liquid Fuel: Crude oil, Fractional distillation of crude oil, Properties of liquid fuel: Octane number and Cetane number. Gaseous Fuel: Hydrogen gas, economy of hydrogen gas as fuel. Lubricants: Introduction, classification of lubricants, properties of lubricants, uses of lubricants.	7
UNIT V	Energy Sources & Storage Devices: Introduction, Principle of batteries, Types of Batteries: Primary Batteries-Dry Cell, Mercury cell, Secondary Batteries-NICAD (Ni-Cd) battery, Lithium-ion battery. Green energy sources: Photo voltaic cell (Solar Cell), Fuel Cell.	6
UNIT VI	Corrosion & Its Control: Introduction, Types of corrosion: Dry and Wet corrosion, Mechanism of dry and wet corrosion, Factor affecting corrosion: Nature of metal and nature of environment, Types of wet corrosion- Pitting corrosion, waterline corrosion, stress and galvanic corrosion, Methods of corrosion control- Cathodic protection: Sacrificial anode and impressed current method, Protective coating: Galvanizing and Tinning process.	7
	Total	40

Text Books:

1. Textbook of Engineering Chemistry by Dara S S and Umare S S.
2. Engineering Chemistry by Jain & Jain (Dhanpat Rai & Sons)
3. Engineering chemistry by S. S. Dara, S. Chand Publication
4. Engineering & Technology by Shashi Chawala, Dhanpat Rai & Sons.
5. Engineering Chemistry by K. Sesha Maheswaramma, Mridula Chugh, Pearson.

Reference Books:

- 1) Engineering Chemistry: Fundamentals and Applications by Shikha Agarwal.
- 2) Chemistry for Engineers by B K Ambasta
- 3) Engineering Chemistry by N Krishnamurthy and P Vallinayagam.
- 4) Engineering & Technology Vol-I & II-by Rajaram& Kuriocose.
- 5) Engineering Chemistry by Prasanta Rath (Cengage learning).

B.Tech. First Year

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.

Unit No.	Content: Basics of Electrical Engineering	No. of Lectures Required
1	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
2	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
3	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
4	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
5	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
6	Single phase Transformer: Single-phase transformer construction and working (Ideal and practical), Types of Transformer, 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

Recommended 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 Semester (Mechanical Engg)

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

Course Prerequisites: 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: 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	04

	monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).	
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: 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)	5

	and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas.	
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 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 (SarvabhaumVyawastha)- from family to worldfamily!	5
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:

- 1) 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) Sussan 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 Nagraj, 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.
- 8) Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi STantra Shodh, Amravati.
- 9) E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
- 10) M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human

Values), Eastern Economy Edition, Prentice Hall of India Ltd.

11) B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.

12) B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow.
Reprinted 2008.

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 / Second Semester (All branches)

Course Code	Course Title	L	T	P	C
2SF06	Indian Knowledge System	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: Indian Knowledge System	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 Aryabhatta, 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, Microbiology and Paracitology, Communicable diseases and	5

	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.	
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 Books:

- 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 (All Branches)

Course Code	Course Title	L	T	P	C
2SF07	Applied Chemistry Lab	00	00	02	01

Course Prerequisites:

1. Basic knowledge of qualitative and quantitative analysis.
2. Basic knowledge of titrations-based experiments.
3. Knowledge of chemistry lab precautions, prohibitions and safety aids.

Course Learning Objectives:

1. To impart skills of quantitative and qualitative analysis.
2. To provide knowledge of synthesis of co-crystal.
3. To familiar students with some fundamental of chemistry experiments.

Course Outcomes:

Students will be able to

1. Determine the properties of water, chemical fuel, lubricant and cement based on laboratory techniques.
2. Synthesis of co-crystals and determination of its melting point.
3. Handle some important analytical instruments.

	Subject: Applied Chemistry Lab
Expt. 1	Preparation of Paracetamol and oxalic acid co-crystal and determination of its melting point.
Expt. 2	Determination of hardness of water by EDTA method.
Expt.3	Determination Alkalinity (NaOH and Na ₂ CO ₃) in given water sample
Expt.4	Determination of chlorine in water sample. (Iodometry)
Expt.5	Determination of Dissolved Oxygen in Water Sample.
Expt.6	Determination of pH of unknown sample by pH meter
Expt.7	Determination of H ⁺ ion concentration by conductivity meter.
Expt.8	Determination of % CaO in given cement sample.
Expt.9	Determination of % of moisture in coal sample by proximate analysis.
Expt.10	Determination of viscosity of lubricating oil by Redwood viscometer No.1
Expt.11	Determination of viscosity of lubricating oil by Redwood viscometer No. 2
Expt.12	Determination of flash point of lubricating oil by Abel's apparatus
Expt.13	Determination of acid value of lubricating oil.
Expt.14	Determination of mass of Zn coating on galvanized article

	Total hours for the completion of minimum nine (09) experiments
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Text Books:

1. Experiments and Calculations in Engineering Chemistry by S. S. Dara, S. Chand & Company LTD.
2. Engineering Chemistry Practical Book by Dipika Jaspal and Arti Malviya.
3. Laboratory Manual on Engineering Chemistry by S. K. Bhasin and Sudha Rani, Dhanpat Rai Publishing Company.

Reference Books:

- 1) Experiments In Engineering Chemistry by Payal B Joshi.
- 2) Principles of Analytical Chemistry by Miguel Valcarcel

B.Tech. First Year

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

Prerequisite: Nil

Course Learning Objectives:

1. To analyse DC Circuits.
2. To analyse 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 parameters 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 parameters 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 the 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. First Year (All Branches)

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 Engineering (Mechanical Engg)

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

Course Pre-requisites: Nil

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, forming processes and joining processes
3. To make the students well versed with basic electrical, electronics and computer components.
4. 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

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: Computer Science & Engineering (IoT)

SEMESTER: II (GROUP-B)

Sr No	Course Code	Course Name	Teaching Scheme							Examination Scheme									
			Hours / Week			Group	Total Hrs/ Week	Credits		Theory						Practical			
			Lecture	Tutorial	P/D					Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		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	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
2	1SF02	Applied Physics	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
3	1SF03	Engineering Graphics	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
4	1SF04	Programming for Problem Solving	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
5	1SF05	Professional Communication Skills*	1	1	--	--	2	2		--	--	--	50	50	25	--	--	--	--
6	1SAKNX01	Multimedia and Web Designing	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
7	1SF06	Design Thinking **	1	--	--	--	1	1					50	50	25	--	--	--	--
Practicals																			
8	1SF07	Applied Physics Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
9	1SF08	Engineering Graphics Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
10	1SF09	Programming for Problem Solving Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
11	1SAKNX02	Multimedia and Web Designing Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
12	1SF10	NSS/Sports/Yoga/Cultural/Community Service #	--	--	2	--	2	1		--	--	--	--	--	--	50	--	50	--
			15	1	10		26	21						600				250	
* Assessment will be based on Test and Assignments																Total		850	

** Assessment will be based on Case Studies and Assignments

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

Prof. Ram Meghe Institute of Technology and Research, Badnera
(An Autonomous Institution)
Four Year Under Graduate Program in Bachelor of Technology (Information
Technology)
Choice Based Credit System (Semester Pattern)
Syllabus of Bachelor of Technology (Information Technology)
Semester I

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

Course Pre-requisites:

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 (Hrs.)
UNIT-1	Differential Calculus I: Successive differentiation, Leibnitz's theorem on the nth derivative of a product, Indeterminate forms.	7
UNIT-2	Differential Calculus II: Partial differentiation, Euler's theorem on homogeneous function.	6
UNIT-3	Jacobian : Jacobians of explicit functions and implicit function with properties, functional dependence, maxima and minima of function of two independent variables.	7
UNIT-4	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-5	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-6	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: Applied Physics (AP)	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 Semester (Mechanical Engg)

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

Course Pre-requisites:

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: 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 Semester (All Branches)

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

Course Prerequisites: Basic Computer Knowledge, 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

	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 (PCS)	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: Professional Communication Skills (PCS)	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. (Information Technology)

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

Course Pre-requisites: 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

Unit	Subject: 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 Multimedia” (Pearson Education)
2. Roy Uttam K: Web Technologies, Oxford University Press, 2010.

References:

1. Rajan Parekh “Principles of Multimedia” (Tata McGraw-Hill)
2. S.J.Gibbs & D.C.Tsichritzis “Multimedia Programming”, Addison Wesley 1995
3. Mohler J.L. & Duff J.M.: Designing 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 (DT)	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: 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 likes vernier calliper, 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: 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 it's 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. Shrinivas Rao: Engineering Physics Practical, Laxmi Publication.

Reference Books:

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

B.Tech. First Semester (Mechanical Engg)

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

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 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

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

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 **ISF04 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. (Information Technology)

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 practical's

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 Valet

Any 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: 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

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 :Computer Science & Engineering (IoT)

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																		
1	3SX01	Discrete Mathematics	2	--	--	BSC	2	2	3	60	30	10	100	40	--	--	--	--
2	3SX02	Analog & Digital Electronics	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
3	3SX03	Object Oriented Programming using Java	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
4	3SX04V	Communication & Industrial Network	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
5	3SXOE	OE-1	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--
6	3SX05	Engineering Economics*	2	--	--	EEMC	2	2	--	--	--	50	50	25	--	--	--	--
7	3SX06	Environmental Science**	2	--	--	VEC	2	2	--	--	--	50	50	25	--	--	--	--
Practicals																		
8	3SX07	Analog and Digital Electronics Lab	--	--	2	PCC	2	1	--	--		--	--	--	25	25	50	25
9	3SX08	Object Oriented Programming Lab	--	--	2	PCC	2	1	--	--		--	--	--	25	25	50	25
10	3SX09	Communication & Industrial Network Lab	--	--	2	PCC	2	1	--	--		--	--	--	25	25	50	25
11	3SX10	**CEP / FP	--	--	4	ELC	4	2	--	--		--	--	--	50	--	50	25
		Total	18		10		28	23					700	--			200	
															Total		900	

3SXOE-1: (A) Social Science (B) Human Resource Management (C) Industrial Management and Quality Control (IMQC)

* Assesment will be based on Internal Assessments.

** Assesment will be based on Field Visit and/or Assignments.

B.Tech Third Semester CSE (IOT)

Course Code	Course Title	L	T	P	C
3SX01	Discrete Mathematics	02	00	00	02

Course Pre-requisite: Basic knowledge of Mathematics

Course Learning Objectives:

- 1 Learn basic terminology, formal logic, proofs, sets, relations, functions.
2. Use formal logic proof and logical reasoning to solve problems.
3. Learning algebraic structures, graphs, trees and apply these concepts to various areas of Computer Science.

Course Outcomes:

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

Sr. No.	CO ID	Description
1	3ST01.1	Define logical connectives and normal forms.
2	3ST01.2	Explain predicates, deductive logic and examine the solution based on logical inference.
3	3ST01.3	Make use of properties of relations and identify equivalence and partial order relations.
4	3ST01.4	Determine Semi-group and monoids, and Product and Quotient of Groups.
5	3ST01.5	Assess algebraic structure for a given mathematical problem.
6	3ST01.6	Inspect different traversal methods for trees and graphs.

	Course Name: Discrete Mathematics	Lect Hrs.
Unit-1	Mathematical Logic: Statements & Notation, Connectives, Equivalence Formula, Duality Law, Tautological Implication, Normal forms.	05
Unit-2	Theory of inference: The theory of inference for the statement calculus, Validity using truth tables, Predicate calculus, Inference theory of the Predicate Calculus.	05
Unit-3	Set Theory: Basic concepts, Venn Diagrams, Representation of Discrete Structure, Relation and ordering, Partial Ordering, Functions.	05
Unit-4	Algebraic Structures: Semi-groups and Monoids, Product & Quotients of semi-groups, Polish expression, Groups, Product and Quotients of Groups.	05
Unit-5	Lattice & Boolean Algebra: Boolean algebra, Functions on Boolean Algebra, Boolean Functions as Boolean Polynomials, Minimization of Boolean Functions.	05
Unit-6	Graphs Theory: Basic concepts, Paths, Reachability & connectedness, Matrix representation of graphs, Trees: tree searching, undirected trees.	05
	Total	30

Text Book:

J.P.Trembley and R.Manohar, "Discrete Mathematical Structures with application to Computer Science" 1988 (MCG)

References:

1. C.L.Liu : “Combinational Mathematics” Mc Graw Hill, 1988.
2. Stanant “Discrete Structure” Prentice Hall.
3. C.L.Liu “Element of Discrete Mathematics” Second Edition McGrawHill, 1987.
4. Norman L.Biggs “Discrete Mathematics” Second Edition, Oxford.

B.Tech Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SX02	Analog and Digital Electronics	03	00	00	03

Course Pre-requisite: Nil

Course Learning Objectives:

1. To understand the operation of transistor and to analyze linear and non-linear applications of Op-amp.
2. To study the working of IC 555 and its applications.
3. To study basic concepts of Boolean algebra, minimization techniques for Boolean expression and formal procedures for the analysis and design of sequential circuits.

Course Outcomes:

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

Sr. No	CO ID	Description
1	3SX02.1	Comprehend the knowledge of basic concepts and performance parameters of Op-Amp.
2	3SX02.2	Explain the Op-Amp Fundamentals and applications.
3	3SX02.3	Comprehend the knowledge of waveform generators using IC 555, A to D & D to A converter
4	3SX02.4	Understand number systems, binary arithmetic, and logic gate functions with truth tables.
5	3SX02.5	Use Boolean algebra to solve logic functions and implement minimization techniques using K-maps
6	3SX02.6	Comprehend the knowledge of sequential circuit building blocks and specific sequential circuits

	Course Name: Analog and Digital Electronics	Lect Hrs.
Unit-1	Bipolar Junction Transistors: Operation of PNP and NPN transistor, CB, CE and CC configurations with characteristics, DC load line, Transistor biasing methods, effect of negative feedback, transistor as a switch.	07
Unit-2	Operational Amplifier: Block diagram of Op-Amp (ICuA741), Op-Amp parameters, Inverting and noninverting amplifiers, Integrator and differentiator, comparator, zero-crossing detector, Schmitt trigger.	07
Unit-3	Timer IC and Data Converters: Introduction to IC 555, IC 555 based design of Astable, Mono-stable multi-vibrator, Successive Approximation based A to D Converter. R-2R Ladder based D to A convertor.	07

Unit-4	Number systems, Codes and Logic Gates: - Number system and their conversions, BCD codes, Octal codes, Hexadecimal codes, Gray Code, Addition and Subtraction using 1's and 2's complement. Basic Binary Logic Gates and Universal Gates.	07
Unit-5	Boolean Algebra and Minimization Techniques: - Boolean Algebra, Demorgan's Theorem, Simplifications using Boolean Algebra, SOP and POS form, K-map representation and minimization of logical functions up to 4 variables, don't care conditions.	07
Unit-6	Flip-flops, Registers and Counters: - S-R Flip-flops, J-K Flip-flops, Master slave J-K Flip-flops, D-type Flip-flops, T-type Flip-flops. Universal Shift Register. Basic principle of Asynchronous and synchronous counter. (No design numerical expected)	07
	Total	42

Text Book:

1. Milliman and Halkias: Integrated Electronics, Tata McGraw Hill, New Delhi.
2. R.A. Gayakwad, "OP-AMP and Linear Integrated Circuits", Prentice Hall/ Pearson Education Publications.
3. R P Jain, "Modern Digital Electronics", TMH. M
4. Morris Mano and M.D.Ciletti, "Digital Design", Pearson Education.

References:

1. K R Botkar "Integrated Circuits" Khanna Publications.
2. Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley Intl. Publication. 2. Paul Horowitz, W. Hill, "The art of Electronics", Cambridge Publications
3. Wakerly, "Digital Design: Principles and Practices", 3rd edition, Pearson Education, 2004.
4. Charles H. Roth, "Fundamentals of Logic Design", 4th Edition, Jaico Publication
5. Lee S.C, "Digital Circuits and Logic Design", PHI.

B.Tech Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SX03	Object Oriented Programming Using Java	03	00	00	03

Course Pre-requisite: 2SAEKNX01 Introduction to Python

Course Learning Objectives:

1. Able to apply Java programming concepts, including classes, objects, inheritance, interfaces, and multithreading, to develop robust applications.
2. Apply knowledge of arrays, strings, packages, and visibility control to create modular and efficient programs.
3. Understand and implement control structures, exception handling, and multithreading.

Course Outcome:

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

Sr. no.	CO ID	Description
1.	3SX03.1	Understand the evolution, features, and structure of Java programming language and its execution environment including JDK, JRE, and JVM.
2.	3SX03.2	Discuss the concepts of variables, data types, operators, and control structures to write basic Java programs using decision-making and looping constructs.
3.	3SX03.3	Understand and apply the principles of object-oriented programming such as classes, objects, methods, constructors, and static members in Java.
4.	3SX03.4	Understand the use of arrays and strings, and inheritance mechanisms including method overriding, super, this, abstract classes, and final keywords.
5.	3SX03.5	Understand and implement interfaces and packages for achieving abstraction and modularity in Java programs.
6.	3SX03.6	Apply exception handling mechanisms and basic multithreading concepts to develop robust and concurrent Java applications.

	Subject: Object Oriented Programming using Java	Lect Hrs.
UNIT I	Java Fundamentals and Programming Basics Java Evolution: Evolution and Features of Java, Java Environment: JDK, JRE, JVM, Structure of a Java Program	7

	Tokens: Keywords, Identifiers, Variables and Data Types, Operators and Expressions, Command Line Arguments, Simple Java Programs	
UNIT II	Control Statements and Access Modifiers Decision-Making Statements: if, if-else, Nested if, else-if ladder, switch Looping Constructs: for, while, do-while, break, continue Access Modifiers: public, private, protected, default	7
UNIT III	Classes, Objects, and Methods Defining Classes and Creating Objects, Instance and Static Variables/Methods, Method Overloading, Constructors, Use of this keyword, Introduction to Wrapper Classes.	7
UNIT IV	Arrays, Strings, and Inheritance Array: One-dimensional and Two-dimensional Arrays. String: String Handling using String, String Builder, String Buffer Inheritance: Concept and Types, Method Overriding, super and this keywords, Final Methods and Classes, Abstract Classes and Methods	7
UNIT V	Interfaces and Packages Interfaces: Defining and Implementing Interfaces, Multiple Inheritance via Interfaces Packages: Using Java API Packages, Creating User-defined Package	7
UNIT VI	Exception Handling and Multithreading Exception Handling: try-catch, finally, throw, throws, Built-in Exceptions and Multiple Catch Blocks Multithreading: Introduction to Threads, Creating Threads using Thread class and Runnable interface, Thread Lifecycle, Thread Priorities	7

Total: 42 hrs

Text Books:

1. Programming with Java A Primer, Fourth Edition- E. Balguruswami (McGraw Hill)
2. Let Us Java 4th edition –Yasvant Kanetkar

Reference Books:

1. Java - The Complete Reference 11th edition - Herbert Schildt (McGraw Hill)

B.Tech. Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SX04V	Communication & Industrial Network	03	00	00	03

Course pre-requisite: Nil

Course Objectives:

1. To understand the fundamental principles of data communication & industrial networks, including protocol architectures, network types, and connecting devices.
2. To analyze data link control protocols and industrial communication technologies used in automation, control systems, and IoT applications.
3. To evaluate real-time networking challenges, quality of service techniques, and security threats in industrial network environments.

Course Outcomes:

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

Sr. no.	CO ID	Description
1	3SX04.1	Describe the layered architecture of OSI and TCP/IP models and classify different types of networks network connecting devices, industrial networks in automation and control system.
2	3SX04.2	Analyze flow control and ARQ protocols to ensure efficient and error-free data transmission along with Multiple Access Techniques and Controlled Access Techniques.
3	3SX04.3	Analyze network layer addressing and functions including IPv4/IPv6, ARP, and network layer routing protocols.
4	3SX04.4	Evaluate routing algorithms and traffic control mechanisms for efficient data transmission & understand transport layer protocols
5	3SX04.5	Understand & compare industrial communication protocols and networking technologies.
6	3SX04.6	Analyze the performance challenges of real-time networking and apply QoS mechanisms to industrial data communication & Identify industrial network security threats.

	Course Name: Communication & Industrial Network	Lect Hrs.
UNIT I	Introduction to Data Communication & Industrial Network: A brief history of Internet, Protocols and Standards, Need for Protocol Architecture, OSI Reference Model, Overview of TCP/IP architecture, Addresses in TCP/IP. Types of Networks: LAN, MAN, WAN. Network connecting Devices: Hubs, Repeater, Bridges, Switches, Routers, Gateways. Network Topology: Mesh, Bus, Tree, Ring, Star. Overview of industrial networks in automation and control system. Manufacturing,	8

	process control, SCADA system, Industrial network applications in IoT.	
UNIT II	Data Link Control Protocols: Need for Flow control, Stop and Wait Flow Control, Sliding Window Flow Control, Stop and wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, Transmission efficiency of ARQ protocols. Contention Techniques: CSMA, CSMA/ CD (IEEE 802.3), CSMA/CA. Con-trolled Access Techniques: Polling, Token Passing. Multiple Access Control Protocols: Token Bus (IEEE 802.3) and Token Ring protocols (IEEE 802.5)	7
UNIT III	Network Layer Logical Addressing: Network layer Issues, IPV4 addresses, Class full addressing, Classless addressing (Problems expected), IPv4: Datagram, Fragmentation, Checksum, Address Resolution Protocol(ARP), IPv6 addresses, IPv6 Packet format, Comparison between IPv4 and IPv6. Network Layer Routing: Alternate routing in circuit switched network, Fixed Routing, Flooding, and Random Routing in Packet Switched networks	7
UNIT IV	Routing Algorithms and Transport layer: Dijkstra's Algorithm (Problems expected), Bellman Ford Algorithm (Problems expected). Traffic Control: Leaky bucket algorithm, Token bucket algorithm. Transport Layer: User datagram protocol (UDP), Transmission control protocol.	6
UNIT V	Industrial Communication Protocols & Networking Technologies: Introduction to Modbus, Profibus, CAN, Device Net. Wired communication technologies- Industrial Ethernet and RS-485. Overview of Time-Sensitive Networking (TSN) and its importance in industrial automation.	7
UNIT VI	Real-Time Networking, Quality of Service (QoS) & Security in Industrial Network: Real-time networking challenges: Latency, jitter, and throughput. Techniques to ensure real-time data communication in industrial networks. QoS for industrial networks: Prioritization, traffic management & their applications. Security in Industrial Networks: Importance & common security threats in industrial networks- DDoS attacks and Malwares.	7
	Total	42

Text Book:

1. Alberto Leon-Garcia, Indra Widjaja, Communication Networks, McGraw-Hill
2. "Industrial Network Security: Securing Critical Infrastructure Networks for Smart Grid, SCADA, and Other Industrial Control Systems" by Eric D. Knapp and Raj Samani
3. Industrial Network by Gary. D. Anderson

Reference Books:

1. Nader F. Mir, "Computer and Communication Networks", Pearson Education, 2007.
2. "Industrial Ethernet: A Pocket Guide" by Perry S. Marshall
3. "Industrial IoT: Challenges, Design Principles, Applications, and Security" by Sabina Jeschke, Christian Brecher, and Houbing Song

B. Tech. Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SX05	Engineering Economics	02	00	00	02

Course Pre-requisites: Nil

Course Learning Objectives:

1. Study the concept of economics & Engineering Economics.
2. Understand the concept of time value of money and cash flow.
3. Discuss the evaluation of engineering alternatives, theory of cost & cost effectiveness.
4. Understand numerous depreciation analysis methods, different risk analysis methods to mitigate risks.

Course Outcomes:

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

1. Understand the scope of engineering economics with principles
2. Evaluate Time value of money
3. Compare and evaluate alternative engineering projects using appropriate economic metrics
4. Analyze costs associated with engineering projects and assess their impact on project feasibility.
5. Apply different depreciation analysis
6. Identify and mitigate risks associated with economic decision-making using sensitivity analysis and simulation techniques

	Subject: Engineering Economics	L (Hrs)
Unit-1	Subject Matter of Economics : Meaning of Economics, Principles of Engineering Economics , Macro Vs Micro Economics, Utility & Law of Diminishing Marginal Utility, Concepts of Demand & Supply & its Elasticity, Concept of Inflation & Economic policies	05
Unit-2	Basics of Engineering Economy: Time value of money and cash flow analysis, Interest rates and compounding, Discrete and continuous compounding, Future worth, present worth	05
Unit-3	Economic Comparison of Alternatives: Comparing projects with equal lives, Comparing projects with unequal lives, Rate of return and internal rate of return (IRR), Benefit-cost analysis	05
Unit-4	Cost Analysis: Classification of costs (fixed, variable, sunk), Cost estimation techniques. Break-even analysis	05
Unit-5	Depreciation and Replacement Analysis: Methods of depreciation (straight- line, sum-of-years-digits, etc.), Depreciation for tax purposes, Replacement analysis and economic life determination	05
Unit-6	Risk and Uncertainty Analysis: Sensitivity analysis, Monte Carlo simulation, Decision-making under uncertainty	05
	Total	30

Recommended Text books

1. "Engineering Economics and Costing," by Sasmita Mishra, Second Edition, PHI, 2010
2. "Principles of Microeconomics" N. G. Mankiw, 4 th edition, Pearson Education, 2017
3. "Engineering Economy" Sullivan, Wicks, and Koester, Prentice Hall Publication 11th Ed

Reference books

1. "Fundamentals of Engineering Economics" by Blank and Tarquin
2. "Economic Analysis for Engineering Design" by Riggs, Bodily, and Hartmann

3. "Cost and Management Accounting," by Dr. S. N. Maheshwari and Dr. S. K. Maheshwari

Term Work: 50 Marks

Marking Scheme:

1. Case studies (at least 2) – 10 Marks
2. Attendance – 10 Marks
3. Class Test (Internal) – 10 Marks
4. Assignment (2 Nos.) – 20 Mark

B.Tech. Third Semester CSE(IoT)

Course code	Course Title	L	T	P	C
3SX06	Environmental Science	02	00	00	02

Course Prerequisite: Nil

Course Learning Objectives:

1. The importance of Environmental Studies.
2. The need for renewable and non-renewable energy resources.
3. The components, structures and types of the ecosystem.
4. The Impact of different types of pollution.

Course Outcomes:

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

1. Understand the scope and importance of environmental studies.
2. Apply the knowledge of renewable and non-renewable energy resources.
3. Understand the concept of ecosystem.
4. Apply the knowledge of environmental pollution.
5. Understand the current environmental issues of India.
6. Understand the role of Information Technology in the environment and human health.

	Subject: Environmental Science	L
Unit-1	The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness.	05
Unit-2	Renewable and non-renewable resources: Natural resources and associated problems, Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Energy Resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies, Role of individual in conservation of natural resources.	05
Unit-3	Eco Systems: Concept of an ecosystem, structure and function of an ecosystem, Producers, consumers, decomposers, Food chains, food webs. Introduction, types, characteristic features, structure and function of the following ecosystems: Forest ecosystem, Grass land ecosystem, Desert ecosystem, Aquatic eco systems (ponds,	05

	streams, lakes, rivers, oceans, estuaries)	
Unit-4	Environmental Pollution: Definition, Causes, effects and control measures of: Air pollution, Water pollution, Noise pollution, role of an individual in prevention of pollution, Pollution Case Studies.	05
Unit-5	Current Environmental Issues in India: Water conservation-development of watersheds, Rain water harvesting and ground water recharge, Eutrophication and restoration of lakes, Conservation of wetlands, Ramsar sites in India. Climate Changes – Global warming, Acid rain, Ozone layer Deflection, Waste Management - Swachha Bharat Abhiyan.	05
Unit-6	Human population and the environment: Population explosion- family welfare program, Environment and human health, Human rights, Women and child welfare, Role of information technology in Environment and human health. Visit to environmental assets-river / forest / grassland / hill / mountain. Visit to a polluted site-urban/rural/industrial/agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hills slopes, etc (field work equal to 5 lecture works)	05
	Total	30

Text Book:

1. Textbook of Environmental studies by Erach Bharucha, UGC

References:

1. Fundamental concepts in Environmental Studies by D D Mishra, S Chand & Co Ltd
2. Environmental studies, Nidhi Dhawan, Kiran Bist by I.K. International House Pvt Ltd.

Term Work: 50 Marks

Marking Scheme:

1. Field Visit – 10 Marks
2. Attendance – 10 Marks
3. Class Test (Internal) – 10 Marks
4. Assignment (2 Nos.) – 20 Mark

B.Tech Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SX07	Analog and Digital Electronics Lab	00	00	02	01

Course Requisite: 1. 3SX02-Analog and Digital Electronics

Course Learning Objectives:

1. To impart the concepts of analog and digital electronics practically.
2. To learn the operation of various logic gates and their implementation using digital IC's.
3. To learn the realization of various combinational and sequential circuits.

Course Outcomes:

After successful completion of this course, students will be able to

Sr. No	CO ID	Description
1	3SX07.1	Use his/her understanding/knowledge of analog and digital electronics so as to design /conduct experimentation related to the given aim/objective
2	3SX07.2	Use equipment's/other concerned resources for conduction of experiments
3	3SX07.3	Interpret results, formulate findings, draw suitable conclusion and respond to inquiries, related to given experiment

List of Experiments:

Minimum 08-10 experiments should be conducted based on 3SX02 – Analog and Digital Electronics Syllabus

B.Tech Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SX08	Object Oriented Programming Lab	00	00	02	01

Course Pre-requisite: 3SX03 Object-Oriented Programming

Course Learning Objectives:

1. Design, implement, test, and debug simple programs in an object-oriented programming language using Java.
2. Design and test the implementation of Java programming concepts.

Course Outcomes:

After successful completion of this course, students will be able to -

Sr. No	CO ID	Description
1	3SX08.1	Use his/her understanding/knowledge of Object Oriented Programming using Java so as to develop computer program related to the given aim/objective.
2	3SX08.2	Use equipment's/other concerned resources for conduction of experiments.
3	3SX08.3	Interpret results, formulate findings, draw suitable conclusion and respond to inquiries, related to given experiment.

List of Experiments:

Minimum 08-10 experiments should be conducted based on 3SX03 – Object Oriented Programming using Java Syllabus

B.Tech Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SX09	Communication & Industrial Network Lab	00	00	02	01

Course Pre-requisite: 3SX04 Communication & Industrial Network

Course Learning Objectives:

1. To introduce students to industrial communication standards and protocols used in modern automation and control systems.
2. To provide hands-on experience in configuring, monitoring, and troubleshooting industrial networks such as Modbus, PROFIBUS, and Industrial Ethernet.
3. To enable students to interface industrial devices and develop basic industrial communication applications.

Course Outcomes:

After successful completion of this course, students will be able to-

Sr. No	CO ID	Description
1	3SX09.1	Demonstrate knowledge of industrial communication protocols and their applications in automation systems.
2	3SX09.2	Set up and troubleshoot communication networks between industrial components (e.g., PLC-to-PLC, PLC-to-HMI communication).
3	3SX09.3	Implement basic industrial automation tasks using communication networks and interpret real-time data exchange.

List of Experiments :

Minimum 08-10 experiments should be conducted based on **3SX04 Communication & Industrial Network Syllabus**

B.Tech. Third Semester CSE(IOT)

Course Code	Course Title	L	T	P	C
3SXOE1A	Open Elective-I– Social Science	03	00	00	03

Course prerequisite: Nil

Course Learning Objectives:

1. Understand key social science concepts, Indian culture, social structures, and governance.
2. Study the impact of industry and environment on society and sustainable development.
3. Identify and evaluate major social problems in the context of Indian society.

Course Outcomes:

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

1. Understand the basic concepts in social science in the era of globalization .
2. Comprehend the knowledge of Indian Culture, social structure and marriage institutions in India.
3. Understand the environment in industry and its impact on society.
4. Understand the Indian federal system and its executive framework.
5. Explore the major social problems in India.
6. Understand the human society and social sustainable development.

	Subject: Social Science	L
UNIT I	Introduction to Social Science: Importance to Engineer, Seven categories of Social Sciences (Anthropology, Sociology, History, Geography, Political science, Economics and Linguistics), Rural and Urban problems associated with society.	7
UNIT II	Fundamental concept in social science: i. Indian Culture- Aryan culture and Dravidian Culture ii. Social structure and social system in India. iii. Family and marriage institutions in India.	7
UNIT III	Impact of Industrialization on society: i. Environment in industry with development of science and technology. ii. Fatigue of workers. iii. Motivation, selection and training of workers.	7
UNIT IV	Indian Constitution and Parliament: Salient features of Indian constitution. Fundamental Rights and Duties. Directive Principles of State, Composition and powers of Indian Parliament, President of India: Election and Powers. Prime Ministers and Council of Minister.	7
UNIT V	Major social problems in India: i. Illiteracy ii. Un-employment iii. High population. iv. Poverty. v. Corruption.	7
UNIT VI	Human Society and Environment: i. Human values and professional ethics. ii. General issues on environment ecology, bi-diversity and climate change. iii. Economics and social sustainable development iv. Human resource management, public health, law enforcement and good governance.	7

	Total	42
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Text Books:

1. Social Problems in India, Ram Ahuja, Rawat Publication New Delhi.
2. A New Look into Social Sciences: Sheikh Sabir, A.M.Shiekh and Jaya Dwadshiwar, Sage Publication New Delhi.
3. Ethical Science, Dr. G. N. Nimbarte, Dattson Publication, Nagpur.

Reference Books:

1. Labour Problems and Social Welfare: R. C.
2. Saxsena, Prakashan Kendra, Lucknow.
3. Introduction to Sociology, Vidhyabhushan and Sachdeva, KitabMahal, New Delhi

B.Tech Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SXOE1B	Human Resource Management	03	00	00	03

Course Pre-requisite: 1. 1SF05 Professional Communication Skills

2. 2SF05 Universal Human Values

Course Learning Objectives:

1. To understand the fundamentals of Human Resource Management (HRM).
2. To explore HRM functions like recruitment, selection, training, and performance management.
3. To analyse HR policies, labour laws, and ethical practices in HR

Course Outcomes:

Sr. No.	CO ID	Description
1	3SXOE1B.1	Explain the key principles, functions, and importance of Human Resource Management in an organization.
2	3SXOE1B.2	Analyse the processes of human resource planning, job analysis, recruitment, and selection, with a focus on IT and IoT-based companies.
3	3SXOE1B.3	Evaluate different training methods and employee development strategies, emphasizing their importance in fast-evolving tech environments.
4	3SXOE1B.4	Examine performance appraisal methods, compensation structures, and employee motivation techniques relevant to IT and IoT industries.
5	3SXOE1B.5	Interpret various labour laws, workplace ethics, and employee relations policies, ensuring compliance with organizational and legal standards.
6	3SXOE1B.6	Assess the impact of digital transformation, AI-driven HR tools, and remote work trends on modern HR practices in tech industries.

	Course Name : Human Resource Management	Lect Hrs.
UNIT I	Introduction to Human Resource Management: Definition, Scope, and Evolution of HRM, Functions and Objectives of HRM, HRM vs. Personnel Management, Role of HR in IT and IoT Industries, Strategic HRM and its Importance	7
UNIT II	HR Planning and Recruitment: Human Resource Planning (HRP) Process, Job Analysis, Job Description, and Job Specification, Recruitment: Sources and	7

	Methods, Selection Process: Tests, Interviews, and Selection Criteria, Onboarding and Induction Programs	
UNIT III	Employee Training and Development: Need for Training in the IT Industry, Training Methods: Online vs. Offline, On-the-Job vs. Off-the-Job, Employee Development and Career Planning, Importance of Continuous Learning in IoT & AI Fields, Evaluating Training Effectiveness	7
UNIT IV	Performance Management and Compensation: Performance Appraisal: Purpose, Methods, and Challenges, Key Performance Indicators (KPIs) in Tech Companies, Compensation and Benefits in IT and IoT Sectors, Incentives and Reward Systems, Employee Motivation and Engagement Strategies	7
UNIT V	Employee Relations and Legal Aspects: Employer-Employee Relationship in Tech Firms, HR Policies and Workplace Ethics, Labor Laws and Employment Regulations in India, Grievance Handling and Conflict Resolution, Workplace Safety, Diversity, and Inclusion	7
UNIT VI	HRM in the Digital Age: Role of HR Analytics and Data-Driven Decision Making, Artificial Intelligence in HRM (HR Chatbots, Resume Screening), Remote Work and Virtual Team Management	7
	Total	42

Textbooks:

1. "Human Resource Management" by Gary Dessler
2. "Human Resource Management: People, Data, and Analytics" by Talya Bauer, Berrin Erdogan, David Caughlin, and Donald Truxillo

Reference Books:

1. "HRM, Artificial Intelligence and the Future of Work", by Tony Dundon and Adrian Wilkinson
2. "Human Resource Management" by Sangeetha N.

B.Tech Third Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
3SXOE1C	Open Elective - I: Industrial Management and Quality Control	03	00	00	03

Course Pre-requisite: Communication Skills.

Course Learning Objectives:

1. To understand management, administration and organization in terms of principles and functions.
2. To interpret marketing, materials, production, finance and personnel management.
3. To understand project report, concept of budget and their components.
4. To study concept of quality, business ethics and analyse various quality control techniques.

Course Outcomes:

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

Sr. No	CO ID	Description
1	3SXOE1C.1	Understand the fundamental principles and functions of Industrial management.
2	3SXOE1C.2	Recognize and apply knowledge of marketing and materials management.
3	3SXOE1C.3	Interpret and evaluate personnel management and evaluation methods of job rating.
4	3SXOE1C.4	Comprehend the knowledge of balance sheet, costing and budgetary aspects, project report, profit and loss statement and ratio analysis.
5	3SXOE1C.5	Identify factors controlling quality of design and conformance.
6	3SXOE1C.6	Comprehend professional ethics, Kaizen, Quality Circles, ISO-9000 series and TQM in organization.

	Course Name: Industrial Management and Quality Control	Lect Hrs.
Unit-1	Principles and Techniques of Management: Administration and organization, functions of management, planning, organization structure, motivation, delegation and decentralization, communication, leadership and decision making.	07
Unit-2	Market and Materials Management: A) Marketing strategy, market research, consumer behaviour, advertising and sales promotion, channels of distribution, pricing of products. B) Classes of material, scope of material control, purchasing procedures, order procedures, inventory control, types of production	07
Unit-3	Personnel Management: Meaning and functions of personnel management, recruitment, selection, promotion, wages and salary administration, training and development, Welfare of labour, Problems of labour turn over & retention.	07
Unit-4	Project and Financial Management: A) Case studies of project report, preparation of profit and loss statement and balance sheet. B) Principles of costing, cost sheet preparation, types of budgets and their importance.	07
Unit-5	Quality Control: Concept of quality and quality control, elements of quality, factors controlling quality of design and conformance, process control, inspection planning and scheduling,	

	7 QC (Seven Quality Control) techniques, vendor inspection, sampling plans, Quality audit system.	07
Unit-6	Quality Management and Professional Ethics: Concepts and applications of Kaizen, quality circle, ISO 9000 series, just-in-time, quality planning and total quality management, elements of TQM. Professional business ethics: concept, ethical business codes and values.	07
	Total	42

Text Books:

1. O.P.Khanna, "Industrial Engineering and Management", Dhanpat Rai Publications.
2. Telsang Martand.T., "Industrial and Business Management", S.Chand Publications.
3. Anil Bhat, Arya Kumar, "Management: Principles, Processes and Practices", Oxford University Press.
4. Bharat Wakhlu, "Total Quality", S. Chand Publications.
5. Armand V. Feigenbaum, "Total Quality Control", Tata Mc-Hill Education.

Reference Books:

1. M. Mahajan, "Industrial Engineering and Production Management", Dhanpat Rai & Sons, New Delhi.
2. Bose D. Chandra, "Fundamentals of Financial Management", PHI Learning Publications.
3. Abdul Matheen, "Project Management", Laxmi Publications.

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 :Computer Science & Engineering (IoT)

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																		
1	4SX01	Digital Communication System & Signal Processing	3	--	--	PCC	3	3	3	60	30	10	100	40	--		--	--
2	4SX02	Microcontroller & Applications	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
3	4SX03	Data Structures & Algorithms	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
4	4SXMDM1	MDM-1	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--
5	4SXOE	OE-2	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--
6	4SX04	Introduction to IoT	2	--	--	VSEC	2	2	3	60	30	10	100	40	--	--	--	--
7	4SX05	Entrepreneurship & Project Management**	2	--	--	EEMC	2	2	--	--	--	50	50	25	--	--	--	--
Practicals																		
8	4SX06	Digital communication system & signal processing lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
9	4SX07	Microcontroller & Applications lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
10	4SX08	Data Structures & Algorithms lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
11	4SX09	Android Application Development Lab	--	--	2	VSEC	2	1	--	--	--	--	--	--	25	25	50	25
		Total	19	--	8		26	23					650				200	
4SXOE-2:- (A) Intellectual Property Rights (B) Introduction to Cyber Law (C) Fundamentals of Agricultural Economics															Total		850	

** Assesment will be based on Internal Tests and Assignments

Exit Option: Two suitable skill-based courses (excluding from list of courses undertaken in First to Fourth semesters) to qualify for Diploma

Title	Credit
Two relevant MOOC/NPTEL courses as decided by BOS	8
OR	
1. Internship (Min 120 hrs)	8

B.Tech Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SX01	Digital Communication System & Signal Processing	03	00	00	03

Course Pre-requisite: 3SX04 – Communication & Industrial Network.

Course Learning Objectives:

1. To understand fundamentals of Digital Communication System.
2. To understand the Bandpass Modulation and Baseband Modulation techniques.
3. To understand Multiple Access Schemes and signal processing.

Course Outcomes:

After completing the course, students will be able to-

Sr. No	CO ID	Description
1	4SX01.1	Understand concepts of information theory and analyze information transmission over communication channel.
2	4SX01.2	Understand different modulation and demodulation schemes in Bandpass Digital communication systems.
3	4SX01.3	Comprehend the knowledge of Baseband transmission.
4	4SX01.4	Understand the different multiple access Schemes and Systems.
5	4SX01.5	Understand the concepts of Discrete Time Signals [DTS].
6	4SX01.6	Understand the application of Multi-rate Digital Signal Processing.

	Course Name: Digital Communication System & Signal Processing	Lect Hrs.
Unit-I	Introduction to Digital Communication System: Need for modulation Functional Blocks of Digital Communication System, Line Coding: Need for Line coding, Properties of Line Coding, Types of Line Coding and its comparison. Information Theory: Measure of Information, Entropy and Information Rate, Binary Symmetric Channel.	07
Unit-II	Discrete Time Signals and Systems: Sampling theorem, Proof of Sampling Theorem, Signal reconstruction, DT Signal Operations, DT Signal Classification, Energy and Power Signal, Even and Odd functions, DT Convolution, Classification of Discrete-Time Systems.	07
Unit-III	Baseband Transmission: Base Band Binary PAM, PCM and PWM systems, Inter Symbol Interference, Base band pulse shaping, Eye Diagram correlative coding, Duo-binary Encoder.	06
Unit-IV	Continuous-Time Signal Analysis-The Fourier Transform: Aperiodic Signal, Representation by Fourier Integral, Properties of Fourier Transform (CTFT), Inverse Fourier Transform, Fourier Spectrum.	07
Unit-V	Discrete-Time Fourier Transform: Discrete-Time Fourier Transform (DTFT), Properties of DTFT, Relationship between DTFT & CTFT.	06
Unit-VI	DFT & Z-Transform: Introduction to DFT , Definition and Properties of Z-Transform, concept of Region of Convergence [ROC], Inverse Z-transform using long division method, PFE method and residue method.	06
	Total	39

Text Books:

1. Proakis J. K., "Digital Communication", Mc-Graw Hill Book Co., London (2nd Edition).
2. Nagoorkani, "Digital Signal Processing", Tata McGraw-Hill Education, Second Edition.

References:

1. Kennedy G. "Electronic Communication System" Tata Mc-Graw Hill Co., New Delhi (Third Ed).
2. Shanmugam K.S., "Digital & Analog Communication Systems", John Wiley & Sons, New York, 1996.
3. Oppenheim & Schafer, "Discrete time Processing", PHI.
4. Proakis & Manolakis D.G., "Digital Signal Processing", PHI.
5. Mitra S. K., "Digital Signal Processing", TMH.

B.Tech. Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SX02	Microcontroller and Applications	03	00	00	03

Course Pre-requisite: - 3SX03 Object Oriented Programming, 3SX02 Analog & Digital Electronics

Course Learning Objectives:

1. Understand the architecture and functionality of the 8085 Microprocessor and 8051 microcontrollers.
2. Develop and implement programs for 8051 microcontrollers using Assembly language and Embedded C.
3. Interface various peripheral devices with 8051 microcontrollers.

Course Outcomes:

After successfully completing the course, students will be able to

Sr. No.	CO ID	Description
1	4SX02.1	Comprehend the knowledge of architecture of 8085 Microprocessor and understand the functions of each block.
2	4SX02.2	Comprehend the knowledge of architecture of 8051 Microcontroller and understand the functions of each block.
3	4SX02.3	Illustrate various addressing modes and instruction set of 8051 Microcontroller and develop basic assembly language programs.
4	4SX02.4	Develop assembly language programs for counter/Timers in various modes and understand serial communication along with its operating modes.
5	4SX02.5	Develop assembly language programs for counter/Timers in various modes and understand serial communication along with its operating modes.
6	4SX02.6	To understand and apply Embedded C for 8051-based applications.

	Subject: Microcontroller and Applications	L
UNIT I	Introduction to Microprocessor 8085: Introduction to 8085 microprocessor, Pin diagram, architecture and introduction to	07

	Instruction set.	
UNIT II	Introduction to Microcontroller 8051: Introduction to 8051 microcontroller, Pin diagram, architecture, Ports Structure, memory organization, Special Function Registers	07
UNIT III	Assembly Language Programming of 8051: Addressing modes, Instruction set of 8051, Assembly language programming examples.	07
UNIT IV	Counter/Timers of 8051: Basics of Counter / Timer and Programming, Basics of Serial Communication and programming	07
UNIT V	Interfacing and programming of 8051: Interfacing and programming of external RAM &ROM, Stepper motor, DC Motor; Architecture, Interfacing and programming of ADC 0808 & DAC 0808.	07
UNIT VI	Introduction to Embedded C for 8051: Basics of Embedded C programming, Comparison of Assembly vs Embedded C-Simple programs using Embedded C	07
	Total :	42 Hrs

Text Books:

1. "Microprocessor Architecture, Programming and Applications with the 8085" – Ramesh S.Gaonkar **Penram International Publishing**
2. "The 8051 Microcontroller and Embedded Systems" – Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay (Pearson)
3. The 8051 Microcontroller: Architecture, Programming & Applications" – Kenneth J. Ayala (Cengage Learning)

Reference Books:

1. "The 8051 Microcontroller Based Embedded Systems", by Manish K Patel (McGrow Hills)
2. "8051 Microcontroller: Internals, Instructions, Programming and Interfacing", by Subrata Ghoshal (Pearson).

B. Tech. Fourth Semester CSE(IoT)

Course code	Couse Title	L	T	P	C
4SX03	Data Structure and Algorithm	03	00	00	03

Course Pre-requisite: 1. 3SX01 Discrete Mathematics
2. 3SSX03 Object Oriented Programming

Course Learning Objectives:

1. To understand the linear and nonlinear data Structures and its memory representations.
2. To perform different operations on data structures such as insertion, deletion, searching and Traversing.
3. Comprehend the stacks and queue along with its basic operations.
4. Understand the concept of Trees, graph, data searching and sorting methods with its complexity.

Course Outcome:

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

Sr No.	CO Id	Description
1	4SX03.1	Understand the of basic data structures for storage and retrieval of linear and Non-linear data structure.
2	4SX03.2	Apply knowledge of data structures to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.
3	4SX03.3	Differentiate between arrays & linked list which is used to implement list of abstract data types.
4	4SX03.4	Understand the tradeoffs between stacks and queues which can make appropriate design decisions based on application data requirements.
5	4SX03.5	Design and develop the data structures such as tree by using C as the programming language using static or dynamic implementations.
6	4SX03.6	Recognize the importance of searching, sorting and its application in real world scenarios

	Course Name : Data Structures & Algorithm	Lec Hrs
UNIT I	Introduction to Algorithms and Data Structures: Introduction, Algorithms, Asymptotic Notation, Introduction to Data Structures, Types of Data Structures, Data Structure Operations.	8
UNIT II	Arrays: Introduction, Types of Arrays, Representation of One-Dimensional Array in Memory, Array Traversal, Insertion and Deletion, Sorting and Searching, Representation of Multi-Dimensional Array in Memory. Linked List: Introduction, Linked Lists - Basic Concept, Types of Linked List.	8
UNIT III	Stacks: Introduction to Stacks, Stack Operations. Queues: Introduction, Queues - Basic Concept, Queue Operations, Basics of Circular Queues and Priority Queues.	6
UNIT IV	Trees: Introduction, Basic Concept, Binary Tree, Binary Tree Representation, Binary Tree Traversal, Binary Search Tree,	6
UNIT V	Graphs: Introduction, Basic Concept, Graph Terminology, Graph Implementation, Shortest Path Algorithm, and Graph Traversal.	6
UNIT VI	Sorting and Searching: Introduction, Sorting Techniques: Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort. Searching Techniques: Linear Search, Binary Search	8

Total: 42 hrs

Text Book:

1. Seymour Lipschutz, "Data Structures with C", Schaum's Outline Series.

Reference Books:

1. E. Balagurusamy, "Data Structures using C", McGraw Hill Education, 2018
2. Forouzan, Gilberg, "Data Structures and Algorithms",
3. CENGAGE Learning.
4. Reema Thareja, "Data Structures using C", Oxford University Press, 2011.
5. Arpita Gopal, "Magnifying Data structures", PHI (EEE), 2010.
6. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", CBS Publications

B.Tech Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SX04	Introduction to IoT	02	00	00	02

Course Pre-requisite: 1. 3SX04- Communication & Industrial Network

Course Learning Objectives:

1. To understand the fundamentals and evolution of IoT.
2. To explore enabling technologies, architectures, protocols, and networking components of IoT.
3. To provide insights into IoT applications and essential security considerations.

Course Outcomes:

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

Sr. no.	CO ID	Description
1	4SX04.1	Understand the foundational concepts of IoT.
2	4SX04.2	Compare IoT with related technologies like M2M, CPS, and WoT.
3	4SX04.3	Understand the architectural components and reference models of IoT systems.
4	4SX04.4	Apply networking fundamentals and understand key aspects of IoT security.
5	4SX04.5	Identify suitable communication protocols and sensor network topologies for IoT.
6	4SX04.6	Describe and analyze real-world IoT applications such as smart homes, agriculture, and smart parking.

	Course Name: Introduction to IoT	Lect Hrs.
UNIT I	Introduction to IoT: Definitions, Characteristics of IoT, IoT Architectures, Enabling Technologies in IoT, IoT Applications, IoT Challenges.	5
UNIT II	Predecessors & Emergence of IoT: Introduction, Wireless Sensor Networks, Machine-to-Machine Communications, Cyber Physical Systems, IoT versus M2M, IoT versus CPS, IoT versus WoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components & Addressing Strategies in IoT.	5
UNIT III	IoT Architecture & Reference model: Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model (CISCO), IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View	5
UNIT IV	Basics of Networking & Network Security: Network types, Layered Network Models, Addressing , Internet of Things TCP/IP Transport layer, Security ,Network	5

	Confidentiality, Cryptography, Message Integrity and Authenticity, Digital signatures, Key Management, Internet Security & Firewall.	
UNIT V	IoT Communication Protocols: Messaging Protocols: MQTT, CoAP, XMPP. transport protocols: Introduction of BLE & Li-Fi, Basics of Sensor Network Topologies: Star, Mesh, Ring, Bus.	5
UNIT VI	Applications of IoT: Overview, Block Diagram and Working of real world IoT applications : Smart Home automation, Agricultural System and Smart Parking.	5
	Total	30

Text Books:

1. NPTEL S. Misra, A Mukherjee, Cambridge university Press.
2. David Hanes, Gonzelo Salgueiro, Patrick Grossetete, Robert Barton, and Jerome Hentry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", Cisco Pres, 2017.

Reference Books:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-On-Approach)", 1st Edition, VPT, 2014
2. Cuno Pfister, Getting Started with the Internet of Things, O'Reily Media, 2011, ISBN: 978-1-4493-9357-1

B. Tech. Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SX05	Entrepreneurship and Project Management	02	00	00	02

Course Prerequisites: Nil

Course Learning Objectives

1. To understand the basics of entrepreneurship and explore the process of generating ideas and identifying business opportunities.
2. To gain knowledge of project planning, management, financing, and budgeting.
3. To learn enterprise management and HR fundamentals.
4. To explore social entrepreneurship and sustainability.

Course Outcomes:

After successful completion of this course, the students will be able to -

1. Define core concepts, traits, and types of entrepreneurs.
2. Generate business ideas and apply innovation for value creation.
3. Understand project life cycle and prepare feasibility reports.
4. Analyze project costs, funding sources, and financial projections.
5. Acquire knowledge of management and HR practices in enterprise operations.
6. Apply entrepreneurship knowledge to build successful models for betterment of society.

	Subject: Entrepreneurship and Project management	L (Hrs)
Unit-1	Entrepreneurship: need, scope, Entrepreneurial competencies & traits, Factors affecting entrepreneurial development, Entrepreneurial motivation, conceptual model of entrepreneurship, Entrepreneur vs. Intrapreneur; Classification of entrepreneurs; Entrepreneurial development programs	05

Unit-2	Entrepreneurial Idea and Innovation: Introduction to innovation, Entrepreneurial idea generation and identifying business opportunities, Management skills for entrepreneurs and managing for value creation, Creating and sustaining Enterprising Model & Organizational Effectiveness	05
Unit-3	Project Management: Project management: meaning, scope & importance, role of project manager, project life-cycle, Project appraisal: Preparation of a real-time project, feasibility report containing technical appraisal, Environmental appraisal, Market appraisal (including market survey for forecasting future demand and sales) and Managerial appraisal	05
Unit -4	Project Financing: Project cost estimation & working capital requirements, sources of funds, capital budgeting, Risk & uncertainty in project evaluation, preparation of projected financial statements viz. Projected balance sheet, projected income statement, projected funds & cash flow statements	05
Unit-5	Management of Enterprises: Objectives and functions of management, scientific management, general and strategic management; introduction to human resource management: planning, job analysis, training, recruitment and selection, etc.; marketing and organizational dimension of enterprises	05
Unit-6	Social Entrepreneurship: Social sector perspectives and Social Entrepreneurship, Social Entrepreneurship Opportunities and Successful Models, Social Innovations and Sustainability, Marketing Management for Social Ventures, Risk Management in Social Enterprises	05
	Total	30

Recommended Text Books:

1. "Innovation and Entrepreneurship" by Drucker, P. F., Harper and Row Publication
2. "Business, Entrepreneurship and Management" by Rao, V.S.P., Vikas Publishing House

3. "Entrepreneurship" by Roy Rajeev; OUP.
4. "Text Book of Project Management" by Gopalakrishnan, P. and Ramamoorthy, V.E, McMillan
5. "Project Management for Engineering, Business and Technology" by Nicholas, J.M., and Steyn, H, PHI Publication
6. "Project Management: The Managerial Process," by Gray, C.F., Larson, E.W. and Desai, G.V, McGraw Hill Publication

B.Tech Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SX06	Digital Communication System & Signal Processing Lab	00	00	02	01

Course Pre-requisite: 4SX01 Digital Communication System & Signal Processing

Course Learning Objectives:

1. To understand the practical approach to digital communication & signal processing.
2. To learn and understand modulation and demodulation techniques.
3. To learn the realization and able to understand the digital communication and Multi-rate processing.

Course Outcomes:

After successful completion of this course, students will be able to

Sr. No	CO ID	Description
1	4SX06.1	Use his/her understanding/knowledge of digital communication so as to design /conduct experimentation related to the given aim/objective.
2	4SX06.2	Use equipment's/other concerned resources for conduction of experiments.
3	4SX06.3	Interpret results, formulate findings, draw suitable conclusion and respond to inquiries, related to given experiment

List of Experiments:

Minimum 08-10 experiments should be conducted based on 4SX01 Digital Communication System & Signal Processing Syllabus

B.Tech. Sixth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SX07	Microcontroller and Applications Lab	00	00	02	01

Course Pre-requisite: 3ST08 Object Oriented Programming Lab

Course Learning Objectives:

1. To impart fundamental knowledge of 8085 microprocessors and 8051 microcontroller including their architecture, pin configuration, and internal operations.
2. To develop programming skills in Assembly Language and Embedded C for 8051 microcontroller applications.
3. To enable students to design and implement basic interfacing techniques involving I/O devices, memory, and peripheral modules such as ADC, DAC, and motors.

Course Outcomes:

After successful completion of this course, students will be able to

Sr. No.	CO ID	Description
1	4SX07.1	Understand and explain the architecture, pin configuration, and instruction sets of 8085 microprocessor and 8051 microcontroller.
2	4SX07.2	Write and execute assembly language and embedded C programs for solving real-time tasks using the 8051 microcontroller.
3	4SX07.3	Design and develop interfacing applications using 8051 with memory and peripheral devices like stepper motor, DC motor, ADC, and DAC.

List of Experiments:

*Minimum 08-10 experiments should be conducted based on Syllabus 4SX02
Microcontroller and Applications*

B. Tech Fourth Semester CSE(IoT)

Course code	Couse Title	L	T	P	C
4SX08	Data Structure and Algorithm Lab	00	00	02	01

Course Pre-requisite: 1. 3SX01 Discrete Mathematics
2. 3SX03 Object Oriented Programming

Course Learning Objectives:

1. Familiarize with basic algorithms and their efficiency.
2. Implement basic operations on arrays, stacks, linked list, Queue.
3. Compare sorting and searching techniques.

Course Outcomes:

After successful completion of this course, students will be able to

Sr No.	CO Id	Description
1	4SX08.1	Use his/her understanding/knowledge of Data Structure and Algorithm to design /conduct experimentation related to the given aim/objective.
2	4SX08.2	Students will use stacks, Queue, array and link list in problem-solving
3	4SX08.3	Interpret results, formulate findings, draw suitable conclusion and respond to inquiries, related to given experiment.

List of Experiments:

Minimum 08-10 experiments should be conducted based on 3SX01 Discrete Mathematics and 3SX03 Object Oriented Programming Syllabus

B.Tech Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SX09	Android Application Development Lab	00	00	02	01

Course Pre-requisite: 3SX03- Object Oriented Programming using Java.

Course Learning Objectives:

1. To introduce students to the Android development environment and tools such as Android Studio and SDKs.
2. To equip students with skills to design and build user interfaces using Android components and layouts.
3. To enable students to develop and test basic Android applications involving user input, data storage, and interaction with system components.

Course Outcomes:

After successful completion of this course, students will be able to -

Sr. No	CO ID	Description
1	4SX09.1	Describe the structure of Android applications and the role of various components such as Activities, Intents, and Services.
2	4SX09.2	Develop basic Android applications using appropriate UI elements, layouts, and Android APIs.
3	4SX09.3	Test and debug Android applications and analyze their performance for improved user experience.

List of Experiments:

Minimum 08-10 experiments should be conducted based on **Object Oriented Programming using Java**
Syllabus

B.Tech. Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SXOE2A	Intellectual Property Rights	03	00	00	03

Course Prerequisite: Nil

Course Learning Objectives:

1. Impart awareness on Intellectual Property Rights (IPR) and various regulatory issues related to IPR
2. Familiarize students with the shades of Intellectual Property Rights (IPR)
3. Awareness on intellectual property rights and various regulatory issues related to IPR.

Course Outcomes:

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

1. Define the concept of intellectual property and list its various forms.
2. Explain the process of obtaining a patent, including eligibility criteria and rights associated with patents.
3. Apply copyright laws to determine eligibility for protection and understand procedures for registration.
4. Analyze trademark classification and evaluate criteria for registration.
5. Synthesize understanding to develop strategies for registration and protection of industrial designs.
6. Evaluate the significance of trade secrets in business operations and analyze precautionary measures for protection.

	Subject: 4SXOE2A Intellectual Property Rights	L
Unit-1	Introduction to Intellectual Property Rights: Role of IP in the Economic and Cultural Development of the Society, IP Governance. IP as a Global Indicator of Innovation, Origin of IP, History of IP in India. Patents, Copyrights and Related Rights, Trademarks, Trade Secrets	07
Unit-2	Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention, Rights Associated with Patents, Enforcement of Patent Rights, Inventions Eligible for Patenting, Non-Patentable Matters, Patent Infringements, Process of Patenting.	07
Unit-3	Copyrights: Classes of Copyrights, Criteria for Copyright, Ownership of Copyright, Copyrights of the Author, Copyright Infringements, Liability of Owner of an Auditorium/Hall, Fair Use Doctrine, Non-Copyright Work, Copyright Registration, Judicial Powers of the Registrar of Copyrights, Fee Structure, Copyright Symbol, Validity of Copyright.	07
Unit-4	Trademarks: Eligibility Criteria, Who Can Apply for a Trademark, Acts and Laws, Designation of Trademark Symbols, Classification of Trademarks, Registration of a Trademark is Not Compulsory, Validity of Trademark, Types of Trademarks Registered in India, Trademark Registry, Process for Trademarks Registration. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.	07

Unit-5	Industrial Design: Eligibility Criteria, Acts and Laws to Govern Industrial Designs, Design Rights, Enforcement of Design Rights, Non-Protectable Industrial Designs India, Protection Term, Procedure for Registration of Industrial Designs, Importance of Design Registration, Cancellation of the Registered Design, Application Forms, Famous Case Law: Apple Inc. vs. Samsung Electronics Co.	07
Unit-6	Trade Secret: Criteria for Trade Secret, Registration and Protection Time of Trade Secrets, Rights Associated with Trade Secrets, Enforcement of Trade Secrets, When to Apply for Trade Secret Protection, Precautionary Measures to be Taken by Enterprises/Organizations, Disparity Between Trade Secrets and Patents, Renowned Trade Secrets	07
	Total	42

Text Book:

1. Prof. Rupinder Tewari and Ms. Mamta Bhardwaj, "Intellectual Property: A Primer for Academia" by, Publication Bureau, Panjab University, Chandigarh, 2021.
2. K. V. Nithyananda, "Intellectual Property Rights: Protection and Management", by Cengage Learning India Private Limited, 2019.

Reference Books:

1. Deborah E. Bouchoux, "Intellectual Property for Paralegals – The Law of Trademarks, Copyrights, Patents & Trade Secrets", 4th Edition, Cengage Learning, 2012.
2. N. S. Gopalakrishnan and T. G. Agitha, "Principles of Intellectual Property", Eastern Book Company, Lucknow, 2009.
3. M. M. S. Karki, "Intellectual Property Rights: Basic Concepts", Atlantic Publishers, 2009.
4. Ganguli Prabuddha, "Intellectual Property Rights--Unleashing the Knowledge Economy", Tata McGraw Hill, 2001.

B.Tech. Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SXOE2B	Introduction to Cyber Law	03	00	00	03

Course Prerequisite: Nil.

Course Learning Objectives:

1. Introduction to basics of Computer, Internet and Cyber Law.
2. Demonstrate the concepts of e-Commerce and Inspect the principles of Information Technology Act, 2000.
3. Describe Cyber Crimes and, Enlist and predict the types of Cyber Crimes.
4. Examine the Internet Security issues.

Course Outcomes:

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

1. Describe the fundamentals of computer, internet and cyber law.
2. Outline the fundamentals of E-Commerce.
3. Illustrate the knowledge of cybercrimes.
4. Classify the cybercrimes.
5. Explain the principles of Information Technology Act.
6. Inspect the Internet security issues.

	Subject: 4SXOE2B Introduction to Cyber Law	L
Unit-1	Fundamentals of Computer, Internet and Cyber Law Functional Components of Computer, applications of computers, Internet architecture, world wide web, internet server and types, Need for Cyber Law, difference between Cyber Crimes and Conventional Crimes.	07
Unit-2	Introduction to E-Commerce Electronic data interchange and legal issues, e-commerce models, e-banking, credit card, e-mail, e-governance and objective, models and types.	07
Unit-3	Concepts of Cyber Crime Characteristics of Cyber Crime, Causes and Measures to combat Cyber Crimes, Cyber Crimes against Individuals, Institution and State.	07
Unit-4	Categories of Cyber Crimes Classification of Cyber Crimes, Hacking, Cracking, Digital Forgery, Cyber Stalking/ Harassment, cyber terrorism, Cyber Pornography and Obscenity, Identity Theft, Cyber Defamation, Virus attacks, Computer Fraud, Social Networking Crimes.	07

Unit-5	Information Technology Act, 2000 Silent features of Information Technology Act, 2000, Definitions, Digital Signatures and Certificates, Security Procedures, Electronic Contracts, Penalties and Adjudication, Liabilities of Service Providers.	07
Unit-6	Internet Security: Internet Security, ethical issues of Information Technology- software piracy, firewall and types of firewalls, biometrics and internet security products software.	07
	Total	42

Recommended Books:

1. Pavan Duggal, "Cyber Law", LexisNexis India Publication, 2023, ISBN: INK8196241070.
2. Pavan Duggal, "Cyber Frauds, Cybercrimes and Law in India", Cyber Law University Publication, 2023.
3. Nilakshi Jain, Ramesh Menon, "Cyber Security and Cyber Laws", Wiley India, 2020, ISBN: 9390395755
Sharma Vakul - Information Technology Law and Practice
4. Nandan Kamath, "Law Relating to Computer, Internet and E-commerce", LexisNexis India Publication, 5th Edition, 2016, ISBN: 9789350351819.
5. P. Soni, "Cyber Laws", Sony Prakashan, Nagpur, 2020.

B.Tech Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SXOE2C	OE2:- Fundamentals of Agricultural Economics	03	00	00	03

Course Pre-requisite: Nil

Course Learning Objectives:

1. To understand role of Agriculture and India Cropping pattern in Economic Development.
2. To understand Economic Decisions in Agriculture Production and Production Relationship.
3. To understand Farm Management and Capital formation in Agriculture and understand Crop Insurance, Agricultural Subsidy, PDS and Food Security in India.

Course Outcomes:

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

Sr. No	CO ID	Description
1	4SXOE2.1	Comprehend the knowledge of nature and scope of Agricultural economics and role of agriculture in economic development.
2	4SXOE2.2	Understand the objectives and importance of Cropping Pattern, Five Year plans and Green Revolution
3	4SXOE2.3	Comprehend the knowledge of Economic Decisions in Agriculture Production and Production Relationship
4	4SXOE2.4	Understand the objectives, importance and mechanisms of Capital Formation in Agriculture and Farm Management
5	4SXOE2.5	Have thorough understanding of Crop Insurance, Agricultural Subsidy, PDS and Food Security in India
6	4SXOE2.6	Comprehend the knowledge of various issues in Indian Agriculture

	Course Name: Fundamentals of Agricultural Economics	Lect Hrs.
Unit-1	Introduction to Agricultural Economics: Nature and Scope of Agricultural Economics - Role of Agriculture in Economic Development - Interdependence between Agriculture and Industry	06

Unit-2	Cropping Pattern in India: Meaning - importance - Agricultural Development under Five Year Plans - Green Revolution	07
Unit-3	Economic Decisions in Agriculture Production and Production Relationship: Objectives, Agricultural Production in India, Cobb Douglas Production Function, CES Production Function, Usefulness of Cobb Douglas and CES, Factor – Product Relationship, Factor – Factor Relationship, Product - Product Relationship	08
Unit-4	Capital Formation in Agriculture and Farm Management: Objectives, Meaning and Concept of Agricultural Capital Formation, Public and Private Investment, Cost Relationships and Profit Maximization, Meaning and importance of Farm Management, Agricultural Price Determination in India	07
Unit-5	Crop Insurance: Need and Importance of Crop Insurance, Agricultural Subsidy, Public Distribution System in India, Food Security in India	07
Unit-6	Issues in Indian Agriculture: Land Reforms, Agricultural Credit, Agricultural Labor, WTO and Indian Agriculture,	07
Total		42

Text Books:

1. Sadhu A. N. and Singh Amarjit, (2007), “Fundamentals of Agricultural Economics”, Himalaya Publishing House, New Delhi.
2. Bilgrami, S.A.R. (2010), “An Introduction to Agricultural Economics”, Himalaya Publishing House, New Delhi.

Reference Books:

1. Bhalla, G.D. and G. Singh, (2001), “Economic Liberalization and Indian Agriculture”, Sage Publications, New Delhi.
2. Subba Reddy, S.; Raghu Ram, P.; Neelakanta Sastry, Bhavani Devi, I. (2004). Agricultural Economics. Oxford & IBH Publishing Co. Pvt. Ltd. (or latest edition available)

B.Tech. Fourth Semester CSE(IoT)

Course Code	Course Title	L	T	P	C
4SXH	IoT Architectures & Protocol	03	00	00	03

Pre-Requisite: Nil

Course Objectives:

1. To understand the concepts of IoT Architecture Reference model.
2. To comprehend the different protocols employed for IoT.
3. To design IoT-based systems for real-world problems.

Course Outcomes:

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

Sr.No.	CO ID	Description
1	4SXH.1	Comprehend the knowledge of basic framework of IoT.
2	4SXH.2	Understand the concepts of IoT Architecture Reference model.
3	4SXH.3	Understand the working of IoT Connectivity access protocols.
4	4SXH.4	Understand about IoT Application protocols.
5	4SXH.5	Comprehend the knowledge of IoT related security and issues.
6	4SXH.6	Design IoT-based systems for real-world problems.

	Course Name: IoT Architectures & Protocol	L
Unit-1	Internet of Things: An Overview, Internet of Things, IoT conceptual framework, IoT architectural view, Technology behind IoT, Sources of IoT, M2M communication, Examples of IoT.	07
Unit-2	IoT Architectures: An Architectural Overview, Reference Model and IOT Architecture - Architecture Reference Model – IOT Reference Architecture: Architecture, Functional, information, deployment and operation views; SOA based Architecture, API-based Architecture, OPEN IoT Architecture for IoT/Cloud Convergence.	07
Unit-3	IoT Connectivity Technologies: RFID , NFC, Wi-Fi, Bluetooth low energy, IEEE 802.15.4, Zigbee, Thread, Wireless HART, Z-Wave, LoRa, NB-IoT.	07
Unit-4	IoT communication technologies and Protocols: Internet and Web layering, Introduction to wired and wireless communication technologies for IoT, Edge connectivity and IoT protocols - MQTT, MQTT-SN, Constrained Application Protocol (CoAP), STOMP, AMQP, Comparison of protocols, Wireless sensor networks.	07

Unit-5	IOT and Related Issues: IOT & Related Future Internet Technologies – Networks & Communication – Processes & Data Management - Security, Privacy & Trust - Protocol Convergence	07
Unit-6	Case Studies/ Industrial Application: Cloud-Based Smart-Facilities Management, Healthcare, Environment Monitoring System.	07
Total		42

Text Books:

1. Raj kamal, “Internet of Things architecture and design principles “, 1ed, Mc Graw Hill.
2. Bassi, Alessandro, et al, “Enabling things to talk”, Springer-Verlag Berlin An, 2016.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017
4. Ovidiu Vermesan, Peter Friess, “Internet of Things – From Research & Innovation to Market Deployment”, River Publishers, 2014
5. Jan Holler ,VlasiosTsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, Elsevier Ltd, 2014.

Reference Books:

1. Arshdeep Bahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, Apress, 2014.
3. Hersent, Olivier, David Boswarthick, and Omar Elloumi. The internet of things: Key applications and protocols. John Wiley & Sons, 2011.
4. Buyya, Rajkumar, and Amir Vahid Dastjerdi, eds. Internet of Things: Principles and paradigms. Elsevier, 201