



**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
2025-2026**

**B.Tech. (Information Technology)
(V1.0)**



**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: Information Technology

SEMESTER: I (GROUP-A/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/ IA			Int.	Ext.								
Theory																			
1	1SF01	Applied Mathematics - I	3	--	--	BSC	3	3		3	60	30	10	100	40	--	--	--	--
2	1SF02	Applied Physics	3	--	--	BSC	3	3		3	60	30	10	100	40	--	--	--	--
3	1SF03	Engineering Graphics	2	--	--	ESC	2	2		3	60	30	10	100	40	--	--	--	--
4	1SF04	Programming for Problem Solving	2	--	--	ESC	2	2		3	60	30	10	100	40	--	--	--	--
5	1SF05	Professional Communication Skills*	1	1	--	AEC	2	2		--	--	--	50	50	25	--	--	--	--
6	1SAKNX01	Multimedia and Web Designing	3	--	--	PCC	3	3		3	60	30	10	100	40	--	--	--	--
7	1SF06	Design Thinking **	1	--	--	VEC	1	1		--	--	--	50	50	25	--	--	--	--
Practical																			
8	1SF07	Applied Physics Lab	--	--	2	BSC	2	1		--	--	--	--	--	--	25	25	50	25
9	1SF08	Engineering Graphics Lab	--	--	2	ESC	2	1		--	--	--	--	--	--	25	25	50	25
10	1SF09	Programming for Problem Solving Lab	--	--	2	ESC	2	1		--	--	--	--	--	--	25	25	50	25
11	1SAKNX02	Multimedia and Web Designing Lab	--	--	2	PCC	2	1		--	--	--	--	--	--	25	25	50	25
12	1SF10	NSS/Sports/Yoga/Cultural/ Community Service #	--	--	2	LLC	2	1		--	--	--	--	--	--	50	--	50	25
			15	1	10		26	21						600				250	
																Total		850	

* Assessment will be based on Unit Tests and Assignments

** Assessment will be based on Case Studies and Assignments

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

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
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Four Year Under Graduate Degree Program in Bachelor of Technology
Choice Based Credit System (Semester Pattern)

Branch: Information Technology

SEMESTER: II (GROUP-A/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/ IA			Int.	Ext.			
Theory																			
1	2SF01	Applied Mathematics - II	3	--	--	BSC	3	3		3	60	30	10	100	40	--	--	--	--
2	2SF02	Applied Chemistry	3	--	--	BSC	3	3		3	60	30	10	100	40	--	--	--	--
3	2SF03	Basics of Electrical Engineering	2	--	--	ESC	2	2		3	60	30	10	100	40	--	--	--	--
4	2SF04	Biology for Engineers	2	--	--	BSC	2	2		3	60	30	10	100	40	--	--	--	--
5	2SF05	Universal Human Values*	2	--	--	VEC	2	2		--	--	--	50	50	25	--	--	--	--
6	2SAEKNX01	Introduction to Python	3	--	--	PCC	3	3		3	60	30	10	100	40	--	--	--	--
7	2SF06	Indian Knowledge Systems *	2	--	--	IKS	2	2		--	--	--	50	50	25	--	--	--	--
Practical																			
8	2SF07	Applied Chemistry Lab	--	--	2	BSC	2	1		--	--	--	--	--	--	25	25	50	25
9	2SF08	Basic of Electrical Engineering Lab	--	--	2	ESC	2	1		--	--	--	--	--	--	25	25	50	25
10	2SAEKNX02	Introduction to Python Lab	--	--	2	PCC	2	1		--	--	--	--	--	--	25	25	50	25
11	2SF09	Workshop/Digital Fabrication Lab	--	--	2	ESC	2	1		--	--	--	--	--	--	25	25	50	25
		Total	17		8		25	21						600				200	
																Total	800		

* Assessment will be based on Unit Tests and Assignments

Exit Option: To qualify for certificate in

Computer Science and Engineering IoT

S. No	Title of Courses	Credit
1	Two relevant MOOC/NPTEL courses as decided by BOS	4
2	Internship (Min 60 hrs)	4
	Total	8

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SEMESTER: III																		
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	Max Marks MSE/ MSIE	Max. Marks TA/ IA	Total	Overall Min Passing Marks	Max Marks Int.	Max Marks Ext.	Total	Min Passing Marks
Theory																		
1	3SN01	Applied Mathematics-III	3	--	--	BSC	3	3	3	60	30	10	100	40	--	--	--	--
2	3SN02	Object Oriented Programming	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
3	3SN03	Analog and Digital Electronics	2	--	--	PCC	2	2	3	60	30	10	100	40	--	--	--	--
4	3SN04	Discrete Structure and Graph Theory	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
5	3SNOE1	OE1	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--
6	3SN05	Engineering Economics*	2	--	--	EEMC	2	2	--	--	--	50	50	25	--	--	--	--
7	3SN06	Environmental Science**	2	--	--	VEC	2	2	--	--	--	50	50	25	--	--	--	--
Practical																		
8	3SN07	Object Oriented Programming Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
9	3SN08	Analog and Digital Electronics Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
10	3SN09V	Computer Skill Lab I: HTML 5, JavaScript	--	--	2	VSEC	2	1	--	--	--	--	--	--	25	25	50	25
11	3SN10	Professional Communication	--	--	2	AEC	2	1	--	--	--	--	--	--	25	25	50	25
12	3SN11	Community Engagement Project / Field Project #	--	--	2	ELC	2	1	--	--	--	--	--	--	50	--	50	25
		Total	18		10		26	23					600				250	
																Total	850	

OE-1 : 3SNOE1A Social Science

3SNOE1B Industrial Safety

3SNOE1C Introduction to Cyber Law

* Evaluation will be based on tests, assignments etc.

** Evaluation will be based on Field Visit, Environmental project or other relevant activity

Evaluation will be based on Field Visit, Community Engagement project or other relevant activity

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SEMESTER: IV																			
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/IA			Int.	Ext.								
Theory																			
1	4SN01	Operating System	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
2	4SN02	Computer Networks	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
3	4SN03	Data Structure	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
4	MDM1	MDM-1	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--	
5	4SNOE2	OE-2	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--	
6	4SN04	Computer Organization and Architecture	2	--	--	AEC	2	2	3	60	30	10	100	40	--	--	--	--	
7	4SN05	Entrepreneurship: Early Stage start up*	2	--	--	EEMC	2	2	--	--	--	50	50	25	--	--	--	--	
Practical																			
8	4SN06	Operating System Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
9	4SN07	Computer Networks Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
10	4SN08	Data Structure Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
11	4SN09V	Computer Skill Lab II: Node JS and React JS	--	--	2	VSEC	2	1	--	--	--	--	--	--	25	25	50	25	
		Total	19		8		27	23					650				200		
															Total		850		
* Assessment will be based on tests, Case studies, Assignments, etc.																			

* Assessment will be based on tests, Case studies, Assignments etc.

OE-2 :- 4SNOE2A Aptitude for Engineers

4SNOE2B Project Management

4SNOE2C Accounting and Costing

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

S. No.	Title	Credit
1	Two relevant MOOC/NPTEL courses as decided by BOS	4
2	Internship (Min 60 hrs)	4
	Total	8

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SEMESTER: V																			
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/IA	Int.	Ext.										
Theory																			
1	5SN01	Database Management System	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
2	5SN02	Artificial Intelligence	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
3	5SN03	Formal Language and Automata	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--	
4	5SN04	PEC-1	2	--	--	PEC	2	2	3	60	30	10	100	40	--	--	--	--	
5	5SN05	PEC-2	2	--	--	PEC	2	2	3	60	30	10	100	40	--	--	--	--	
6	MDM2	MDM-2	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--	
7	5SNOE3	OE-3	3	--	--	OE	3	3	3	60	30	10	100	40	--	--	--	--	
Practical																			
8	5SN06	Database Management System Lab	--	--	--	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
9	5SN07	Artificial Intelligence Lab	--	--	--	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
10	5SN08V	Computer Skill Lab III: Advanced Angular Development Lab	--	--	--	PCC	2	1	--	--	--	--	--	--	25	25	50	25	
		Total	19		0		25	22					700				150		
																Total	850		

PEC- 1:- 5SN04PE1A Mobile Computing,
PEC- 2:- 5SN05PE2A Cloud Computing,
OE-3 :- 5SNOE3A Knowledge Management

5SN04PE1B Information Security System
5SN05PE2B Digital Forensics,
5SNOE3B Intellectual Property Rights

5SN04PE1C Web Technology
5SN05PE2C Digital System Design
5SNOE3C Financial Planning

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SEMESTER: VI																		
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/IA			Int.	Ext.		

Theory

1	6SN01	Compiler Design	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
2	6SN02	Design and Analysis of Algorithm	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
3	6SN03	Data Science	2	--	--	PCC	2	2	3	60	30	10	100	40	--	--	--	--
4	6SN04	PEC-3	3	--	--	PEC	3	3	3	60	30	10	100	40	--	--	--	--
5	6SN05	PEC-4	3	--	--	PEC	3	3	3	60	30	10	100	40	--	--	--	--
6	MDM3	MDM-3	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--
7	6SDMP	Disaster Management and Preparedness	2	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--

Practicals

8	6SN06	Compiler Design Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
9	6SN07	Design and Analysis of Algorithm Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
10	6SN08	Data Science Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
11	6SN09	Minor Project	--	--	4	VSEC	4	2	--	--	--	--	--	--	25	25	50	25
		Total	19		10		29	22					600				200	
															Total		800	

PEC- 3: 6SN04PE3A Internet of Things,6SN04PE3B Mobile Application Design6SN04PE3C Digital Signal Processing

PEC- 4 : 6SN05PE4A Data Mining,6SN05PE4B Cryptography and Network Security6SN05PE4C Data Visualization

Exit Option: Two relevant skill-based courses (excluding from list of courses undertaken in First to Sixth semesters) to qualify for B. Voc.

S.No.	Title	Credit
1	Two relevant MOOC/NPTEL courses as decided by BOS	4
2	Internship (Min 60 hrs)	4
	Total	8

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
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Four Year Under Graduate Degree Program in Bachelor of Technology
Choice Based Credit System (Semester Pattern)
Branch: Information Technology

SEMESTER: VII																		
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/IA			Int.	Ext.		
Theory																		
1	7SN01	Machine Learning	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
2	7SN02	Embedded Systems	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
3	7SN03	PEC-5	2	--	--	PEC	2	2	3	60	30	10	100	40	--	--	--	--
4	7SN04	PEC-6	2	--	--	PEC	2	2	3	60	30	10	100	40	--	--	--	--
5	MDM4	MDM-4	3	--	--	MDM	3	3	3	60	30	10	100	40	--	--	--	--
Practicals																		
6	7SN05	Machine Learning Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
7	7SN06	Embedded Systems Lab	--	--	2	PCC	2	1	--	--	--	--	--	--	25	25	50	25
8	7SN07	Research Methodology	--	--	4	ELC	4	2	--	--	--	--	--	--	50	--	50	25
9	7SN08	PROJECT	--	--	12	ELC	12	6	--	--	--	--	--	--	100	100	200	100
		Total	13		20		33	23					500				350	
															Total		850	

PEC- 5 7SN03PE5A Block Chain, 7SN03PE5B Big Data Analytics 7SN03PE5C Image Processing
PEC- 6 : 7SN04PE6A Distributed Computing, 7SN04PE6B Virtual Reality & Augmented Reality, 7SN04PE6C Pattern Recognition

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: Information Technology

SEMESTER: VIII																		
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/IA			Int.	Ext.		
Theory																		
1	8SN01	Software Engineering*	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
2	8SN02	Natural Language Processing*	3	--	--	PCC	3	3	3	60	30	10	100	40	--	--	--	--
Practicals																		
4	8SN03	Internship/On Job Training (OJT)/ Apprenticeship	--	--	24	ELC	24	12	--	--	--	--	--	--	150	150	300	150
		Total	6		24		30	18					200				300	
																Total	500	

*Internal Assessment marks (Total 30 marks) will be calculated on the basis of MCQ Test online (15 marks) Unit-1 and Unit-2 and case study (15 Marks) based on subject's syllabus

Credits

Sem	SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI	SEM VII	SEM VIII	Total
Credits	21	21	23	23	22	22	23	18	173

MDM BASKETS OF COURSES FOR ALL Departments

MDM Basket/ Track Name	Sr. No.	Course Code	Course Name	Semester	Students from following Departments can Register	Offered by Department of
Artificial Intelligence	1	4SAMDM1	Artificial Intelligence and Expert Systems	IV	CE, CSE, EXTC, IT, CSE(IoT), ME	Artificial Intelligence and Data Science
	2	5SAMDM2	Applied Artificial Intelligence	V		
	3	6SAMDM3	Generative Artificial Intelligence	VI		
	4	7SAMDM4	Safe and Responsible Artificial Intelligence Systems	VII		
Data Science	1	4SAMDM5	Programming for Data Science	IV	CE, CSE, EXTC, IT, CSE(IoT), ME	
	2	5SAMDM6	Business Intelligence and Analytics	V		
	3	6SAMDM7	Data Engineering	VI		
	4	7SAMDM8	Ethics in Data Science	VII		
Civil Engineering	1	4SCMDM1	Introduction to Environmental Engineering	IV	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	Civil Engineering
	2	5SCMDM2	Introduction to Water Resource Engineering	V		
	3	6SCMDM3	Introduction to Transportation Engineering	VI		
	4	7SCMDM4	Basics of Structural Analysis	VII		
Construction Technology	1	4SCMDM5	Building Planning	IV	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	
	2	5SCMDM6	Construction Materials	V		
	3	6SCMDM7	Basics of Surveying	VI		
	4	7SCMDM8	Basics of Geotechnical Engineering	VII		
Computer Science and Engineering	1	4SKMDM1	Fundamentals of Data Structures	IV	CE, EXTC, CSE(IoT), ME	Computer Science and Engineering
	2	5SKMDM2	Introduction to Algorithms	V		
	3	6SKMDM3	Database Management System	VI		
	4	7SKMDM4	Basics of Enterprise Resource Planning	VII		

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	
Software Engineering	1	4SKMDM5	Software Requirements Engineering	IV	AI&DS, CE, EXTC, IT, CSE(IoT), ME	Computer Science and Engineering	
	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			

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	
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	Computer Science & Engineering(IoT)	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			

DOUBLE MINOR (SPECIALIZATION) BASKETS OF COURSES FOR ALL DEPARTMENTS

Double Minor / Specialization Minor Basket TrackName	Sr. No.	Course Code	Course Name	Semester	Students from following Departments can Register	Offered by Department of
Advanced Programming	1	3SASM	Programming Language for Data Science	III	CSE, CE, EXTC, IT, CSE(IoT), ME	Artificial Intelligence and Data Science
	2	4SASM	Advanced Java Programming	IV		
	3	5SASM	Mobile Application Development	V		
	4	6SASM	Introduction to Gaming	VI		
	5	7SASM	Introduction to Software Development Platform (GitHub)	VII		
	6	8SASM	Databases and SQL for Data Science	VIII		
Construction Management and Environmental Engineering	1	3SCSM	Environmental Pollution and Control	III	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	Civil Engineering
	2	4SCSM	Water Treatment Engineering	IV		
	3	5SCSM	Waste Water Treatment Engineering	V		
	4	6SCSM	Project Management and Planning	VI		
	5	7SCSM	Construction Material Management	VII		
	6	8SCSM	Construction Quality Management	VIII		
Web Technology	1	3SKSM	Introduction of HTML	III	AI&DS, CE, EXTC, IT, CSE(IoT), ME	Computer Science and Engineering
	2	4SKSM	JavaScript	IV		
	3	5SKSM	Web Engineering	V		
	4	6SKSM	Cloud Technology	VI		
	5	7SKSM	Distributed Database	VII		
	6	8SKSM	User Experience Design	VIII		
Embedded System	1	3SESM	Fundamentals of Digital Electronics	III	AI&DS, CE, CSE, IT, ME	Electronics and Telecommunication Engineering
	2	4SESM	Digital System Design	IV		
	3	5SESM	Introduction to Microprocessors	V		
	4	6SESM	Microcontroller and Applications	VI		
	5	7SESM	Advanced Microcontrollers	VII		
	6	8SESM	Embedded System and RTOS	VIII		

DOUBLE MINOR (SPECIALIZATION) BASKETS OF COURSES FOR ALL DEPARTMENTS

Double Minor / Specialization Minor Basket TrackName	Sr. No.	Course Code	Course Name	Semester	Students from following Departments can Register	Offered by Department of
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		
Industrial IoT	1	3STSM	Introduction to Internet of Things	III	AI&DS, CE, CSE, EXTC, IT, ME	Computer Science & Engineering (IoT)
	2	4STSM	Industrial Sensors and Actuators	IV		
	3	5STSM	Industrial Networks	V		
	4	6STSM	Embedded System for Internet of Things	VI		
	5	7STSM	Edge and Fog Computing	VII		
	6	8STSM	Internet of Things Security	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		

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

Honors Baskets of Courses for all Departments

Name of Department	Sr. No.	Course Code	Course Name	Semester
Information Technology	1	4SNH	Advanced Data Science	IV
	2	5SNH	Artificial Neural Network	V
	3	6SNH	Advanced Artificial Intelligence	VI
	4	7SNH	Advanced Machine Learning	VII
	5	8SNH1	Advanced Speech and Natural Language Processing	VIII
	6	8SNH2	Minor Project	VIII
Computer Science & Engineering (IoT)	1	4STH	IoT Architectures and Protocols	IV
	2	5STH	Internet of Things Security	V
	3	6STH	Embedded Systems and IoT	VI
	4	7STH	Machine Learning For IoT	VII
	5	8STH1	Data Science in IoT	VIII
	6	8STH2	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

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 OF COURSES for 4th Semester

Semester	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours / Week			Honours Course Applicable to Students of	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.		
IV	4SAH	Advanced Programming for Data Science	3	--	--	Artificial Intelligence & Data Science		3	3	60	30	10	100	40	--	--	--	--
IV	4SCH	Air Pollution and Control	3	--	--	Civil Engineering		3	3	60	30	10	100	40	--	--	--	--
IV	4SKH	Data Science and Analytics	3	--	--	Computer Science and Engineering		3	3	60	30	10	100	40	--	--	--	--
IV	4SEH	PLC & SCADA	3	--	--	Electronics and Telecomm. Engineering		3	3	60	30	10	100	40	--	--	--	--
IV	4SNH	Advanced Data Science	3	--	--	Information Technology		3	3	60	30	10	100	40	--	--	--	--
IV	4STH	IoT Architectures and Protocols	3	--	--	Industrial Internet of Things		3	3	60	30	10	100	40	--	--	--	--
IV	4SMH	Energy Audit	3	--	--	Mechanical Engineering		3	3	60	30	10	100	40	--	--	--	--
		Total	3					3					100					

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 OF COURSES for 5th Semester

Semester	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours / Week			Honours Course Applicable to Students of	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.		
V	5SAH	Advanced Data Science and Analytics	3	--	--	Artificial Intelligence & Data Science		3	3	60	30	10	100	40	--	--	--	--
V	5SCH	Structural Dynamics	3	--	--	Civil Engineering		3	3	60	30	10	100	40	--	--	--	--
V	5SKH	Natural Language Processing and Text Analytics	3	--	--	Computer Science and Engineering		3	3	60	30	10	100	40	--	--	--	--
V	5SEH	Electronics Circuit Design	3	--	--	Electronics and Telecomm. Engineering		3	3	60	30	10	100	40	--	--	--	--
V	5SNH	Artificial Neural Network	3	--	--	Information Technology		3	3	60	30	10	100	40	--	--	--	--
V	5STH	Internet of Things Security	3	--	--	Computer Science & Engineering(IoT)		3	3	60	30	10	100	40	--	--	--	--
V	5SMH	Computer Aided Design	3	--	--	Mechanical Engineering		3	3	60	30	10	100	40	--	--	--	--
		Total	3					3					100					

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 OF COURSES for 6th Semester

Semester	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours / Week			Honours Course Applicable to Students of	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.		
VI	6SAH	Business and Web Analytics	3	--	--	Artificial Intelligence & Data Science		3	3	60	30	10	100	40	--	--	--	--
VI	6SCH	Geographic Information Systems	3	--	--	Civil Engineering		3	3	60	30	10	100	40	--	--	--	--
VI	6SKH	Artificial Neural Network	3	--	--	Computer Science and Engineering		3	3	60	30	10	100	40	--	--	--	--
VI	6SEH	Cognitive Radio	3	--	--	Electronics and Telecomm. Engineering		3	3	60	30	10	100	40	--	--	--	--
VI	6SNH	Advanced Artificial Intelligence	3	--	--	Information Technology		3	3	60	30	10	100	40	--	--	--	--
VI	6STH	Embedded Systems and IoT	3	--	--	Computer Science & Engineering (IoT)		3	3	60	30	10	100	40	--	--	--	--
VI	6SMH	Advance Heat Transfer	3	--	--	Mechanical Engineering		3	3	60	30	10	100	40	--	--	--	--
		Total	3					3					100					

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 OF COURSES for 7th Semester

Semester	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours / Week			Honours Course Applicable to Students of	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.		
VII	7SAH	Data Engineering	3	--	--	Artificial Intelligence & Data Science		3	3	60	30	10	100	40	--	--	--	--
VII	7SCH	Advanced Foundation Engineering	3	--	--	Civil Engineering		3	3	60	30	10	100	40	--	--	--	--
VII	7SKH	Optimization Techniques for Data Analytics	3	--	--	Computer Science and Engineering		3	3	60	30	10	100	40	--	--	--	--
VII	7SEH	Biomedical Signal Processing	3	--	--	Electronics and Telecomm. Engineering		3	3	60	30	10	100	40	--	--	--	--
VII	7SNH	Advanced Machine Learning	3	--	--	Information Technology		3	3	60	30	10	100	40	--	--	--	--
VII	7STH	Machine Learning for IoT	3	--	--	Industrial Internet of Things		3	3	60	30	10	100	40	--	--	--	--
VII	7SMH	3D Printing and Application	3	--	--	Mechanical Engineering		3	3	60	30	10	100	40	--	--	--	--
		Total	3					3					100					

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 OF COURSES for 8th Semester

Semester	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours / Week			Honours Course Applicable to Students of	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.		
VIII	8SAH1	Deep Learning and its Applications	3	--	--	Artificial Intelligence & Data Science		3	3	60	30	10	100	40	--	--	--	--
VIII	8SCH1	Finite Element Method	3	--	--	Civil Engineering		3	3	60	30	10	100	40	--	--	--	--
VIII	8SKH1	Computer Vision	3	--	--	Computer Science and Engineering		3	3	60	30	10	100	40	--	--	--	--
VIII	8SEH1	VLSI Design Verification and Testing	3	--	--	Electronics and Telecomm. Engineering		3	3	60	30	10	100	40	--	--	--	--
VIII	8SNH1	Advanced Speech and Natural Language Processing	3	--	--	Information Technology		3	3	60	30	10	100	40	--	--	--	--
VIII	8STH1	Data Science in IoT	3	--	--	Industrial Internet of Things		3	3	60	30	10	100	40	--	--	--	--
VIII	8SMH1	Design of Transmission System	3	--	--	Mechanical Engineering		3	3	60	30	10	100	40	--	--	--	--
VIII	8SNH2	Minor Project	3			Information Technolog		3	--	--	--	--	--	--	50	50	100	50
		Total	3					6					100					

Prof. Ram Meghe Institute of Technology and Research Badnera-Amravati

(An Autonomous Institute)

Four Year Under Graduate Degree Program in Bachelor of Technology

Branch: Information Technology

Syllabus of 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 : Nonhomogeneous 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.

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

Course pre-requisites:

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 fiber optics, its types and applications.
6. The students will gain the knowledge of fluid dynamics and its applications.

	Subject: Applied Physics	L (Hrs)
Unit-1	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.	08

Unit-2	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.	06
Unit-3	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.	07
Unit-4	Laser Physics: Absorption, spontaneous and stimulated emission of radiation, population inversion, pumping, metastable state, characteristics and applications of laser, Ruby laser, He-Ne Laser.	06
Unit-5	Fiber Optics: Snell's law, total Internal reflection, construction of optical fiber, acceptance angle and acceptance cone, numerical aperture, types of optical fiber, attenuation, fiber optic communication system.	07
Unit -6	Fluid Dynamics: Viscosity, Stoke's law, streamline and turbulent flow of liquid, Poiseuille's equation, Continuity equation, Bernoulli's theorem.	06
	Total	40

Recommended 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.

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 (Hrs)
Unit-1	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-2	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-3	Projection of Solids: Projection of solids for Prism, Pyramid, Cone and Cylinder.	05
Unit-4	Orthographic Projection: Construction of elevation, plan and side view of given object by using first and third angle projection methods.	05
Unit-5	Isometric Views and Projection: Construction of isometric scale, isometric views and projection.	06
Unit -6	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

Recommended 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.

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

Course Pre-requisites: Nil

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 operations in C.

	Subject: Programming for Problem Solving	L (Hrs)
Unit-1	Introduction: Characteristics of Computer, Organization of Computer, Input –Process Output Cycle Various Types of Memory	05

	(Primary Memory & Secondary Memory), Introduction to C language, Basic structure.	
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

Recommended 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

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

Course Pre-Requisites:

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. To develop skills needed for approaching different types of interviews.
6. To become ethical confident individual professionally and socially.

	Subject: Professional Communication Skills	L (Hrs)
Unit-1	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	05
Unit-2	Unseen passage, vocabulary building (Synonyms & Antonyms, Prefix and Suffix, Error Analysis, one word substitute), developing story on given outline.	05
Unit-3	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	05
Unit-4	Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic-	05

	questioning and clarifying –GD strategies- activities to improve GD skills	
Unit-5	Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview & panel interview – FAQs related to job interviews	05
Unit -6	Recognizing differences between groups and teams- networking professionally- respecting social protocols-understanding career management-developing a long- term career plan-making career changes.	05
	Total	30

Recommended 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

References:

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

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. Explain the fundamental concepts and components of multimedia, its historical development and current trends.
2. Apply multimedia authoring tools and techniques to create and manipulate graphics, images, and multimedia content.
3. Develop proficiency in 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 web examine its history, and discuss the major issues in web solution development.
4. Understand the basics of HTTP and the concepts of persistent and non-persistent connections.
5. Utilize the elements and attributes of HTML
6. Compare and contrast the advantages and compatibility of CSS

	Subject: Multimedia and Web Designing	L (Hrs)
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

Recommended 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.
- Joel Sklar: Text Book of Web Design, CENGAGE Learning.

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

Course Pre-requisites: 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 (Hrs)
Unit-1	Fundamentals of Design Thinking: Principles of Design Thinking, the process of Design Thinking, how to plan a Design Thinking project	02
Unit-2	Understanding the Design Problem: Search field determination, Problem clarification, Understanding of the problem, Problem analysis, Reformulation of the problem	03
Unit-3	Observing the Problem: Observation Phase, Empathetic design, Tips for observing, Methods for Empathetic Design	02
Unit-4	Defining the Problem: Point-of-View Phase, Characterization of the target group, Description of customer needs	03
Unit-5	Finding and Selecting Ideas: Ideate Phase, The creative process and creative principles, Creativity techniques, Evaluation of ideas	02
Unit -6	Prototyping: Prototype Phase, Lean Startup Method for Prototype Development, Visualization and presentation techniques	02
	Total	14

Recommended 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:

1. Dr. D. Ravindran, Introduction to Design Thinking, Notion Press

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, Analyze the obtained data and Draw conclusions from the Laboratory exercise based on the analyzed 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)

Recommended Text Books:

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

Reference Books:

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

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

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 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 **1SF04 Programming for Problem Solving***

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

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 develop the ability to apply Cascading Style Sheets (CSS) to enhance the presentation of web pages and improve 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
 - d. Any other relevant

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.
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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

Branch: Information Technology

Syllabus of Semester-II

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

Course pre-requisites:

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. Able to 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 integral over bounded regions.
6. Evaluate triple integral and its applications.

	Subject: Applied Mathematics-II	L (Hrs)
Unit-1	Matrices: Rank of a matrix, Consistency of linear system of equations by matrix method, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof).	07
Unit-2	Fourier series: Fourier expansion of function in $(C, C+2L)$, half range Fourier series.	06
Unit-3	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.	07
Unit-4	Integral Calculus I: Differentiation under integral sign, Beta Function and Gamma Function.	07
Unit-5	Integral Calculus II: Double integration, change of order of integration, transformation to polar coordinates, Evaluation of area by double integration.	06
Unit -6	Integral Calculus III: Triple integration, Transformation to spherical polar coordinates, Volume of solid by triple integration.	07
	Total	40

Recommended 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. – Advanced Engineering Mathematics (S. Chand)

Course Code	Course Title	L	T	P	C
2SF02	Applied Chemistry	03	00	00	03

Course Pre-requisites:

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	L (Hrs)
Unit-1	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.	06
Unit-2	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.	06
Unit-3	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.	08
Unit-4	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.	07

Unit-5	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.	06
Unit -6	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.	07
	Total	40

Recommended 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).

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

Course Pre-requisites:

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

Course Learning Objectives:

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

Course Outcomes:

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

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

	Subject: Basics of Electrical Engineering	L (Hrs)
Unit-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

Unit-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
Unit-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
Unit-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
Unit-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
Unit -6	Single phase Transformer: Single-phase transformer construction and working (Ideal and practical), Types of Transformers, EMF equation of Transformer, Efficiency & Regulation of transformer, condition for maximum efficiency. Electrical Safety: Safety precautions in electrical installation, Earthing, Types of Earthing (Plate and Pipe Earthing)	05
	Total	30

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.

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

Course Pre-requisites: Nil

Course Learning Objectives:

1. To acquire the knowledge of basic concepts of biology and need of the subject in Engineering.
2. To study the human organs and their analogy with the 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 (Hrs)
Unit-1	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	05

Unit-2	Human Organ Systems and Bio Designs – 1 Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics.). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signaling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).	05
Unit-3	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-4	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-5	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	05
Unit -6	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 selfcleaning 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).	05
	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 AC Udayashankar Lambert Academic Publishing, 2019.
8. 3D Bioprinting: Fundamentals, Principles and Applications by Ibrahim Ozbolat, Academic Press, 2016.

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

Course Pre-requisites: 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

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 (Hrs)
Unit-1	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 selfexploration, 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	05

Unit-2	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	05
Unit-3	Understanding Harmony in the Family and Society- Harmony Human - Human Relationship: Understanding harmony in the Family- the basic unit of human interaction, understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas.	05
Unit-4	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!	05
Unit-5	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	05
Unit -6	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.	05
	Total	30

Recommended Text Book:

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

References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Susan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A 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 Tantra 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

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

Course Pre-requisites: 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: Introduction to Python	L (Hrs)
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

Recommended Text Book:

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

Reference Books:

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

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

Course Pre-requisites: Nil

Course 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 (Hrs)
Unit-1	India's Contribution to Science and Technology: Pre-Independence contribution. Brief information about various fields of contributions.	04
Unit-2	Contribution in Astronomy: The Beginnings of Indian Astronomy, The Early Historical Period, The Siddhāntic Era, The Kerala School, Other Post-Siddhāntic Developments.	04
Unit-3	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	04

Unit-4	Contributions to Mathematics: First Steps , contributions from: early historical period, the classical period, the classical period: post Aryabhata, contributions of Shri P C Mahalanobis, Shri Shrinivasa Ramajujan.	05
Unit-5	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 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.	05
Unit -6	Contributions to Plant and Animal Science Plant Science in Ancient India, Animal Science in Ancient India, Indian Traditional Knowledge on Environmental Conservation.	04
	Total	26

Recommended Text Book:

1. Indian Contributions to Science compiled by Vijnana Bharati

Reference Books:

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

Term Work: (50 Marks)

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

Marking scheme:

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

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

Course Pre-Requisites:

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:

1. Determine the properties of water, chemical fuel, lubricant and cement based on laboratory techniques.
2. Synthesize co-crystals and determination of melting point of it.
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

Recommended 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

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

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

List of Experiments:

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

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

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 Pythonbased practical tasks.
3. Analyze outputs, interpret results, formulate findings, and draw appropriate conclusions based on the objectives of the given practical.

List of Experiments:

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

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.

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, equipment's 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

Branch: Information Technology

Syllabus of Semester-III

Course Code	Course Title	L	T	P	C
3SN01	Applied Mathematics – III	03	00	00	03

Course Prerequisite:

1. Essential knowledge of differential and Integral Calculus
2. Basic knowledge of Probability and Vector Algebra

Course Learning Objectives: -

1. Solve linear and partial differential equations, as well as linear difference equations, using analytical methods based on characteristic roots and general solution techniques.
2. Apply empirical laws and numerical methods to interpret data, model relationships between variables, and perform computations effectively.
3. Analyse vector fields through vector differentiation to understand their physical and geometric interpretations in applied contexts.

Course Outcomes:

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

1. Apply the knowledge to solve differential equations by various methods
2. Demonstrate the basic concepts of Statistics
3. Demonstrate the basic concepts of Probability
4. Identify and solve certain forms of partial differential equation and difference equations
5. Use numerical methods to obtain appropriate solutions
6. Apply the knowledge of vector calculus to solve physical problems

	Subject: Applied Mathematics – III	L (Hrs)
Unit-1	Ordinary differential equations: Complete solution of linear differential equation by using complementary function and particular integral, Cauchy's linear differential equations	07
Unit-2	Statistics: Curve fitting by least square method for straight lines and parabola, Coefficient of Correlation, Line of Regression	07
Unit-3	Probability: Binomial Distribution, Poisson Distribution, Normal Distribution	07
Unit-4	a. Difference equation: Complete solution of linear difference equation with constant coefficients b. Partial differential equation: Lagrange's linear equation of first order	07
Unit-5	Numerical Methods: Solution of algebraic and transcendental equations by Newton-Raphson method, Solution of system of linear equations by Gauss-Seidal method, Numerical solution of differential equations by Picard's method, Taylor's series method and Runge-Kutta fourth order method	07
Unit -6	Vector calculus: Scalar and vector point functions, Differentiation of vectors, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point	07
	Total	42

Recommended Text Book :-

1. "A Text Book of Applied Mathematics Vol.- II" by Wartikar P.N. & Wartikar J.N.- Pune V.G. Prakashan, Pune.
2. "Higher Engineering Mathematics 40/e" by Grewal B.S., Khanna Publishers.
3. "Advance Engineering Mathematics" by Dass H. K., S. Chand

Reference Books:-

1. "Advanced Engineering Mathematics" by Kreyszig E.K. -, John Wiley.
2. "Higher Engineering Mathematics" by Ramana B.V., (TMH).
3. "Engineering Mathematics" by Singh R.R. & Bhatt M., (TMH).

Course Code	Course Title	L	T	P	C
3SN02	Object Oriented Programming	03	00	00	03

Course Prerequisite: 1SF04 Programming for Problem Solving

Course Learning Objectives:

1. Demonstrate the fundamentals of object-oriented programming using Java, including the use of methods, constructors, arrays, and core principles like inheritance, polymorphism, abstraction, and encapsulation.
2. Explain the different types of exception-handling techniques and perform filehandling operations for effective data management.
3. Develop interactive and concurrent applications using multithreading, event handling, and the event delegation model for GUI-based program design.

Course Outcomes:

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

1. Explain and apply basic concepts of OOP using Java programming language
2. Apply and implement OOP concepts like method, constructor and Array
3. Apply the OOP principles in programming for solving real life problems
4. Demonstrate various file handling input output operations and use of exception handling
5. Create the multithreading using java programming
6. Design Graphical user interface using Java Window toolkit and event handling mechanism

	Subject: Object Oriented Programming	L (Hrs)
Unit-1	Introduction to Object Oriented Programming: Introduction, Need of OOP, Principles of Object-Oriented Languages, Procedural Language Vs OOP, Application of OOP, Java Virtual Machine, Java features, Program Structures. Introduction to Software Development Life Cycle (SDLC) Java	07

	Programming Constructs: Variables, Primitive data types, Identifier, Literals, Operators, Expressions, Primitive Type Conversion and Casting, Flow of Control	
Unit-2	Classes, Objects and Methods: Classes, Objects, Creating Objects, Methods, Constructors, Class Variable and Methods, this keyword, Arrays, Command Line Arguments. Introduction to String class	07
Unit-3	Object Oriented Principles: Inheritance, Polymorphism, Method Overloading, Method Overriding, super keyword, final keyword, Access Modifiers, Abstract class, Interfaces, Packages	07
Unit-4	Exception Handling & Input /Output files in Java: Exception Introduction, Exception handling Techniques, Multiple Catch Statements, Using Finally Statement, User-defined exception, Input / Output: The java.io.file Class, Reading and Writing data, Randomly Accessing a file, reading and writing files using I/O package	07
Unit-5	Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Lifecycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface	07
Unit -6	GUI & Event Handling: Introduction to applet & applet life cycle, Event delegation Model, java.awt.event Description, Sources of events, Event Listeners, Adapter classes, Abstract Window Toolkit: Introduction, Components and Containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Textfield and Textarea, Container Class, Layouts, Menu, Scrollbar	07
	Total	42

Recommended Text Book:

1. "Programming in Java" by Sachin Malhotra and Saurabh Choudhary, Oxford University Press 2010.

Reference Books:

1. "Java Complete References" by Herbert Schildt, McGraw Hill
2. "Programming with Java" by E. Balagurusamy, McGraw Hill
3. "A Programmer's Guide to Java Certification 3rd Edition" by Khalid Mughal, Pearson
4. "A Text Book of Java Programming" by Liang:, PHI

Course Code	Course Title	L	T	P	C
3SN03	Analog and Digital Electronics	02	00	00	02

Course Prerequisite: 1SF02 Applied Physics,
2SF03 Basics of Electrical Engineering

Course Learning Objectives:

1. Understand the basic operation and applications of Bipolar Junction Transistors (BJT)
2. Introduce linear integrated circuits like OPAMP IC-741 & Timer IC-555
3. Illustrate digital logic expression realization & minimization concepts using K-Map.
4. Summarize the working of various Combinational and Sequential logic circuits.

Course Outcomes:

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

1. Outline the basic applications of Bipolar Junction Transistor (BJT).
2. Get acquainted with analog ICs like Op-Amp IC-741
3. Explain the working of Oscillators and Timer circuits
4. Apply the concept of K-Map to simplify logic expressions
5. Design and implement combinational circuits
6. Explore the applications of sequential circuits

	Subject: Analog and Digital Electronics	L (Hrs)
Unit-1	Introduction to Analog Circuits: Transistor as an Amplifier, Need of biasing, Potential divider bias circuit, Transistor as a Switch	05
Unit-2	Linear Integrated Circuits: OP AMP: Block diagram of Op-Amp, ideal Op-Amp parameters. Applications of op-amp: Inverting & Non-Inverting Amplifier, Summing Amplifier, Comparator	05

Unit-3	Oscillators and Timers: Transistor as an Oscillator: Barkhausen Criterion, R-C Phase Shift Oscillator, Working principle of Crystal oscillator, Timer IC 555: Block diagram, working, Astable multivibrator, Monostable multivibrator	05
Unit-4	Introduction to Digital Circuits: Logic gates, Standard logic expression forms, SOP, POS, Logic expression realization & minimization using K-map (up to four variables only)	05
Unit-5	Introduction to Combinational Circuits: Adders and Subtractors, Code convertors (BCD and Gray), Introduction to Multiplexers, Demultiplexers, Encoders and Decoders	05
Unit -6	Introduction to Sequential Digital Circuits: Difference between Combinational and Sequential circuits, Working of SR, JK, D & T Flip- Flops, Asynchronous counters, Mod counter, Up-Counter, Down-Counter. Working of Shift Registers	05
	Total	30

Recommended Text Books:

1. “Principles of Electronics” by V. K. Mehta, Rohit Mehta, S.CHAND Publication
2. “Modern Digital Electronics” by Jain R.P., TMH Publication
3. “Op-Amps & Linear Integrated circuits” by Gayakwad R.A, PHI Publication

Reference Books:

1. “Basic Electronics & Linear circuits” by N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta: (TTTI)
2. “Electronics Devices & circuits” by S. Salivahanan:, McGwar Hill Publication , Third Edition
3. “Introduction to Digital Logic Design” by John P. Hayes, Pearson Education
4. “Fundamentals of Digital Circuits” by Anand Kumar, PHI Publication
5. “Electronic Devices and Circuits” by K R Botkar,

Course Code	Course Title	L	T	P	C
3SN04	Discrete Structure & Graph Theory	03	00	00	03

Course Prerequisite: 1SF01 Applied Mathematics-I,

2SF01 Applied Mathematics-II

Course Learning Objectives: -

1. Develop critical thinking and ethical awareness through the application of discrete mathematical logic and analytical problem-solving techniques.
2. Analyse and solve problems involving sets, relations, functions, recursion and boolean algebra by formulating effective solutions using appropriate discrete mathematical methods.
3. Construct, interpret and draw conclusions from discrete structures such as graphs and trees in various computational and real-world contexts.

Course Outcome:

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

1. Identify basic terminology of Mathematical Logic, Theory of inference & Predicate calculus
2. Identify, illustrate, and solve engineering problems based on set theory
3. Identify and Design Algebraic Structures and grammar
4. Examine and formulate the concept of Lattices & Boolean Algebra to solve engineering problems
5. Design and interpret graphs
6. Design and interpret Trees

	Subject: Discrete Structure & Graph Theory	L (Hrs)
Unit-1	Mathematical Logic: Statements & Notation, Connectives, Normal forms, The Theory of Inference for the Statement Calculus, Predicate Calculus, The Inference Theory of the Predicate Calculus	07

Unit-2	Set Theory: Basic concepts of Set Theory, Representation of Discrete Structure, Relation and ordering, Functions	07
Unit-3	Algebraic Structures: Algebraic Systems, Semi groups and Monoids, Grammars and Languages, Polish expression & their compilation, Groups, Semi groups	07
Unit-4	Lattice & Boolean Algebra: Lattices as Partially Ordered Sets, Boolean Algebra, Boolean Functions, Representation of Boolean Functions, Tabulation	07
Unit-5	Graph Theory: Basic concepts of Graph Theory, Paths, Reachability & Connectedness, Matrix representation of graphs, Storage Representation and Manipulation of Graphs, Coloring Graphs	07
Unit -6	Trees: Tree Searching, Minimal spanning trees, Simple Precedence Grammars, rooted tree, expression tree, Distance between spanning trees of a graph. PERT and related techniques	07
	Total	42

Recommended Text Book:

1. “Discrete Mathematical Structures with Application to Computer Science” by J. P. Trembley, R. Manohar, Tata McGraw Hill, Latest Edition

Reference Books:

1. “Discrete Mathematical Structures” by Bernard Kolman, Robert C. Busby, Sharon Ross, Third Edition PHI.
2. “Discrete Mathematical Structures” by G Shankar Rao, , New Age International, 2002
3. “Discrete Mathematics and its Applications” by Kenneth H. Rosen, 7th Edition, McGraw Hill Edition.
4. “Discrete Mathematics” by S.K. Chakraborty & B.K.Sarkar OXFORD.

Course Code	Course Title	L	T	P	C
3SNOE1A	Open Elective-1: 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 (Hrs)
Unit-1	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-2	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-3	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-4	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-5	Major social problems in India: i. Illiteracy ii. Un-employment iii. High population. iv. Poverty. v. Corruption.	7
Unit -6	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

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. Saxena, Prakashan Kendra, Lucknow.
3. Introduction to Sociology, Vidhyabhushan and Sachdeva, KitabMahal, New Delhi

Course Code	Course Title	L	T	P	C
3SNOE1B	Open Elective-I: Industrial Safety	03	00	00	03

Course Pre-requisites: NIL

Course Learning Objectives:

1. To learn the principles of safety, terminologies in accident prevention and its theories
2. To study the theory and practice of occupational, health, ergonomics and hygiene
3. To study the principle of fire engineering and firefighting.

Course Outcomes:

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

1. Understand the Safety management system
2. Conduct Safety education and training for employees
3. Understand and apply Principles of accident prevention
4. Understand and contribute for Planning, organizing and directing for safety
5. Understand the Occupational health and hygiene
6. Understand the fire protection system

	Subject: Industrial Safety	L (Hrs)
Unit-1	Introduction to Safety Management System: Management: Concept, definition, nature and importance. Role and functions of Manager. Elements and functions of Management, Management Principles: General principles of Management	7
Unit-2	Development of safety movement: - Need for safety-safety and productivity-planning for safety planning procedure- safety policyformulation of safety policy-safety budget-role and qualification of safety professional-safety committees-need, types and functions of committees safety organizations	7

Unit-3	Accident prevention: - Basic philosophy of accident prevention-nature and causes of accidents accident proneness-cost of accidents-accident prevention methods-Domino theory-safety education and training- training methods-motivation and communicating safety-personal protective equipment	7
Unit-4	Safety management techniques: - Safety inspection-Safety sampling technique-Safety audit Safety survey-Incident recall technique-Job safety analysis-Damage control-Risk management. Involvement in safety: - Role of management-role of supervisors-role of workmen- role of unions-role of government	7
Unit-5	Occupational health and hygiene: - Functional units and activities of occupational health and hygiene-types of industrial hazards-physical, chemical, mechanical, electrical, social, biological, ergonomic and environmental hazards-factors impeding safety-housekeeping-hearing conservation programme	7
Unit-6	Industrial fire protection: - Fire chemistry-classification of fires-fire prevention activities-fire risks-fire load -contributing factors to industrial fires-fire detection-industrial fire protection systems	7
	Total	42

Text Books:

1. Industrial Safety Health and Environment Management Systems by R. K. Jain, Khanna Publications
2. Industrial Safety and Health Management Sixth Edition C. Ray Asfahl David W. Rieske Pearson Education, Inc
3. A course of Industrial Safety K U Mistry
4. Techniques of safety management Dar. Peterson
5. Industrial Safety and environment A K Gupta

Course Code	Course Title	L	T	P	C
3SNOE1C	Open Elective-I– 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: Introduction to Cyber Law	L (Hrs)
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.

Course Code	Course Title	L	T	P	C
3SN05	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:

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.

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

Course Code	Course Title	L	T	P	C
3SN06	Environmental Science	02	00	00	02

Course Pre-requisite: 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 environment and human health.

	Subject: Environmental Science	L (Hrs)
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 eco-system, structure and function of an ecosystem, Producers, consumers, decomposers, Food chains, food webs. Introduction, types, characteristic features, structure and function of the following eco systems: Forest ecosystem, Grass land ecosystem, Desert ecosystem, Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)	05
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 environment 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

Course Code	Course Title	L	T	P	C
3SN07	Object-Oriented Programming Lab	00	00	02	01

Course Prerequisite: 3SN02 Object-Oriented Programming

Course Learning Objectives:

1. Implement object-oriented system development using Java construct and object-oriented principals
2. Implement the concepts of Java file handling, exception handling, and multithreading.
3. Demonstrate the concept of GUI development and Event handling mechanism.

Course Outcomes:

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

1. Design and implement Java programs using oops control constructs and oops principles like inheritance, abstraction, polymorphism, and encapsulation.
2. Demonstrate various file handling input-output operations and use of exception handling in Java also develop multithreaded applications using Java programming.
3. Design an application using a graphical user interface using Java window toolkit and event handling mechanism.

List of Experiments:

Minimum 08-10 experiments should be conducted based on course 3SN02: Object Oriented Programming

Course Code	Course Title	L	T	P	C
3SN08	Analog and Digital Electronics Lab	00	00	02	01

Course Prerequisite: Analog and Digital Electronics

Course Learning Objectives:

1. To understand the working & applications of Bipolar Junction Transistor (BJT)
2. To explore various applications of linear integrated circuits.
3. To study various logic gates using truth tables.
4. To study and explore various combinational and Sequential logic circuits

Course Outcomes:

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

1. Implement Bipolar Junction Transistor (BJT) as amplifier & as switch
2. Apply analog electronics concepts using discrete devices and linear integrated circuits
3. Implement combinational logic using digital integrated circuits
4. Illustrate sequential logic using digital integrated circuits

List of Experiments:

Minimum 08-10 experiments should be conducted based on course 3SN03: Analog and Digital Electronics.

Course Code	Course Title	L	T	P	C
3SN09V	Computer Skill LabI: HTML 5, JavaScript	00	00	02	01

Course Prerequisite: Multimedia Web Design

Course Learning Objectives:

1. To understand the fundamentals of HTML5 and JavaScript for developing interactive web applications.
2. To design and create structured web pages using HTML5 elements, forms, tables, multimedia and semantic tags.
3. To apply JavaScript programming concepts, including control structures, functions, arrays and objects, to solve web-based problems.
4. To develop dynamic and responsive web pages using DOM (Document Object Model) manipulation, event handling and client-side validation techniques.

Course Outcomes:

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

1. Apply HTML5 and JavaScript concepts to create basic interactive web pages and web applications.
2. Design and develop well-structured web pages using HTML5 elements, forms, tables, multimedia, and semantic tags.
3. Implement JavaScript programs utilizing variables, operators, decision-making statements, loops, functions, arrays, and objects.

List of Experiments:

Minimum 8-10 Practical with one Mini project

Sr. No	List of Practical
1	Create First HTML5 Web Page - Design a basic web page using HTML5 document structure, headings, paragraphs, lists, images and hyperlinks.
2	Develop a Personal Resume Web Page - Create a resume webpage using HTML5 elements, images, links and lists.
3	Develop a Student Registration Form

	- Design a form using HTML5 input controls and validation attributes.
4	Design Structured Web Pages Using Tables and Semantic Elements - Create a college timetable and use semantic tags such as <header>, <nav>, <section>, <article> and <footer>.
5	Create a Multimedia Learning Portal - Integrate audio, video, PDFs and external resources using HTML5 multimedia elements.
6	Develop a Basic Calculator Using JavaScript - Perform arithmetic operations using JavaScript functions and event handling.
7	Implement Decision-Making and Looping Constructs - Create programs for grade calculation, number checking and pattern generation using conditional and looping statements.
9	Develop Applications Using Functions and Arrays - Create a student grade evaluation system and simple data-processing applications using functions and arrays.
10	Create Dynamic Web Pages Using DOM Manipulation - Develop a To-Do List Manager with add, edit, delete, and task completion functionalities.
11	Implement Form Validation and Browser Storage - Develop an Expense Tracker application using JavaScript validation and Local Storage.
12	Develop an Interactive Quiz Application - Display questions, evaluate answers, and generate scores dynamically.
13	Develop a Complete Online Examination System - Implement student login, MCQ-based examination, timer, result generation, score display and Local Storage support.
14	Mini Project

Course Code	Course Title	L	T	P	C
3SN10	Professional Communication	00	00	02	01

Course Prerequisite: 1SF05 Professional Communication Skills

Course Learning Objective

1. To foster students to become a good communicator in English, in spoken and written forms.
2. To engage students in proper listening skills and presentation skills through various student activities.
3. To expose students to exhibit stage courage and to improve their social competence.

Course Outcomes

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

1. Demonstrate English spoken communication
2. Apply appropriate type of communication in different situations
3. Acquire effective listening skills for better understanding
4. Develop proper written communication
5. Express and present their ideas effectively
6. Improve social competence

List of Experiments:

Minimum 08-10 activities involving students activities, in small groups to enable them to perform effective communication in different forms.

Course Code	Course Title	L	T	P	C
3SN11	Community Engagement Project / Field Project	00	00	02	01

Course Pre-requisite: Nil

Course Learning Objective:

1. To understand real-world community issues through field engagement.
2. To develop ethical communication and teamwork skills.
3. To apply academic knowledge in solving societal problems.

Course Outcomes:

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

1. Demonstrate the highest standards of professional and ethical conduct in relationship building in the community-campus partnership
2. Demonstrate critical and contemplative listening skills that help generate common ground for interactions with those from other positionalities while recognizing differences in dynamics of power, culture, values, and norms
3. Engage with diverse groups of people and perspectives which will foster their learning about existing assets, challenges, and aims of the community through data collection and survey
4. Demonstrate skills, awareness, and commitment to cross-cultural communication, relationship building, and reciprocity that allows them to negotiate difference through a pluralistic orientation
5. Articulate a heightened sense of personal responsibility to community issues, differentiating between distinct paths towards engagement, such as accompaniment, advocacy, service providers, and action researchers
6. Provide solutions to existing societal problems and certain critical issues

List of Projects:

Each group of 10 to 12 students is required to undertake a community engagement project to understand various societal problems, and critical issues and provide solutions to those problems using his/ her knowledge of the specialization field and other contemporary knowledge.

Term Work: 50 Marks Marking Scheme:

1. Field Visit – 20 Marks
 2. Project report – 20 Mark
 3. Attendance – 10 Marks
-

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

Four Year Under Graduate Degree Program in Bachelor of Technology

Branch: Information Technology

Syllabus of Semester-IV

Course Code	Course Title	L	T	P	C
4SN01	Operating System	03	00	00	03

Course Prerequisite:

1SF04 Programming for Problem Solving

4SN03 Data Structure and algorithms

4SN06 Computer Organization and Architecture

Course Learning Objectives:

1. Define operating systems, their types, processes, and threads.
2. Explain and analyze scheduling, synchronization, and deadlocks.
3. Describe and compare main and virtual memory management.
4. Apply concepts of file systems, disk scheduling, and distributed systems.

Course Outcomes:

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

1. Describe the role of operating systems and a process
2. Use the concept of process scheduling and thread
3. Demonstrate the concept of process synchronization and deadlock
4. Apply the main memory and virtual memory management scheme
5. Discuss the concept of file system management
6. Evaluate the concept of disk scheduling and describe distributed systems

	Subject: Operating System	L (Hrs)
Unit-1	Introduction: Operating System Definition, OS Services, System Calls, Types of System Calls, OS Structure, Process Concept, Process Scheduling, Operations on Processes, Cooperating & Inter-process Communication	07
Unit-2	Threads: Multithreading Models, Threading Issues, and Thread Life Cycle. CPU Scheduling: Concepts, Scheduling Criteria, Scheduling Algorithms	07
Unit-3	Process Synchronization: The Critical Section Problem, Semaphores, Monitors. Deadlocks: Definition& Characterization. Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	07
Unit-4	Main Memory: Background, Swapping, Contiguous Memory Allocation schemes, Paging, Segmentation. Virtual Memory: Background, Demand Paging, Process Creation, Page Replacement policies, Allocation of Frames, Thrashing	07
Unit-5	File-System Interface: Directory Structure, File-System Mounting, File Sharing, Protection, File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods Free-Space Management	07
Unit -6	Disk Scheduling, Disk Management, introduction of distributed Systems, types of distributed Systems	07
	Total	42

Recommended Text Books:

1. “Operating System Concepts”, Avi Silberschatz, P. B. Galvin, G. Gagne: John Wiley & Sons Publication., 6th Edition
2. “Operating Systems”, Achyut S. Godbole, Atul Kahate: McGraw Hill Publication, 3rd Edition.

Reference Books:

1. “Modern Operating Systems”, A..S. Tanenbaum Pearson Education, 4th Edition
2. “Operating Systems”, William Stallings Prentice-Hall, 9th Edition
3. “Operating Systems”, D. M. Dhamdhare Tata McGraw-Hill, 3rd Edition

Course Code	Course Title	L	T	P	C
4SN02	Computer Networks	03	00	00	03

Course Prerequisite: Nil

Course Learning Objectives:

1. Understand the fundamental concepts of computer networking and services offered by OSI model, design issues of data link layer and data link protocols
2. Study and understand multiple access protocols for efficient channel access and collision management in networks
3. Understand network layer design principles, including addressing, routing
4. Understand UDP and TCP protocols and discuss performance issues within the transport layer, application layer protocols and technologies

Course Outcomes:

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

1. Explain the fundamental concepts of computer networking and services offered by the OSI model
2. Discuss design issues of data link layer, error detection-correction technique and elementary data link protocols
3. Demonstrate multiple access protocols like ALOHA, CSMA, collision-free methods, and collision management in networks
4. Understand and apply network layer design principles, including addressing, routing, and Ethernet technologies
5. Use UDP and TCP protocols and performance issues within the transport layer
6. Describe application layer protocols and technologies

	Subject: Computer Networks	L (Hrs)
Unit-1	Introduction to Computer Networks: Uses of computer networks, Network Hardware, Network Software, Reference Models, Guided Transmission Media, Wireless Transmission, Communication Satellites, The Public Switched Telephone Network, The Mobile Telephone System, Cable Television.	07
Unit-2	Data Link Layer: Design issues, Error detection and correction, Elementary Data Link protocols, Sliding window Protocols, Example Data Link protocols	07
Unit-3	MAC Sublayer: The channel allocation problem, Multiple Access protocols, Ethernet, Wireless LANS, Broadband Wireless, Blue tooth, Data Link Layer Switching	07
Unit-4	Network Layer: Design issues, Routing Algorithms, Internet Working, IPv4 Protocol, IP addresses, IPv6 addressing, Internet Control Protocol.	07
Unit-5	The Transport Layer: Transport Layer Services, The internet transport protocols UDP and TCP, Delay Tolerant Networking.	07
Unit 6	The Application Layer: DNS, Electronic Mail, The World Wide Web, Streaming Audio and Video	07
	Total	42

Recommended Textbook:

1. “Computer Networks” by Andrew S. Tanenbaum, Pearson Education, Fifth Edition

Reference Books:

1. “Computer Networking” by James F. Kurose & K W Ross, Pearson Education (LPE), 7th Edition
2. “Computer Network & Internet” by Douglas E. Comer, Addison Wesley., 5th Edition
3. “Communication Networks” by Leon Garcia & Widjaja: TMH, 2nd Edition
4. “Data & Computer Communication” by William Stallings: Pearson Education, 10th Edition

Course Code	Course Title	L	T	P	C
4SN03	Data Structure	03	00	00	03

Course Prerequisite: 1SN04 Programming for Problem Solving

Course Learning Objectives:

1. Understand the Data Structures and its memory representations
2. Equip the student with the ability to identify and analyze the usage of various data Structure
3. Understand various data searching, sorting and their complexity

Course Outcomes:

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

1. Describe the basics of Data Structures and algorithms
2. Explain the Data Structures array with various operations and its applications
3. Implement Link List and its Types with operations
4. Illustrate with example stack and queue operations
5. Examine the binary tree and its traversal methods
6. Construct Graph and shortest path algorithm and various sorting techniques

	Subject: Data Structure	L (Hrs)
Unit-1	Data Structure Basics and Pattern Matching: Data structures basics, algorithmic notations & functions, Complexity of algorithms, Subalgorithms. String Processing: storing strings, pattern matching algorithms – Fast and slow	07
Unit-2	Arrays: linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, Bubble sort, linear search and Binary search algorithms. Multidimensional arrays, Pointer arrays. Record structures and their memory representation	07
Unit-3	Linked List: Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion, deletion operations on linked lists. Header linked lists, Introduction to Two-way linked lists	07

Unit-4	Stacks & Queues: Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, an application of stacks, Implementation of recursive procedures by stacks, Queues, Priority queues	07
Unit-5	Trees: Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes: threads, Binary Search Trees-Searching, insertion and deletion in BST. Heap and heap sort, Path length & Huffman's algorithm	07
Unit -6	Sorting Algorithms and Hashing: Insertion Sort, Selection Sort. Radix sort, Merge Sort, Hashing Techniques	07
	Total	42

Recommended Text Book:

1. "Data Structures" by Seymour Lipschutz:, Schaums Outline Series, McGraw-Hill, Int. Editions.

Reference Books:

1. "Data Structures and algorithms" by Forouzan, Gilberg, CENGAGE Learning, 3rd Edition
2. "Data Structures using C" by Reema Thareja, Oxford University Press, 2nd Edition. 2011.
3. "Magnifying Data Structures" by Arpita Gopal, PHI (EEE), 2010, EBook
4. "Fundamentals of Data Structures" by Ellis Horowitz and Sartaj Sahani, CBS Publications, 2nd Edition

Course Code	Course Title	L	T	P	C
4SNOE2A	Aptitude for Engineers	03	00	00	03

Course Prerequisites:

Basic knowledge of Mathematics.

Course Learning Objectives:

1. To learn the basics of aptitude.
2. To learn the fundamentals of Quantitative Aptitude and Reasoning
3. To learn the simple techniques to solve problems on Aptitude and Reasoning

Course Outcomes:

Students will be able to –

1. Apply the knowledge of calculation speed in aptitude.
2. Understand the basic concepts of Arithmetic ability.
3. Understand the basic concepts of Quantitative ability.
4. Develop the General Mental Ability.
5. Acquire satisfactory competency in Reasoning.
6. Apply the basic concepts of Data Interpretation.

	Subject: Aptitude for Engineers	L (Hrs)
Unit-1	Basic of Aptitude: Importance of calculation speed, Multiplication Techniques, Method to find out Square and Square roots, Cube and Cube roots, Simplification, Basic concepts of Percentage.	07
Unit-2	Arithmetic Ability: Basic concepts of Ratio and Proportion, Combination of Ratios, Average, Problems on Ages	07
Unit-3	Quantitative Ability: Basic concept of Time and work, Pipe and Cisterns, Fundamental relationship between time, speed and distance, Problems on Train,	07
Unit-4	General Mental Ability: Series Completion: Types of Number Series, Alphabet Series, Alphanumeric Series, Continuous pattern series, Introduction to Coding – decoding, Letter coding, Direct letter coding,	07

	Number symbol coding, deciphering message word codes, Alpha-Numeric sequence puzzle.	
Unit-5	Reasoning Ability : Basic concepts of Blood Relation, relation puzzle, coded relation, Important fact of a Clock and Calendar and its numerical, Problem on Directional sense	07
Unit -6	Data Interpretation: Introduction to Tabulation Data, Basic concepts of Bar Graph, Fundamentals of Pie Chart.	07
	Total	42

Recommended Text Books:

1. Quantitative Aptitude, Dr. R.S. Aggrawal, S. Chand & Company Ltd.
2. A Modern Approach to Verbal and Non Verbal Reasoning, Dr. R.S. Aggrawal, S. Chand & Company Ltd..

Reference Books :

1. A New Approach to Reasoning Verbal, Non Verbal and Analytical, BS Sijwali and Indu Sijwali, Arihant Publication Ltd
2. Complete Mathematics Part-1, Rishikesh Kumar, Lucent Publication Ltd.
3. Quantitative Aptitude, Abhijit Guha, McGraw Hill
4. Quantitative Aptitude for CAT, Trishna, Pearson Publication.

Course Code	Course Title	L	T	P	C
4SNOE2B	Project Management	03	00	00	03

Course Pre-requisite: Nil

Course Learning Objectives:

1. Students should be able to understand Project Life Cycle and Project Development Steps.
2. Student should be able to carry out project planning using tools like BAR chart.
3. Student should be able to carry out project planning using tools Networking methods like CPM, PERT etc.
4. Student should know process and need of PERT

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

1. Apply the knowledge of management functions like planning, scheduling, executing and controlling to construction projects.
2. Solve and apply various planning tools like BAR chart to compare and control the project at the time of execution.
3. Demonstrate their capability for preparing the project networks to work out best possible time for completing the project.
4. To understand the concept of PERT.
5. Develop the various report writing techniques for successful completion of projects.
6. To understand importance and application of project management performance

	Subject: Project Management	L (Hrs)
Unit-1	Project Project, Project life cycle - Conceptual Phase, Planning Phase, Execution Phase, Termination phase, Project Stakeholders. Concept of feasibility study Project identification considering objectives and SWOT analysis, Screening of Project Ideas	07
Unit-2	Introduction on Bar Chart Work break down structure, Project Monitoring & Controlling, Planning Tools: Basic concept of Bar Chart, their advantage, limitations, Numerical on Bar Chart. Technical Feasibility: Process selection, Level of automation, Plant capacity, Acquiring technology, appropriate technology plant location, Equipment selection & procurement, Govt. policies.	07

Unit-3	Networking Networking – Activity, Event, Dummy Activity, Fulerson’s numbering rule. Introduction of Critical Path Method four kinds of floats.. Numerical on TF,FF,IF	07
Unit-4	PERT PERT: Concept, technique, three time estimates, average time, Critical path, slack computation, S.D, Variance, Numerical on PERT	07
Unit-5	Project Report: Preparation of project report, Risk analysis, Sensitivity analysis, Methods of rising capital.	07
Unit-6	Introduction To: Projected balance sheet, Projected profit & loss statement, Projected cash flow, Rate of return, Discounted playback period, Return after taxes. Initial review, Performance analysis, Ratio analysis, Sickness, Project revival, Organization aspects.	07
	Total	42

Recommended Text Books:

1. Kumar Neeraj Jha, “Construction Project Management- Theory and Practice”, Pearson Education, New Delhi ,17..

Reference Book:

1. K. K. Chitkara, “Construction Project Management- Planning, schedule and controlling”, second edition”, Tata
2. McGraw Hill Education pvt. Ltd, New Delhi.
3. John M. Nicholas and Herman steven, “Project management for engineers, business and technology”, fourth
4. edition, Routledge Publication, New York.
5. Prasanna Chandra, “Projects Planning, analysis, selection, financing, implementation and review”, 7th edition,
6. McGraw Hill Education India Pvt. Ltd., New Delhi.
7. Harold Kerzner, “Project Management system approach to planning, scheduling and controlling, second.

Course Code	Course Title	L	T	P	C
4SNOE2C	Accounting & Costing	03	00	00	03

Course Prerequisite: Nil

Course Learning Objectives:

1. To explain fundamental accounting concepts, branches, and objectives, and understand accounting as an information system with its terms.
2. To Build a comprehensive understanding of financial statements, including preparation and interpretation, and analyze annual reports.
3. To qualify understanding of depreciation concepts, causes, methods, and practical implications in accounting and practical implications of cost accounting in relation to financial and management accounting.
4. To Learn the preparation of cost sheets, Marginal Costing principles, break-even analysis, and techniques of Cost Audit.

Course Outcomes:

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

1. Understand fundamental accounting concepts, branches, and objectives, showcasing comprehension of accounting as an information system
2. Master financial statements, exhibiting proficiency in their preparation, interpretation, and analysis of annual reports
3. Demonstrate expertise in depreciation concepts, causes, methods, and their practical implications in accounting scenarios
4. Grasp the scope, objectives, and practical implications of cost accounting, connecting with both financial and management accounting
5. Participate in discussions and demonstrate skills in preparing cost sheets, unit costing, and overhead costing, including tender price calculation
6. Acquire and apply knowledge of Marginal Costing principles, conduct break-even

	Subject: Accounting & Costing	L (Hrs)
Unit -1	Introduction of Accounting - Book Keeping & Accounting, Branches of Accounting, Objectives and Functions of Financial Accounting, accounting as an information system and its users, Accounting Terms.	07
Unit -2	Financial Statement - Meaning, Importance & Limitation of Financial Statement, Preparation of Trading Account and Profit And Loss Account, Balance Sheet. Understanding the annual report of companies.	07
Unit -3	Depreciation – Concept of depreciation; Causes of depreciation; Depreciation, depletion, amortization, and dilapidation; Depreciation accounting; Methods of recording depreciation.	07
Unit -4	Introduction of Cost Accounting - Definition, Scope, objectives and significance of cost accounting, relationship with financial accounting and management accounting. Practical implication of cost accounting.	07
Unit -5	Cost Sheet - Unit Costing, Preparation of Cost Sheet and Statement of Cost (Including calculation of tender price), Overhead costing, (Including calculation of machine hour rate.)	07
Unit -6	Costing Method – Marginal Costing- Profit – Volume Ratio, Break – Even Point, Margin of Safety, Application of Break-even Analysis. Cost Audit – Meaning, Importance and Techniques of Cost Audit, Cost Audit Programme.	07
	Total	42

Text Books:

1. Financial Accounting for Management by Ambrish Gupta
2. Financial Accounting: An Indian Perspective by Paresh Shah and Sejal Shah
3. Corporate Accounting by Naseem Ahamed
4. Cost Accounting: Theory and Practice by Bhabatosh Banerjee
5. Cost Accounting: Principles and Practice by Rajasekaran
6. Cost Accounting: Text and Problems by M. N. Arora

Course Code	Course Title	L	T	P	C
4SN04	Computer Organization and Architecture	02	00	00	02

Course Prerequisites: 1SF04 Programming for Problem Solving,
4SN03 Data Structures.

Course Learning Objectives: -

1. Understand the basic concept of computer hardware, software, and memory location.
2. Interpret the concept of instruction sequencing, addressing modes, execution of a complete instruction, hardwired control and Micro-programmed control.
3. Describe I/O organization and bus arbitration.
4. Understand the concept of memory unit, Cache memories and Virtual Memories.

Course Outcomes:

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

1. Understand the basic structure of computer functional units and memory locations.
2. Understand the basics of addressing modes, stacks, queues, and subroutines.
3. Understand the basic processing unit of a computer, the execution of a complete instruction.
4. Understand the input/output organization of the computer including interrupt, DMA, buses, interfaces, etc.
5. Understand the concepts of RAM, and ROM.
6. Understand the concepts of cache memory, virtual memory

	Subject: Computer Organization and Architecture	L (Hrs)
Unit-1	Basic structure of computer: hardware, software and firmware, program sequencing. concept of memory locations & address.	05
Unit-2	Main memory and I/O operations: Instructions & instruction sequencing. Addressing modes. basic I/O operations. Stacks. & subroutines	05
Unit-3	Processing Unit: fundamental concepts. execution of a complete instruction. hardwired control, performance consideration. Microprogrammed control.	05
Unit-4	I/O organization: Accessing I/O devices, interrupts, direct memory access, bus arbitration: centralized and distributed.	05
Unit-5	Memory Unit: basic concepts, semiconductor RAM memories, internal organization, static & dynamic RAMs, ROMs. Speed, size & cost considerations.	05
Unit -6	Cache memories: Operations, performance considerations. Hierarchy of cache memories, Virtual memories.	05
	Total	30

Recommended Text Books:

1. “Computer Organization” by V. Carl Hamacher & S. Zaky, McGraw-Hill (ISE) 5th Ed.
2. “Computer Organization and Architecture: Designing for Performance” by William Stallings, Pearson Education 10th Edition.

Reference Books:

1. “Computer Organization and Design: The Hardware/Software Interface” by David A. Patterson and John L. Hennessy, Elsevier Publication, 5th Edition.
2. “Computer Architecture and Organization” by John P. Hayes, WCB/McGraw-Hill. 3rd Edition.
3. “Design and Architecture” by Vincent P. Heuring and Harry F. Jordan, Pearson Education, 2nd Edition.
4. “Structured Computer Organization” by Tenenbaum A.S, Pearson Education, 5th Edition.

Course Code	Course Title	L	T	P	C
4SN05	Entrepreneurship: Early-Stage Start-Up	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: Early-Stage Start-Up	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	05

	containing technical appraisal, Environmental appraisal, Market appraisal (including market survey for forecasting future demand and sales) and Managerial appraisal	
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

Course code	Course Title	L	T	P	C
4SN06	Operating System Lab	00	00	02	01

Course Prerequisite: 4SN01 Operating System

Course Learning Objectives:

1. Learn the fundamentals of operating systems, threads, and grasp process scheduling and concurrency control with synchronization
2. Explore deadlock concepts, grasp fundamental memory management, and apply virtual memory management principles
3. Understand the concept of File System management and solve the problems on Disk Management and Scheduling

Course Outcomes:

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

1. Describe the operating system's role, thread concepts, and apply process scheduling algorithms
2. Illustrate deadlock concepts and fundamentals of memory management
3. Analyze File System management and appraise concepts related to Disk Management, Scheduling, and Protection

List of Experiments:

Minimum 08-10 experiments should be conducted based on course 4SN01: Operating System.

Course code	Course Title	L	T	P	C
4SN07	Computer Networks Lab	00	00	02	01

Course Prerequisite: Nil

Course Learning Objectives:

1. To understand the fundamental concepts of computer networking.
2. To familiarize the students with basic taxonomy and terminology of data communication.
3. To introduce the students to advanced networking concept, network reference models, network design, simulation, modeling and analysis.

Course Outcomes:

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

1. Discuss fundamental concepts of computer networks to design simulation-based networks
2. Develop programming skills in Computer Networking using simulation tools
3. Demonstrate programming skills in Computer Networking using various protocols

List of Experiments:

Minimum 08-10 experiments should be conducted based on course 4SN07: Computer Networks

Course code	Course Title	L	T	P	C
4SN08	Data Structure Lab	00	00	02	01

Course Prerequisite: 1SF04 Programming for Problem-Solving Lab

Course Learning Objectives:

1. To understand the Data Structures and its memory representations.
2. To equip the student with the ability to identify and analyze the usage of various data Structure
3. To understand various data searching, sorting, and its complexity.

Course Outcomes:

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

1. Implement various algorithms on array, link list using C Programming
2. Demonstrate and differentiate between various searching and sorting algorithm
3. Implement operation and application of Data Structure stack, queue and tree.

List of Experiments:

Minimum 08-10 experiments should be conducted based on course 4SN03: Data Structure

Course code	Course Title	L	T	P	C
4SN09V	Computer Skill Lab II: Node JS and React JS	00	00	02	01

Course Prerequisite: Computer Skill Lab I

Course Learning Objectives:

1. To implement file handling, modules, APIs, and database connectivity using Node.js.
2. To design interactive user interfaces using React components, props, state, and hooks.
3. To apply frontend and backend concepts to develop small-scale web applications.

Course Outcomes:

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

1. Understand the fundamental concepts of Node.js and React.js for web application development.
2. Develop simple backend and frontend applications using JavaScript frameworks and libraries.
3. Build and integrate basic full-stack web applications using Node.js, React.js, and MongoDB.

Sr. No	List of Practical
1	Introduction to Node.js and Setting Up the Development Environment
2	Working with Node.js Modules and Packages
3	File System Operations Using Node.js
4	Building a Simple HTTP Server with Node.js
5	Managing Data with JSON and CRUD Operations
6	Developing RESTful APIs Using Express.js
7	Connecting Node.js Applications with MongoDB
8	Setting Up a React Development Environment
9	Creating and Rendering React Components
10	Working with Props and Component Communication
11	Managing State and Handling Events in React
12	Building Dynamic User Interfaces with Conditional Rendering
13	Working with Lists, Keys, and Forms in React
14	Implementing React Hooks and Consuming REST APIs
	Mini Project

B. Tech. (IT) Honors with Multidisciplinary Minor
Semester: 4 Honors Course

Course Code	Course Title	L	T	P	C
4SNH	Advanced Data Science	03	00	00	03

Course Prerequisites:

1. 1SF04 Programming for Problem Solving.
2. 3SNSM Introduction to Information Technology
3. 4SN03 Data Structure and algorithms

Course Learning Objectives:

Student will

1. Apply essential Python skills and packages to import, manipulate, and analyze data effectively.
2. Demonstrate an understanding of natural language processing (NLP) concepts and their implementation using Python.
3. Utilize data visualization tools in Excel and Tableau to interpret and communicate data-driven insights.
4. Explain the fundamentals of reinforcement learning and discuss its applications in data science and artificial intelligence.

Course Outcomes:

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

1. Explain Python necessary skills using Python packages.
2. Apply the concept of importing and manipulating data.
3. Explain the concept of natural language processing.
4. Demonstrate basics and working with data using Tableau.
5. Implement various Excel visualization tools.
6. Describe the concept of reinforcement learning.

	Subject: Advanced Data Science	L (Hrs)
Unit-1	Python Packages: Pandas, Numpy, Sci-kit Learn, Mat-plot library, Seaborn.	07
Unit-2	Importing Data: Reading CSV files, Saving in Python data, Loading Python data objects, Writing data to CSV file. Manipulating Data: Selecting rows/observations, Rounding Number, selecting columns/fields, Merging data, Data aggregation, Data merging techniques.	07
Unit-3	Introduction to NLP: Text Pre-processing, Noise Removal, Lexicon Normalization, Lemmatization, Stemming, Object Standardization.	07
Unit-4	Tableau: Introduction, Tableau Basics, Working with Data Sources, Visualization using Tableau, Different Charts in Tableau.	07
Unit-5	Excel Visualization Tools: Chart Visualizations in Excel Power View, Map Visualization in Excel Power View, Table Visualization in Excel Power View, Organization Chart in Excel.	07
Unit -6	Reinforcement Learning: Basics of reinforcement learning, Markov Decision Processes (MDP), Q-learning, Working with OpenAI Gym.	07
	Total	42

Recommended Text Books:

1. Practical Statistics for Data Scientists By Peter Bruce, Andrew Bruce, O'Reilly Media, Inc.
2. Python Data Science Handbook By Jake VanderPlas O'Reilly Media, Inc

Reference Books :

1. Introduction to Machine Learning with Python By Andreas C. Müller, Sarah Guido, O'Reilly Media, Inc.
 2. Think Stats By Allen B. Downey O'Reilly Media, Inc.
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