



**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.
Computer Science
and Engineering**



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

**Published By
Principal**

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

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

Four Year Under Graduate Degree Program in Bachelor of Technology

Choice Based Credit System (Semester Pattern)

Branch: Computer Science & Engineering

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 Passin g Marks
												Max Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																			
1	1SF01	Applied Mathematics - I	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
2	1SF02	Applied Physics	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
3	1SF03	Engineering Graphics	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
4	1SF04	Programming for Problem Solving	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
5	1SF05	Professional Communication Skills*	1	1	--	--	2	2		--	--	--	50	50	25	--	--	--	--
6	1SAKNX01	Multimedia and Web Designing	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
7	1SF06	Design Thinking **	1	--	--	--	1	1					50	50	25	--	--	--	--
Practicals																			
8	1SF07	Applied Physics Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
9	1SF08	Engineering Graphics Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
10	1SF09	Programming for Problem Solving Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
11	1SAKNX02	Multimedia and Web Designing Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
12	1SF10	NSS/Sports/Yoga/Cultural/Community Service #	--	--	2	--	2	1		--	--	--	--	--	--	50	--	50	--
			15	1	10		26	21						600				250	
* Assessment will be based on Test and Assignments																Total		850	

** Assessment will be based on Case Studies and Assignments

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

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
(An Autonomous Institute)
Four Year Under Graduate Degree Program in Bachelor of Technology
Choice Based Credit System (Semester Pattern)
Branch: Computer Science & Engineering
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
Theory																			
1	2SF01	Applied Mathematics - II	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
2	2SF02	Applied Chemistry	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
3	2SF03	Basics of Electrical Engineering	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
4	2SF04	Biology for Engineers	2	--	--	--	2	2		3	60	30	10	100	40	--	--	--	--
5	2SF05	Universal Human Values*	2	--	--	--	2	2		--	--	--	50	50	25	--	--	--	--
6	2SAEKNX01	Introduction to Python	3	--	--	--	3	3		3	60	30	10	100	40	--	--	--	--
7	2SF06	Indian Knowledge Systems *	2	--	--	--	2	2		--	--	--	50	50	25	--	--	--	--
Practicals																			
8	2SF07	Applied Chemistry Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
9	2SF08	Basic of Electrical Engineering Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
10	2SAEKNX02	Introduction to Python Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
11	2SF09	Workshop/Digital Fabrication Lab	--	--	2	--	2	1		--	--	--	--	--	--	25	25	50	25
		Total	17		8		25	21						600				200	
* Assessment will be based on Unit Tests and Assignments																Total		800	

* Assessment will be based on Unit Tests and Assignments

Exit Option: To qualify for Certificate

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

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Four Year Under Graduate Degree Program in Bachelor of Technology
Choice Based Credit System (Semester Pattern)
Branch: Computer Science & Engineering

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	Internal		Total	Overall Min Passing Marks	Max Marks		Min Passing Marks
											Max Marks MSE/ MSIE	Max. Marks TA/ IA			Int.	Ext.	
Theory																	
1	3SK01	Discrete Mathematics	2			PCC	2	2	3	60	30	10	100	40			
2	3SK02	Object Oriented Programming	2			PCC	2	2	3	60	30	10	100	40			
3	3SK03	Data Structures	3			PCC	3	3	3	60	30	10	100	40			
4	3SK04	Data Communication	2			PCC	2	2	3	60	30	10	100	40			
5	3SKOE1	OE-1	3			OE-I	3	3	3	60	30	10	100	40			
6	3SK05	Financial Literacy*	2			EEMC	2	2				50	50	25			
7	3SK06	Environmental Science**	2			VEC	2	2				50	50	25			
Practicals																	
8	3SK07	Object Oriented Programming Lab			2	PCC	2	1							25	25	50
9	3SK08	Data Structures Lab			2	PCC	2	1							25	25	50
10	3SK09	Data Communication Lab			2	PCC	2	1							25	25	50
11	3SK10	CEP/FP: Innovation & Creativity			4	ELC	4	2							25	25	50
		Total	16		10		26	21					600				200
															Total		800

OE-1 :	3SKOE1A Intellectual Property Right	3SKOE1B Stress Management	3SKOE1C Industrial Safety	3SKOE1D Introduction to Cyber Law
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* Assessment will be based on Tests, Assignment etc.

** Assessment will be based on field visits, Environmental Project or other related 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			Int.	Ext.		
Theory																		
1	4SK01	Analog and Digital Electronics	2			PCC	2	2	3	60	30	10	100	40				
2	4SK02	Computer Org. and Architecture	3			PCC	3	3	3	60	30	10	100	40				
3	4SK03	Theory of Computation	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	4SKOE2	OE-2	3			OE	3	3	3	60	30	10	100	40				
6	4SK04	Business Communication*	2			AEC	2	2				50	50	25				
7	4SK05	Entrepreneurship Principles & Process*	2			EEMC	2	2				50	50	25				
Practicals																		
8	4SK06	Analog and Digital Electronics Lab			2	PCC	2	1							25	25	50	25
9	4SK07	Computer Organization and Architecture Lab			2	PCC	2	1							25	25	50	25
11	4SK08	Report Writing & Presentation Skill			4	VSEC	4	2							25	25	50	25
		Total	18		8		26	22					600				150	
															Total		750	

OE-2 :-	4SKOE2A Marketing Management	4SKOE2B Project Management	4SKOE2C Accounting & Costing	4SKOE2D Biodiversity
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Exit Option: Two relevant skill-based courses (excluding from list of courses undertaken in First to Fourth semesters) to qualify for Diploma

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

* Assessment will be based on tests, assignments etc.

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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	Int.	Ext.											
Theory																				
1	SSK01	Operating System	3			PCC	3	3	3	60	30	10	100	40						
2	SSK02	Artificial Intelligence	3			PCC	3	3	3	60	30	10	100	40						
3	SSK03	Compiler Design	3			PCC	3	3	3	60	30	10	100	40						
4	SSK04	PEC-1	2			PEC	2	2	3	60	30	10	100	40						
5	SSK05	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	SSKOE3	OE-3	3			OE	3	3	3	60	30	10	100	40						
Practicals																				
8	5SK06	Operating System Lab			2	PCC	2	1							25	25	50	25		
9	5SK07	Artificial Intelligence Lab			2	PCC	2	1							25	25	50	25		
10	5SK08	Compiler Design Lab			2	PCC	2	1							25	25	50	25		
		Total	19		6		25	22		700							150			
															Total				850	
PEC-1 :-		5SK04PE1A Data Science & Statistics OR 5SK04PE1B Cyber Security, OR 5SK04PE1C System Simulation																		
PEC- 2 :-		5SK05PE2A Natural Language Processing OR 5SK05PE2B Data Mining OR 5SK05PE2C Digital Marketing																		
OE-3 :-		5SKOE3A Waste to Energy	5SKOE3B Quality Control				5SKOE3C Farming System in Agriculture				5SKOE3D Aptitude for Engineers									

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Sr No	Course Code	Course Name	Teaching Scheme						Examination Scheme										
			Hours / Week			Group	Total Hrs/Week	Credits	Theory						Practical				
			Lecture	Tutorial	P/D				Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max Marks		Total	Min Passing Marks	
Max Marks MSE/ MSIE	Max. Marks TA	Int.	Ext.																
Theory																			
1	6SK01	Database Management System	3			PCC	3	3	3	60	30	10	100	40					
2	6SK02	Design and Analysis of Algorithm	3			PCC	3	3	3	60	30	10	100	40					
3	6SK03	Computer Network	2			PCC	2	2	3	60	30	10	100	40					
4	6SK04	PEC-3	3			PEC	3	3	3	60	30	10	100	40					
5	6SK05	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																			
7	6SK06	Database Management System Lab			2	PCC	2	1							25	25	50	25	
8	6SK07	Design and Analysis of Algorithm Lab			2	PCC	2	1							25	25	50	25	
9	6SK08	Computer Network Lab			2	PCC	2	1							25	25	50	25	
10	6SK09	VSEC-02: Mobile Application Development			2	VSEC	2	1							25	25	50	25	
		Total	19		8		27	21		600						200			
																Total	800		

PEC- 3:-	6SK04PE3A Data Visualization OR 6SK04PE3B Cryptography OR 6SK04PE3C Microprocessor
PEC- 4 :-	6SK05PE4A Machine Learning OR 6SK05PE4B Information Retrieval OR 6SK05PE4C Pattern Recognition

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

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

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Branch: Computer Science & Engineering

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		Min Passing Marks
											Max Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.	
Theory																	
1	8SK01	Software Engineering*	3			PCC	3	3	3	60	30	10	100	40			
2	8SK02	PEC-7*	3			PEC	3	3	3	60	30	10	100	40			
Practicals																	
3	8SK03	Internship/ Research Internship/ On Job Training			24	ELC	24	12							150	150	300
		Total	6		24		30	18					200			300	
															Total		500

PEC- 7 :-	8SK02PE7A Cloud Computing OR 8SK02PE7B Wireless Sensor Network OR 8SK02PE7C Quantum Computing
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* The internal assessment for theory subject will be as follows:

1. There will be online MCQ examination of 15 marks based on Unit I and Unit II.
2. There will be online assignment of 15 marks based on Unit III to Unit VI.
3. The 10 Marks of Teacher Assessment will be based on overall performance of the student.

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Four Year Under Graduate Degree Program in Bachelor of Technology
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HONOR BASKET for CSE																		
Sr No	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours / Week			Group	Total Hrs/Week	Credits	Theory						Practical			
			Lecture	Tutorial	P/D				Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max Marks		Total	Min Passing Marks
						Max Marks MSE/ MSIE	Max. Marks TA	Int.	Ext.									
Theory																		
1	4SKH	Data Science and Analytics	3			HON		3	3	60	30	10	100	40				
2	5SKH	Natural Language Processing and Text Analytics	3			HON		3	3	60	30	10	100	40				
3	6SKH	Artificial Neural Network	3			HON		3	3	60	30	10	100	40				
4	7SKH1	Recommender System	3			HON		3	3	60	30	10	100	40				
5	8SKH	Computer Vision	3			HON		3	3	60	30	10	100	40				
Practicals																		
6	7SKH2	Honor Project	3			HON		3							50	50	100	50
		Total	18		0			18					500				100	
															Total	600		

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Four Year Under Graduate Degree Program in Bachelor of Technology

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Branch: Computer Science & Engineering

Allocation of Credits throughout the Semesters

Name of Degree Offered	Semesters								Total Credits
	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	
BTech CSE with Multidisciplinary Minor	21	21	21	22	22	21	23	18	169
BTech CSE Honors with Multidisciplinary Minor	21	21	21	25	25	24	29	21	187
BTech CSE with Double Minors : Multidisciplinary and Specialization Minor	21	21	24	25	25	24	26	21	187

MDM BASKETS OF COURSES FOR ALL Departments							
MDM Basket/ Track Name	Sr. No.	Course Code	Course Name	Semester	Students from following Departments can Register	Offered by Department of	
Artificial Intelligence	1	4SAMDM1	Artificial Intelligence and Expert Systems	IV	CE, CSE, EXTC, IT, CSE(IoT), ME	Artificial Intelligence and Data Science	
	2	5SAMDM2	Applied Artificial Intelligence	V			
	3	6SAMDM3	Generative Artificial Intelligence	VI			
	4	7SAMDM4	Safe and Responsible Artificial Intelligence Systems	VII			
Data Science	1	4SAMDM5	Programming for Data Science	IV	CE, CSE, EXTC, IT, CSE(IoT), ME		
	2	5SAMDM6	Business Intelligence and Analytics	V			
	3	6SAMDM7	Data Engineering	VI			
	4	7SAMDM8	Ethics in Data Science	VII			
Civil Engineering	1	4SCMDM1	Introduction to Environmental Engineering	IV	AI&DS, CSE, EXTC, IT, CSE(IoT), ME	Civil Engineering	
	2	5SCMDM2	Introduction to Water Resource Engineering	V			
	3	6SCMDM3	Introduction to Transportation Engineering	VI			
	4	7SCMDM4	Basics of Structural Analysis	VII			
Construction Technology	1	4SCMDM5	Building Planning	IV	AI&DS, CSE, EXTC, IT, CSE(IoT), ME		
	2	5SCMDM6	Construction Materials	V			
	3	6SCMDM7	Basics of Surveying	VI			
	4	7SCMDM8	Basics of Geotechnical Engineering	VII			
Computer Science and Engineering	1	4SKMDM1	Fundamentals of Data Structures	IV	CE, EXTC, CSE(IoT), ME	Computer Science and Engineering	
	2	5SKMDM2	Introduction to Algorithms	V			
	3	6SKMDM3	Database Management System	VI			
	4	7SKMDM4	Basics of Enterprise Resource Planning	VII			
Software Engineering	1	4SKMDM5	Software Requirements Engineering	IV	AI&DS, CE, EXTC, IT, CSE(IoT), ME		
	2	5SKMDM6	Software Architecture	V			
	3	6SKMDM7	Software Project Management	VI			
	4	7SKMDM8	Software Testing and Quality Assurance	VII			
Electronics and Communication Engineering	1	4SEMDM1	Electronic Instrumentation	IV	AI&DS, CE, CSE, IT, CSE(IoT), ME	Electronics and Telecommunication Engineering	
	2	5SEMDM2	Electronic Devices and Circuits	V			
	3	6SEMDM3	Analog and Digital Communication	VI			
	4	7SEMDM4	Electronic Circuit Design	VII			
Telecommunication Engineering	1	4SEMDM5	Basic Electronic Communication Systems	IV	AI&DS, CE, CSE, IT, ME		
	2	5SEMDM6	Introduction to Wireless Communication	V			
	3	6SEMDM7	Introduction to Mobile Computing	VI			
	4	7SEMDM8	Satellite and Optic Fiber Communication	VII			
Information Technology	1	4SNMDM1	Data Transmission and Information Technology	IV	AI&DS, CE, CSE, EXTC, CSE(IoT), ME	Information Technology	
	2	5SNMDM2	Data Communication Networks	V			
	3	6SNMDM3	E-Commerce	VI			
	4	7SNMDM4	Management Information Systems	VII			
Cyber Security	1	4SNMDM5	Introduction to Cyber Security	IV	CE, EXTC, CSE(IoT), ME		
	2	5SNMDM6	Fundamentals of Cryptography	V			
	3	6SNMDM7	Basics of Ethical Hacking	VI			
	4	7SNMDM8	Blockchain Technology	VII			
Mechanical Engineering	1	4SMMDM1	Energy Engineering	IV	AI&DS, CE, CSE, EXTC, IT, CSE(IoT)	Mechanical Engineering	
	2	5SMMDM2	Automobile Engineering and Electric Vehicles	V			
	3	6SMMDM3	Industrial Engineering	VI			
	4	7SMMDM4	Industrial Automation	VII			
Robotics and Automation Engineering	1	4SMMDM5	Mechatronics	IV	AI&DS, CE, CSE, EXTC, IT, CSE(IoT)		
	2	5SMMDM6	Rapid Prototyping	V			
	3	6SMMDM7	Automation Engineering	VI			
	4	7SMMDM8	Robotics and industrial Application	VII			
Internet of Things	1	4SXMDM1	Fundamentals of IoT	IV	AI&DS, CE, CSE, EXTC, IT, ME	Computer Science & Engineering(IoT)	
	2	5SXMDM2	Sensors and Actuators	V			
	3	6SXMDM3	Single Board Computers	VI			
	4	7SXMDM4	Industrial Internet of Things	VII			

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

Semester I

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

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Branch: Computer Science & Engineering

SEMESTER: I (GROUP-A)																		
Sr No	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours / Week			Group	Total Hrs/Week	Credits	Theory					Overall Min Passing Marks	Practical			
			Lecture	Tutorial	P/D				Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		Total		Max Marks		Total	Min Passing Marks
											Max Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																		
1	ISF01	Applied Mathematics - I	3			BSC	3	3	3	60	30	10	100	40				
2	ISF02	Applied Physics	3			BSC	3	3	3	60	30	10	100	40				
3	ISF03	Engineering Graphics	2			ESC	2	2	3	60	30	10	100	40				
4	ISF04	Programming for Problem Solving	2			ESC	2	2	3	60	30	10	100	40				
5	ISF05	Professional Communication Skills	1	1		AEC	2	2	3	60	30	10	100	40				
6	ISAKN01	Multimedia and Web Designing	3			ESC	3	3	3	60	30	10	100	40				
7	ISF06	Design Thinking *	1			VEC	1	1				50	50	25				
Practicals																		
8	ISF07	Applied Physics Lab			2	BSC	2	1							25	25	50	25
9	ISF08	Engineering Graphics Lab			2	ESC	2	1							25	25	50	25
10	ISF09	Programming for Problem Solving Lab			2	ESC	2	1							25	25	50	25
11	ISAKN02	Multimedia and Web Designing Lab			2	PCC	2	1							25	25	50	25
12	ISF10	NSS/Sports/Yoga/Cultural/ Community Service **			2	LLC	2	1							50		50	
			15	1	10		26	21					650				250	
															Total		900	

* Assessment will be based on Unit Tests and Assignments

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to:

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

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

	Total	40
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Text Books:

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

Reference Books:

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to,

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

	Subject: Applied Physics (AP)	L
UNIT I	Electron Ballistics: Motion of charged particle in uniform transverse electric and transverse magnetic fields, velocity selector (energy filter), Bainbridge mass spectrograph, Hall effect, cathode ray oscilloscope : working and its block diagram.	8
UNIT II	Crystallography: Crystal structure, Unit cell, Cubic crystal structure: SC, BCC and FCC, Unit cell characteristics: Effective number of atoms per unit cell, atomic radius, coordination number, atomic packing fraction, Miller indices, Bravais lattice Inter-planar distance between adjacent planes.	6

UNIT III	Interference and Diffraction of Light: Fundamental condition of interference, thin film interference due to reflected light, Newton's rings experiment and its applications, Fresnel and Fraunhofer diffraction, plane transmission diffraction grating.	7
UNIT IV	Laser Physics: Absorption, spontaneous and stimulated emission of radiation, population inversion, pumping, metastable state, characteristics and applications of laser, Ruby laser, He-Ne Laser.	6
UNIT V	Fibre Optics: Snell's law, total Internal reflection, construction of optical fibre, acceptance angle and acceptance cone, numerical aperture, types of optical fibre, attenuation, fibre optic communication system.	7
UNIT VI	Fluid Dynamics: Viscosity, Stoke's law, streamline and turbulent flow of liquid, Poiseuille's equation, Continuity equation, Bernoulli's theorem.	6
	Total	40

Text Books:

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

Reference Books:

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

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

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

	Subject: Engineering Graphics	L
UNIT I	Basics of Engineering Drawing and Projection: Introduction to drawing instrument and their uses, concept of dimensioning and scales, geometric construction. Projection of Point, Projection of Line.	04
UNIT II	Projection of Plane: Projection of different types of planes such as triangular plane, square plane, rectangular plane, pentagonal plane, hexagonal plane, circular plane etc. by using change of position method and auxiliary plane method.	04
UNIT III	Projection of Solids: Projection of solids for Prism, Pyramid, Cone and Cylinder.	05
UNIT IV	Orthographic Projection: Construction of elevation, plan and side view of given object by using first and third angle projection methods.	05

UNIT V	Isometric Views and Projection: Construction of isometric scale, isometric views and projection.	06
UNIT VI	Fundamental of CAD Software: Drafting environment and drafting screen, coordinate systems, drafting and dimensioning commands, editing commands, drafting of basic geometrical shapes, display commands, CAD software customization.	06
	Total	30

Text Books:

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites: Basic Computer Knowledge, Logical Thinking

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

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

Course Outcomes :

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

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

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

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

Text Book:

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

Reference Books:

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to

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

	Subject: Professional Communication Skills (PCS)	L
Unit I	Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers	5
Unit II	Unseen passage, vocabulary building (Synonyms & Antonyms, Prefix and Suffix, Error Analysis, one word substitute), developing story on given outline.	5
Unit III	Self-Introduction-organizing the material - introducing the topic – extempore speech – Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—Visual presentation	5
Unit IV	Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -- questioning and clarifying –GD strategies- activities to improve GD skills	5
Unit V	Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview & panel interview – FAQs related to job interviews	5

Unit VI	Recognizing differences between groups and teams- networking professionally- respecting social protocols-understanding career management-developing a long- term career plan-making career changes.	5
	Total	30

Text Books:

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

Reference Books:

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

Term Work (50 marks):

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

Marking Scheme:-

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites: Nil

Course Learning Objectives:

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

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

Course Outcomes:

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

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

Unit	Subject: Multimedia and Web Designing	L
Unit-1	Introduction to multimedia: Introduction and Multimedia Data Representations, Introduction to Multimedia, Components of Multimedia, Multimedia: Past and Present Early History of Multimedia, Hypermedia, Multimedia Software Tools, Multimedia in the Future.	07
Unit-2	Multimedia Authoring and Data Representations: - Multimedia Authoring and Tools: Multimedia Authoring, VRML. Graphics and Image Data Representations: Graphics/Image Data Types, 1-Bit Images, 8-Bit Gray-Level, Images, Image Data Types.	07
Unit-3	Introduction to the Web: - History of web, Protocol governing the web, Web architecture, Major issues in Web solution development, Web servers, Web browsers, Internet Standards, TCP/IP protocol suites, IP Address, MIME.	07

Unit-4	Hypertext Transfer Protocol [HTTP]: - Introduction to HTTP, Web Server and Client, Web Resources, URL and its Anatomy, Message Format, Persistent and non-persistent Connections, Web caching, Proxy.	07
Unit-5	Hypertext Markup language [HTML]: - History of HTML, HTML basics, Elements, attributes and tags of HTML, Various Types of Tags: (Basic Tags, Advanced Tags, Images, Meta Tag) Planning of web page, Model Structure of web site, Designing web pages, Multimedia content.	07
Unit-6	Cascading Style Sheet [CSS] :- Introduction, advantages, Adding Cascading Style Sheet (CSS), Browser compatibility, Cascading Style Sheet (CSS) and page layout, Selectors, Grouping, Type Selectors.	07
	Total	42

Text books:

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

References:

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites: Nil

Course Learning Objectives:

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

Course Outcomes:

Students will be able to –

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

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

Text Books:

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

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

Term Work (50 marks)

Students should complete the following activities

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

Marking Scheme:-

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

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to,

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

List of Experiments

1. Study of CRO I: To measure A.C voltage, D.C voltage and frequency using CRO.
2. Study of CRO II: To determine frequency of unknown signal by using Lissajous patterns.
3. To determine wavelength of monochromatic light by using Newton's Ring experiment.
4. To determine wavelength of monochromatic light by using Plane transmission diffraction grating.
5. Determination of grating element of diffraction grating, using LASER beam.
6. Study of various crystal structures.
7. To determine Miller Indices of crystal planes.
8. To plot the V-I characteristics of LED and to find it's striking potential.
9. To measure the intensity and divergence of given LASER beam.
10. To determine the coefficient of viscosity using Stoke's law.
11. Study of Hall effect in semiconductor.

Total (Minimum 8 practicals are to be performed)

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

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

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

List of Practical:

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

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

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

B.Tech First Semester (Computer Science & Engineering)

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***

List of Experiments/ Practical's:

Minimum 8 experiments are to be performed.

1. Set up a C programming environment (compiler, IDE, etc.).
2. Write a simple program to display "Hello, World!".
3. Solve a simple problem using a top-down approach and develop a program accordingly.

4. Use flowcharts or pseudo code to represent the algorithm for a specific problem.
5. Write program to illustrate precedence of operator
6. Write programs that demonstrate the use of if, if-else, and switch statements for decision making.
7. Create and manipulate 1-D, 2-D arrays (declaration, initialization, accessing elements).
8. Explore string manipulation functions (strcpy, strcat, strlen, etc.)
9. Write programs using user-defined functions to solve specific tasks
10. Understand and use return values and their types.
11. Explore the concept of call by value using pointers.
12. Explore the concept of call by reference using pointers

B.Tech First Semester(Computer Science & Engineering)

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

Course Learning Objectives:

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

Course Outcomes (CO):

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

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

Perform any 8 Practical's from following list of practical's

1. Introduction to Hyper Text Mark-up Language (HTML) and how to create HTML file using notepad
2. Demonstrate the use of some of basic html tags
3. Design a web page and include link to redirect on another webpage.
4. Write a HTML Program to demonstrate various List tags.
5. Write a HTML program to design static webpage which should allow to enter user's personal data
6. Write a HTML program to demonstrate the use of various Image tags
7. Write a HTML Program to create a table using table tags of HTML
8. Make a form in html web page which takes all the details of person
9. Design a web page using HTML Style sheet.
10. Create html page which make a use of Internal/ External CSS file. A CSS File must use following CSS Selector

11. Create a HTML web page which uses CSS Border, Background, Padding
12. Create a web page which embed image, video and Links in Table
13. Create a HTML page which showcase images in gallery
14. Create a Mini project for
 - a. Students Notice Board
 - b. Result Display Board
 - c. Personal information Valet

Any other relevant

B.Tech First Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to –

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

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

Text Book:

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

Reference Book:

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

Term Work (50 marks):

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

Marking Scheme:

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

Semester II

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

SEMESTER: II (GROUP-A)																			
Sr No	Course Code	Course Name	Teaching Scheme							Examination Scheme									
			Hours / Week			Group	Total Hrs/Week	Credits	Theory						Practical				
			Lecture	Tutorial	P/D				Duration of paper (Hr)	Max Marks Paper ESE/ ESSE	Internal		Total	Overall Min Passing Marks	Max Marks		Total	Min Passing Marks	
						Max Marks MSE/ MSIE	Max. Marks TA	Int.	Ext.										
Theory																			
1	2SF01	Applied Mathematics - II	3			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		3	60	30	10	100	40				
6	2SAEKNT01	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				
Practicals																			
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	2SAEKNT02	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						650				200	
																Total		850	

* Assessment will be based on Unit Tests and Assignments

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

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

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

Course Requisite:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to:

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

	Subject: Applied Mathematics II	L
Unit I	Matrices: Rank of a matrix, Consistency of linear system of equations by matrix method, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof).	7
Unit II	Fourier series: Fourier expansion of function in $(C, C+2L)$, half range Fourier series.	6
Unit III	Complex Numbers: Roots of complex number by deMoivre's theorem, Hyperbolic and inverse hyperbolic functions, Separation of real and imaginary parts, Logarithm of complex numbers.	7
Unit IV	Integral Calculus I: Differentiation under integral sign, Beta Function and Gamma Function.	7
Unit V	Integral Calculus II: Double integration, change of order of integration, transformation to polar coordinates, Evaluation of area by double integration.	6
Unit VI	Integral Calculus III: Triple integration, Transformation to spherical polar coordinates, Volume of solid by triple integration.	7
Total		40

Text Books:

1. Wartikar P.N. & Wartikar J.N.- A Text Book of Applied Mathematics Vol.-I & II, Pune V.G. Prakashan, Pune.

2. Grewal B.S. - Higher Engineering Mathematics, 40/e, Khanna Publishers.

Reference Books:

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

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to

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

	Subject: Applied Chemistry (AC)	L
UNIT I	Engineering Materials and Their Properties: Introduction, Classification of Engineering materials, Chemical Forces in materials- Primary forces and Secondary forces, Properties of materials, Role of chemical forces in alteration of magnitude of the properties such as Density, Melting Point, Solubility, Strength, Stiffness, Elasticity and Plasticity. Real life examples where these interactions played major role to enhanced their properties: - vulcanized rubber and plasticized PVC.	6
UNIT II	Cement Engineering: Introduction, Types of cement, Raw materials used for the manufacturing of Portland cement, Manufacturing of Portland cement by wet process. Functions of chemical constituents of cement: Tri-calcium aluminate, Tri-calcium silicate, Di-calcium silicate, Tetra-calcium aluminoferrite, magnesia, sulphur trioxide, iron oxide, alkalis, free lime, alumina. Physical Properties of Portland cement: Heat of hydration, Fitness, Soundness, Strength, Setting and hardening.	6
UNIT III	Water Characteristics & Their Effects on Boiler: Introduction. Characteristics of water: - Hardness, pH, alkalinity, DO, TDS and Chloride	8

	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.	
UNIT IV	Fuel and Lubricant: Introduction, Types of Fuels, Properties of Fuels: Ignition Temperature, Calorific value. Types of calorific value. Solid Fuel: Coal, classification of coal, analysis of coal: ultimate analysis. Liquid Fuel: Crude oil, Fractional distillation of crude oil, Properties of liquid fuel: Octane number and Cetane number. Gaseous Fuel: Hydrogen gas, economy of hydrogen gas as fuel. Lubricants: Introduction, classification of lubricants, properties of lubricants, uses of lubricants.	7
UNIT V	Energy Sources & Storage Devices: Introduction, Principle of batteries, Types of Batteries: Primary Batteries-Dry Cell, Mercury cell, Secondary Batteries- NICAD (Ni-Cd) battery, Lithium-ion battery. Green energy sources: Photo voltaic cell (Solar Cell), Fuel Cell.	6
UNIT VI	Corrosion & Its Control: Introduction, Types of corrosion: Dry and Wet corrosion, Mechanism of dry and wet corrosion, Factor affecting corrosion: Nature of metal and nature of environment, Types of wet corrosion- Pitting corrosion, waterline corrosion, stress and galvanic corrosion, Methods of corrosion control- Cathodic protection: Sacrificial anode and impressed current method, Protective coating: Galvanizing and Tinning process.	7
	Total	40

Text Books:

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

Reference Books:

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

B.Tech Second Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

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

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

Unit No.	Basics of Electrical Engineering	L
1	Fundamentals of Electrical Engineering: Basic concepts of Current, Voltage, Power, energy and relationship between them. Resistance, Resistivity, Conductance, Conductivity, Network simplification of Resistances (Series, Parallel, Delta-Star and Star-Delta transformation)	05
2	DC Circuit Analysis: Types of Sources, Current and voltage division principle, Source Transformation, Ohm's Law, Kirchoff's Laws (KCL and KVL) , Superposition Theorem, Thevenin's Theorem.	05
3	Magnetic circuits and Electromagnetic Induction: Basic concepts of Flux, flux density, MMF, Reluctance, Permeance, Magnetic field intensity and their relationship. Series Magnetic circuits, B-H curve, Principle of electromagnetic induction, Types of Magnetically induced EMF, Concept of self and mutual Inductance.	05
4	A.C. Fundamentals: Generation of sinusoidal alternating voltages and currents, Different terminologies associated with AC circuit. Behavior of AC circuit containing Pure R, L, and C. Phasor representation in rectangular & polar form, Impedance and admittance concept. Series R-L, R-C and R-L-C circuit, Resonance in Series R-L-C circuit, Power in single phase circuit: - Concepts of active, reactive and apparent power, Power factor.	05

5	Polyphase Circuits : Generation of Three phase voltages, current and power, Star connected and delta connected balanced circuits, Relationship between line current, phase current and line voltage, phase voltage , analysis of balanced three phase circuits Power measurement in Three phase circuit .	05
6	Single phase Transformer: Single-phase transformer construction and working (Ideal and practical), Types of Transformer, EMF equation of Transformer, Efficiency & Regulation of transformer, condition for maximum efficiency. Electrical Safety : Safety precautions in electrical installation, Earthing, Types of Earthing (Plate and Pipe Earthing)	05
	Total	30

Text Books:

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

Reference Books:

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

B.Tech Second Semester (Computer Science & Engineering)

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 the need of the subject in Engineering.

2: To study the human organs and their analogy with engineering applications.

3: To be acquainted with the latest trends in bio-engineering.

4: To become familiar with the concept of Bio-mimicry and understand how nature has inspired innovations in technology.

Course outcomes:

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

	Subject: Biology for Engineers	L
UNIT I	Introduction to Basic Biology: Cell: What is a Cell, Cell theory, Cell shapes, structure of a Cell, Cell cycle chromosomes, The Plant Cell and animal Cell, protoplasm, prokaryotic and eukaryotic Cell, Plant Tissue and Animal Tissue. Carbohydrates, proteins, Amino acid, nucleic acid (DNA and RNA) and their types	04
UNIT II	Human Organ Systems and Bio Designs – 1 Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics.). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signaling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).	04
UNIT III	Human Organ Systems and Bio Designs – 2 Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems).	05

UNIT IV	Trends in Bioengineering-1 Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D Printed tooth, Dental implants, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis	05
UNIT V	Trends in Bioengineering-2 Cloning in microbes, plants and animals, Basics of biosensors, biochips, Bio fuels. Tissue engineering And its application, transgenic plants and animals	06
UNIT VI	Nature-Bioinspired Materials and Mechanisms: Bio-mimicry, Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).	06
	Total	30

Reference Books:

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

B.Tech Second Semester (Computer Science & Engineering)

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

Course Prerequisites: NIL**Course Learning Objectives:**

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

Course Outcomes:

Students will be able to

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

	Subject: Universal Human Values	L
UNIT I	Process for Value Education: Understanding nature and scope for Value Education, Self-Exploration–concept and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being	4
UNIT II	Understanding Harmony in the Human Being - Harmony in Myself: Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ – Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body	5
UNIT III	Understanding Harmony in the Family and Society- Harmony Human - Human Relationship: Understanding harmony in the Family- the basic unit of human interaction, understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas)	5

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

Text Books:

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

Reference Books:

- 1) Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA.
- 2) E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
- 3) Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991.
- 4) Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
- 5) A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
- 6) P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
- 7) A N Tripathy, 2003, Human Values, New Age International Publishers.
- 8) Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi STantra Shodh, Amravati.
- 9) E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
- 10) M Govindrajan, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

- 11) B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
- 12) B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Term Work (50 marks):

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

Marking Scheme:-

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

B.Tech Second Semester (Computer Science & Engineering)

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

Course Prerequisite: Basic Knowledge of Computer.

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

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

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

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

	Subject: (2SAEKNX01) Introduction to Python	L
Unit-1	An Introduction to Python: Characteristics of Python, Why Python, Print statement, Comments, Python Variables, Data types, Operators in Python, Global and local variables, Basic Programs.	07
Unit-2	Data Structures in Python: Python Data Structures (List, Tuples, Dictionaries, Sets), Function related to data structure, Basic String Operations in Python (String Manipulation, Accessing Strings, Basic Operations, String slices), Simple Input and Output, Output formatting, Basic Programs	07
Unit-3	Python Program Flow: Indentation, if statement, and its related statements, while loop, for loop, range statement, break and continue, Assert, Examples of Looping.	07
Unit-4	Functions and Modules: Function: Functions, defining a function, Calling a function, Types of functions, Function Arguments, Create a Module, Standard Modules, Exception Handling	07

Unit-5	Working with Data in Python: Modes of file handling (Opening and closing file, Reading and writing files), Date and Time with its functions, Introduction to Modules and packages.	07
Unit-6	Classes and Objects: Overview of OOP, Class Definition, Creating Objects, Objects as Arguments, Objects as Return Values, Built-in Class Attributes, Inheritance, Overloading, Overriding, Programs.	07
	Total	42

Text Book:

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

Reference Books:

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

B.Tech Second Semester (Computer Science & Engineering)

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

Course Prerequisites: Nil

Course Learning Objectives:

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

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

Course Outcomes:

Students will be able to –

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

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

UNIT VI	Contributions to Plant and Animal Science Plant Science in Ancient India, Animal Science in Ancient India, Indian Traditional Knowledge on Environmental Conservation.	4
	Total	26

Text Books:

- 1) Indian Contributions to Science compiled by Vijnana Bharati

Reference Books:

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

Term Work: (50 Marks)

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

Marking scheme:

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

B.Tech Second Semester (Computer Science & Engineering)

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

Course Prerequisites:

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

Course Learning Objectives:

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

Course Outcomes:

Students will be able to

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

List of Experiments

1. Preparation of Paracetamol and oxalic acid co-crystal and determination of its melting point.
2. Determination of hardness of water by EDTA method.
3. Determination Alkalinity (NaOH and Na₂CO₃) in given water sample
4. Determination of chlorine in water sample. (Iodometry)
5. Determination of Dissolved Oxygen in Water Sample.
6. Determination of pH of unknown sample by pH meter
7. Determination of H⁺ ion concentration by conductivity meter.
8. Determination of % CaO in given cement sample.
9. Determination of % of moisture in coal sample by proximate analysis.
10. Determination of viscosity of lubricating oil by Redwood viscometer No.1
11. Determination of viscosity of lubricating oil by Redwood viscometer No. 2
12. Determination of flash point of lubricating oil by Abel's apparatus
13. Determination of acid value of lubricating oil.
14. Determination of mass of Zn coating on galvanized article

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

B.Tech Second Semester (Computer Science & Engineering)

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

Course Prerequisite: Nil

Course Learning Objectives:

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

Course Outcomes:

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

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

List of Experiments:

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

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

B.Tech Second Semester (Computer Science & Engineering)

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

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

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

Course Outcomes:

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

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

List of Experiment:

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

List of Experiments/ Practical's:

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

1. Introduction and Installation of Python.
2. Write a python program to find largest of three numbers.
3. Write a python script that prints prime numbers less than 20.
4. Write python program in which a function is defined and calling that function prints Hello World

5. Write python program to store data in list and then try to print them.
6. Write python program to print list of numbers using range and for loop
7. Write python program to demonstrate working with dictionaries in python.
8. Write python program to demonstrate working with tuples in python.
9. Write python program to create, concatenate and print the string and accessing substring from given string.
10. Write python program to load data from dataset and analyze the data.
11. Write python program to subtract five days from current date.
12. Write python program to convert string to date-time.

Software Tools:

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

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

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

B.Tech Second Semester (Computer Science & Engineering)

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

Course Pre-requisites: Nil

Course Learning Objectives:

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

Course Outcomes:

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

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

Group A

- 1) **Fitting** : Introduction to different tools , equipment's and operations in Fitting Shop. Prepare one job in the Fitting shop, involving operations like marking, filing, hacksaw cutting, drilling and tapping etc.
- 2) **Sheet Metal** : Introduction to Sheet Metal tools and equipment's, their uses, different sheet metal joints and operations in Sheet Metal. Prepare one job in the Sheet Metal shop.
- 3) **Welding** : Introduction to Welding, welding tools and equipment's, their uses. Brief introduction to different welding processes, different welding joints. Prepare one job in the Welding shop.
- 4) **Smithy** : Introduction to different tools , equipments and Smithy operations like upsetting, drawing ,bending, forming etc. Prepare one job in the smithy shop.
- 5) **Carpentry** : Introduction to different wood working tools , equipment's and machines , types of joints and operations performed in Carpentry Shop. Prepare one job in the Carpentry shop.
- 6) **Machining** :- Introduction and practice of basic machining operations on Drilling , Lathe and shaper machine tools.

Group B

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

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

Semester III

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

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	Internal		Total	Overall Min Passing Marks	Max Marks		Min Passing Marks
											Max Marks MSE/ MSIE	Max. Marks TA/ IA			Int.	Ext.	
Theory																	
1	3SK01	Discrete Mathematics	2			PCC	2	2	3	60	30	10	100	40			
2	3SK02	Object Oriented Programming	2			PCC	2	2	3	60	30	10	100	40			
3	3SK03	Data Structures	3			PCC	3	3	3	60	30	10	100	40			
4	3SK04	Data Communication	2			PCC	2	2	3	60	30	10	100	40			
5	3SKOE1	OE-1	3			OE-I	3	3	3	60	30	10	100	40			
6	3SK05	Financial Literacy*	2			EEMC	2	2				50	50	25			
7	3SK06	Environmental Science**	2			VEC	2	2				50	50	25			
Practicals																	
8	3SK07	Object Oriented Programming Lab			2	PCC	2	1							25	25	50
9	3SK08	Data Structures Lab			2	PCC	2	1							25	25	50
10	3SK09	Data Communication Lab			2	PCC	2	1							25	25	50
11	3SK10	CEP/FP: Innovation & Creativity			4	ELC	4	2							25	25	50
		Total	16		10		26	21					600				200
															Total		800

OE-1 :	3SKOE1A Intellectual Property Right	3SKOE1B Stress Management	3SKOE1C Industrial Safety	3SKOE1D Introduction to Cyber Law
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* Assessment will be based on Tests, Assignment etc.

** Assessment will be based on field visits, Environmental Project or other related activity

B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK01	Discrete Mathematics	02	00	00	02

Course Prerequisites: Fundamentals of Logic, Basic Algebra

Course Learning Objectives:

1. Develop a deep understanding of fundamental concepts and enhance logical reasoning skills.
2. Facilitate discussions on propositional and predicate logic.
3. Explain the application of graphs, trees, and related algorithms.
4. Foster the ability to relate Discrete Mathematics concepts to Computer Science.

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

1. Define and express logic sentences in terms of predicates, quantifiers, and logical connectives.
2. Describe the solution for a given problem using deductive logic and prove the solution based on logical inference.
3. Use algebraic structure for a given mathematical problem.
4. Examine the given problem as graph networks and solve with techniques of graph theory
5. Design and minimize digital circuits using logic gates and combinations of gates.
6. Implement algorithms for tree searching and undirected trees, enhancing problem-solving techniques

	Subject: Discrete Mathematics	L
Unit-1	Mathematical Logic:- Propositions, Truth Tables, Compound Propositions, Logical Operators, Logic and Bit Operations; Logical Equivalences, De Morgan's Laws.	05
Unit-2	Theory of inference:- Predicates, Quantifiers: Restricted Domains, Precedence, Logical Equivalences; Rules of Inference for Propositional Logic, Use to Build Arguments, Resolution, Combination for Propositions and Quantified Statements;	05
Unit-3	Set Theory:- Introduction, Venn Diagrams, Subsets, Size of a Set, Power Sets, Cartesian Products, Set Notation with Quantifiers, Truth Sets and Quantifiers, Set Operations, Functions, Inverse Functions, Compositions of Functions, Partial Functions; Functions as Relations, Relations on a Set, Properties of Relations. .	05
Unit-4	Algebraic Structures:- Algebraic Systems: Examples and General Properties; Semigroups and Monoids: Homomorphism of Semigroups and Monoids, Subsemigroups and Submonoids; Groups: Definitions, Subgroups and Homomorphisms, Cosets, Normal Subgroups.	05

Unit-5	Boolean Algebra:- Introduction to Lattices, Boolean Functions, Representing Boolean Functions, sum of product expansions, Logic Gates, Combinations of Gate, Minimization of Circuits, Karnaugh Maps.	05
Unit-6	Graphs Theory:- Basic concepts, Paths, Reachability & connectedness, Matrix representation of graphs, Trees: tree searching, Undirected trees, Minimal spanning trees.	05
	Total	30

Text Book:

1. “Discrete Mathematics and Its Applications” by Kenneth H. Rosen, 7th Edition, McGraw-Hill.
2. “Discrete Mathematical Structures with Applications to Computer Science” by J. P. Tremblay and R. Manohar, Tata McGraw-Hill Edition, McGraw-Hill.

Reference Books:

1. “Discrete Mathematics” by Norman L. Biggs, 2nd Edition, Oxford University Press.
2. “Schaum’s Outline of Theory and Problems of Discrete Mathematics”, by Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, Schaum’s Outlines Series, McGraw-Hill.
3. “Elements of Discrete Mathematics: A Computer Oriented Approach” by C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw-Hill.

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B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK02	Object Oriented Programming	02	00	00	02

Course Prerequisites: Programming for Problem Solving

Course Learning Objectives:

1. To discuss object-oriented concepts in the Java programming language.
2. To evaluate classical problems using Java programming.
3. To demonstrate software development skills using Java programming language for real-world applications.

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

1. Understand the fundamentals of Object-Oriented Programming and its benefits over procedural programming
2. Apply fundamental programming constructs in Java to write basic programs
3. Develop and use classes and objects effectively using Java programming concepts
4. Analyze and implement inheritance and polymorphism in Java using appropriate OOP principles
5. Implement robust Java applications using interfaces, packages, enumerations, and exception handling mechanisms
6. Design user-friendly interfaces and handle file operations using Java I/O, AWT, and Swing libraries

	Subject: Object Oriented Programming	L
Unit-1	Introduction to Object Oriented Programming: Introduction, Need of OOP, Principles of Object-Oriented Languages, Procedural Language Vs OOP, Application of OOP.	5
Unit-2	Introduction to Java: Java Virtual Machine, Java features, Program Structures. Java Programming Constructs: Variables, Primitive data types, Identifier, Literals, Operators, Expressions, Precedence Rules and Associativity, Primitive Type Conversion and Casting, Flow of Control.	5
Unit-3	Classes and Objects: Creating Objects, Methods, Constructors, Class Variable and Methods, this keyword, Arrays, Command Line Arguments, User-defined inputs using I/O package.	5
Unit-4	Inheritance: Inheritance vs. Aggregation, Method Overriding, super keyword, final keyword, Abstract class.	5

Unit-5	Interfaces, Packages and Enumeration: Basics of Interface, Packages and Enumeration. Exception: Introduction, Exception handling Techniques, User-defined exception.	5
Unit-6	Input/Output: The java.io.file Class, Reading and Writing data, Randomly Accessing a file, Reading and Writing Files using I/O Package. User Interface with AWT and Swing: Introduction to AWT and Swing, Difference between AWT and Swing.	5
	Total	30

Text Books:

1. "Programming in Java" by Sachin Malhotra and Saurabh Choudhary, Oxford University Press, 2010.
2. "Java Complete Reference" by Herbert Schildt, McGraw Hill, 5th Edition.

Reference Books:

1. "Programming with Java" by E. Balagurusamy, McGraw Hill.
2. "A Programmer's Guide to Java Certification, 3rd Edition" by Khalid Mughal, Pearson.
3. "A Text Book of Java Programming" by Liang, PHI.
4. "Core Java for Beginners" by Sharnam Shah and Vaishali Shah, SPD, 2010.

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B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK03	Data Structures	03	00	00	03

Course Prerequisites: Programming for Problem Solving

Course Learning Objectives:

1. To understand the linear and nonlinear data Structures and its memory representations.
2. To perform different operations on data structures such as insertion, deletion, searching and traversing.
3. To understand various data searching and sorting methods with its complexity.
4. To introduce various techniques for representation of the data in the real world.

Course Outcomes:

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

1. Recall the definitions and basic concepts of data structures.
2. Explain the operations performed on linear arrays and multidimensional arrays.
3. Describe the operations conducted on linked lists and memory allocation.
4. Implement stack and queue operations including arithmetic expressions.
5. Execute tree traversal algorithms and binary search trees.
6. Utilize graph traversal algorithms including BFS and DFS

	Subject: Data Structures	L
Unit-1	Introduction to Data Structures: Introduction to Data structures, Data Structure Operations, Algorithmic Notation, and Complexity of algorithms. String processing: storing strings, character data type, string operations, word processing, and First pattern matching algorithm.	07
Unit-2	Array & Record Structure: Linear arrays: Memory Representation of arrays, traversing linear arrays, insertion & deletion operations, Bubble sort, linear search and Binary search algorithms. Multi-dimensional arrays, Pointer arrays. Record structures and Matrices.	07
Unit-3	Linked lists: Linked lists: Memory Representation of Linked List, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion & deletion operations on linked lists. Header linked lists, Two-way linked lists.	07
Unit-4	Stack & Queue: Stacks: Sequential Memory Representation of Stack, Arithmetic expressions: Polish notation. Quick sort, Queues: Sequential Memory Representation of Queue, DE Queue, Priority queues.	07

Unit-5	Trees: Introduction to Trees, Binary trees, Memory Representation of Binary Tree, Traversing binary trees, Header nodes, Binary Search Tree, Heap and heap sort, Path length & Huffman's algorithm.	07
Unit-6	Graph & Sorting Algorithms: Introduction to Graphs, Memory representation of graphs, Warshalls' algorithm, operations on Graphs, Breadth First Search, Depth First Search Sorting: Insertion Sort, Selection Sort, Radix sort, Merge Sort.	07
	Total	42

Text Books:

1. "Data Structures" by Seymour Lipschutz, Schaum's Outline Series, McGraw-Hill, International Editions.
2. "An Introduction to Data Structures with Applications" by Trembley, Sorenson, McGraw Hill.

Reference Books:

1. "Fundamentals of Data Structures" by Ellis Horowitz, Sartaj Sahni, CBS Publications.
2. "Data Structure Using C" by Balagurusamy.
3. "Data Structures in Java" by Standish, Pearson Education.

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B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK04	Data Communication	02	00	00	02

Course Prerequisites: Fundamentals of Computer

Course Learning Objectives:

1. Identify components, networks, protocols, line configurations, and signal types in data communication.
2. Understand encoding and modulation techniques used for various signal conversions.
3. Differentiate guided and unguided transmission media and assess their performance

Course Outcomes: Basic Computer Fundamentals, Basic Mathematics and Logic

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

1. Understand fundamental components, networks, and protocols in data communication, allowing them to analyze and design basic communication systems
2. Apply encoding and modulating principles, differentiate signal conversions, and effectively use guided and unguided transmission media.
3. Analyze transmission impairments such as attenuation, distortion, and noise, and evaluate their impact on communication performance.
4. Proficiently apply multiplexing techniques, identify and address transmission errors, contributing to efficient data transmission.
5. Analyze data link control functionalities, compare data link protocols, and evaluate LAN characteristics, fostering a deeper understanding of data communication systems.
6. Explore other protocols in the network layer and understand the transport layer's function in the TCP/IP model.

	Subject: Data Communication	L
Unit-1	Introduction: Components, Networks, Protocols and standards, Basic Concepts: Line Configuration, Topology Transmission mode, analog and digital signals, periodic and periodic signals, analog signals, time and frequency domains, composite signals, digital signals.	05

Unit-2	Encoding and modulating: Encoding and modulating, Different conversion Schemes: Digital –to- digital conversion, analog-to-digital conversion, digital to analog conversion, analog to analog conversion.	05
Unit-3	Transmission of Digital Data: Interfaces and Modems: Digital data transmission, DTE-DCE interface, modems, cable modems, And transmission media: guided media, unguided media, transmission impairment, Performance.	05
Unit-4	Multiplexing: Many to one/ one to many, frequency division multiplexing, wave division multiplexing, TDM, multiplexing applications: the telephone system, Error detection and correction: types of errors, detection, VRC, Longitudinal redundancy check, cyclic redundancy check, checksum, error correction.	05
Unit-5	Data link Control: Line Discipline, flow control, error control, Data link Protocols: Asynchronous Protocols, synchronous protocols, character oriented protocols, bit - oriented protocols, link access procedures.	05
Unit-6	TCP/IP Protocol Suite: Overview of TCP/IP, Network Layer, Addressing, Subnetting, Other protocol in the Network layer, Transport Layer.	05
	Total	30

Text Book:

"Data Communication and Networking" by Behrouz A. Forouzan, 2nd Edition, TMH.

Reference Books:

1. "Data&ComputerCommunications"byWilliamStalling s,6th Edition, Pearson Education.
2. "Data Communication "by William L. Schweber, McGraw Hill.
3. "Computer Communication & Networks "by J.Freey, AEW Press.
4. "Computer Networks & Internet" by D.Corner, Pearson Education.

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B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SKOE1A	Intellectual Property Rights	03	00	00	03

Course Prerequisite: General Awareness of Law and Society, Communication Skills, General Computer or IT Literacy

Course Prerequisite: Nil

Course Learning Objectives:

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

Course Outcomes:

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

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

	Subject: 4SAOE2A (Open Elective – 2(A)) Intellectual Property Rights	L
Unit-1	Introduction to Intellectual Property Rights: Role of IP in the Economic and Cultural Development of the Society, IP Governance. IP as a Global Indicator of Innovation, Origin of IP, History of IP in India. Patents, Copyrights and Related Rights, Trademarks, Trade Secrets	07
Unit-2	Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention, Rights Associated with Patents, Enforcement of Patent Rights, Inventions Eligible for Patenting, Non-Patentable Matters, Patent Infringements, Process of Patenting.	07

Unit-3	Copyrights: Classes of Copyrights, Criteria for Copyright, Ownership of Copyright, Copyrights of the Author, Copyright Infringements, Liability of Owner of an Auditorium/Hall, Fair Use Doctrine, Non-Copyright Work, Copyright Registration, Judicial Powers of the Registrar of Copyrights, Fee Structure, Copyright Symbol, Validity of Copyright.	07
Unit-4	Trademarks: Eligibility Criteria, Who Can Apply for a Trademark, Acts and Laws, Designation of Trademark Symbols, Classification of Trademarks, Registration of a Trademark is Not Compulsory, Validity of Trademark, Types of Trademarks Registered in India, Trademark Registry, Process for Trademarks Registration. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.	07
Unit-5	Industrial Design: Eligibility Criteria, Acts and Laws to Govern Industrial Designs, Design Rights, Enforcement of Design Rights, Non-Protectable Industrial Designs India, Protection Term, Procedure for Registration of Industrial Designs, Importance of Design Registration, Cancellation of the Registered Design, Application Forms, Famous Case Law: Apple Inc. vs. Samsung Electronics Co.	07
Unit-6	Trade Secret: Criteria for Trade Secret, Registration and Protection Time of Trade Secrets, Rights Associated with Trade Secrets, Enforcement of Trade Secrets, When to Apply for Trade Secret Protection, Precautionary Measures to be Taken by Enterprises/Organizations, Disparity Between Trade Secrets and Patents, Renowned Trade Secrets	07
	Total	42

Text Book:

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

Reference Books:

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

B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SKOE1B	Stress Management	03	00	00	03

Course Prerequisites:

Course Learning Objectives:

1. Facilitating the Incorporation of Effective Coping Techniques
2. Assisting Students in Achieving a Relaxed Physiological State
3. Exploring the Role of Yoga in Stress Management

Course Outcome:

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

1. Recall the etymology and definitions of yoga.
2. Explain the principles of yoga and yogic practices.
3. Explain the relationship between mind and body in stress management.
4. Apply yoga techniques for managing stress in various life situations.
5. Analyze the relationship between yogic diet and nutrients for positive health.
6. Practice pranayamas and meditative asanas for relaxation and mental clarity.

	Subject: Stress Management	L
Unit 1	Introduction to Yoga and Yogic practices: Etymology of Yoga and Definitions of Yoga, History and Development of Yoga, Aim, Objectives and Misconceptions about Yoga.	7
Unit 2	General Introduction: Shad-darshan, four paths of Yoga, Principles of Yoga and Yogic practices.	7
Unit 3	Yoga and Stress Management: Human Psyche: Yoga and Modern Concepts, Stress and Psychosomatic Disorders, Relationship between Mind and Body, Mental Hygiene and Role of Yoga in Mental Hygiene, Mental Health: A Yogic perspective, Prayer and Meditation for Mental Health.	7
Unit 4	Psycho-Social Environment and its importance for Mental Health: Concept of Stress according to Modern Science and Yoga, Role of Yoga in Stress management, Role of Yoga in Life management.	7
Unit 5	Wellness-Prevention and promotion of positive health: Health: meaning and definition, Yogic concepts for health and diseases, Yogic principles for healthy life, Introduction to yogic diet and nutrients.	7

Unit 6	Pranayamas & Meditative Asanas: Pranayamas: Equal breathing, Intercoastal breathing, clavicular breathing, diaphragm breathing, alternate nostral breathing, Relaxative Asanas: Padmasana, Sthitaprathanasana, Sukhasana, Vajrasana.	7
	Total	42

Textbooks:

1. Iyengar, BKS. (2003). *The Art of Yoga*. New Delhi: Harper Collins Publishers.
2. Maguire, Imelda. (2005). *Yoga for a Healthy Body*. London: Greenwich Editions.

Reference Books:

1. Nagendra, H.R., & Nagarathana, R. (2004). *Yoga Practices for Anxiety & Depression*. Bangalore: Swami Sukhabodhanandha Yoga Prakashana.
2. Sukhabodhanandha, Swami. (2002). *Stress Management*. Bangalore: Prasanna Trust.
3. Andrews, Linda Wasmer. (2005). *Stress Control for Peace of Mind*. London: Greenwich Editions.
4. Yogendra, Hansa Jayadeva, & Desai, Armaiti Neriosand. (1991). *Yoga for Back and Joint Disorders*. Mumbai: Dr. Jayadeva Yogendra for the Yoga Institute.

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Course code	Course Title	L	T	P	C
3SKOE1C	Industrial Safety	03	00	00	03

Course Prerequisites: 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 fire fighting.

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
UNIT I	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 II	Development of safety movement: - Need for safety-safety and productivity-planning for safety planning procedure- safety policy-formulation of safety policy-safety budget-role and qualification of safety professional-safety committees-need, types and functions of committees safety organizations	6

UNIT III	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 equipments	7
UNIT IV	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	6
UNIT V	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 VI	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	6
	Total	39

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
3SKOE1D	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.

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

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

Recommended Books:

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

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Course code	Course Title	L	T	P	C
3SK05	Financial Literacy*	02	00	00	02

Course Prerequisites: General Awareness, Logical and Analytical Thinking

Course Learning Objectives:

1. Explain foundation of financial literacy such as savings, investment, taxation, and insurance
2. Teach the relevance and process of financial planning
3. Relate and promote financial well-being

Course Outcomes:

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

1. State different types of accounts and investment instrumentS.
2. Identify different types of government investment policies.
3. Operate on various banking and insurance products
4. Examine Personal tax planning
5. Learn about different types of insurance products such as Life Insurance, Term Life Insurance, Endowment Policies, ULIPs, and Health Insurance.
6. Understand mutual funds, types of mutual funds, and the role of brokers and sub-brokers in facilitating investments in financial markets.

	Subject: Financial Literacy	L
Unit 1	Basics of Savings and Investment: Why are investing and savings important? Savings Vs Investment, Power of Compounding, What should be the investment objectives?	05
Unit 2	Risk and Return, Inflation effects on Investment, Investor's Age and Assets Allocation. Tax saving Schemes Government Schemes-National Saving Certificates, Public Provident Fund, Post Office Schemes	05
Unit 3	Equity Linked Savings Schemes, Retirement Benefits Schemes- NPS (New Pension System), Banking Activities: Deposits and Types of Deposits-Saving Bank Accounts, Fixed Deposit Accounts, Recurring Deposit Account, Special Term Deposit Schemes,	05
Unit 4	Loans and Types of loan advanced by Banks and Other secondary functions of Bank. Banking structure in India and Role of Reserve Bank of India	05
Unit 5	Insurance related Products: Role of Insurance as risk management tool, various types of Insurance: Life Insurance, Term Life Insurance, Endowment Policies, ULIP, Health Insurance, Regulatory role of IRDA	05

Unit 6	Financial Markets: Capital Market Vs Money Market, Securities and its types, i.e., Equity, Debentures or Bonds, IPOs and FPOs, Mutual Funds, Types of Mutual Funds, Brokers, sub-brokers	05
	Total	30

Reference Books:

1. *Investment Planning* by SEBI.
2. "Indian Financial System" by T.R. Jain and R.L. Sharma (VK Global Publisher).
3. "Money and Banking" by T.R. Jain and R.K. Kaundal (VK Global Publisher).
4. *Financial Services in India: Concept and Application* by R. Kothari. Publisher: Sage Publications India Pvt. Ltd.
5. "Financial Literacy Education" by A. Zokaityte. Publisher: Palgrave Macmillan.
6. *Investment Management* by V.A. Avadhani. Publisher: Himalaya Publishing House Pvt. Ltd.

Term Work

Students should complete the following activities:

1. Prepare a personal monthly budget and a basic saving plan using real-life data.
2. Analyze case studies of investment options such as Mutual Funds, PPF, NPS, or Insurance schemes.
3. Prepare a comparative report on different banking products and loan types.
4. Submit assignments based on financial markets, securities, and government schemes.

Marking Scheme (Distribution of 50 Marks)

1. Assignment Based Evaluation (15 Marks)
2. Financial report plan (15 Marks)
3. MCQ Test Based Evaluation (20 Marks)

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B.Tech Third Semester (Computer Science & Engineering)

Course ode	Course Title	L	T	P	C
3SK06	Environmental Studies**	02	00	00	02

Course Prerequisite : Nil

Course Learning Objectives:

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

Course Outcomes:

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

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

	Subject: Environmental Studies	L
Unit-1	The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness.	05
Unit-2	Renewable and non renewable resources: Natural resources and associated problems, Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies, Role of individual in conservation of natural resources.	05

Unit-3	Eco Systems: Concept of an eco system, structure and function of an eco system, 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

B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK07	Object Oriented Programming Lab	00	00	02	01

Course Learning Objectives::

1. To explore the principles of Object-Oriented Programming (OOP), such as data abstraction, encapsulation, inheritance and polymorphism.
2. To use the object-oriented paradigm in program design.
3. To provide programming insight using OOP constructs.
4. To use Java concepts like API, Event Handling, Swing and AWT to develop GUI-based application Programs.

Course Outcomes:

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

1. Discuss Object Oriented approach to design software.
2. Demonstrate GUI-based application Programs using API, Event Handling.
3. Implement event handling in GUI applications using Java's Swing and AWT libraries.

List of Experiments:

Minimum 08-10 experiments should be conducted based on 3SK02 Object Oriented Programming.

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B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK08	Data Structure Lab	00	00	02	01

Course Learning Objectives: Throughout the course, the faculty member aims to guide students in achieving the following objectives

1. To understand the linear and nonlinear data Structures and its memory representations.
2. To perform different operations on data structures such as insertion, deletion, searching and traversing.
3. To understand various data searching and sorting methods with its complexity.
4. To introduce various techniques for representation of the data in the real world.

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

1. Implement various linear and nonlinear data structures
2. Apply programming techniques (e.g., pointers, dynamic memory allocation) to implement data structures.
3. Analyze problem domains and select the most suitable data structure based on time and space complexity requirements.

List of Experiment:

Minimum 08-10 experiments should be conducted based on 3SK03 Data Structures

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B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK09	Data Communication Lab	00	00	02	01

Course Learning Objectives:

1. Understand the concept of data link layer framing and its significance.
2. Develop a program that employs bit stuffing to frame data efficiently.
3. Test and troubleshoot the program to ensure accurate and reliable data framing.
4. Demonstrate the ability to adapt the program to different scenarios and data types.

Course Outcomes:

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

1. Understand and implement different LAN configurations and their application in real-world networking scenarios.
2. Demonstrate a comprehensive understanding of various LAN topologies, and Configuration
3. Develop practical programming skills in implementing data link layer framing methods, specifically bit stuffing.

List of Experiment:

Minimum 08-10 experiments should be conducted based on 3SK04 Data Communication

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B.Tech Third Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
3SK10	Innovation & Creativity	00	00	04	02

Course Learning Objectives:

1. Understand the fundamentals of creative thinking and innovation principles.
2. Apply creative problem-solving techniques to real-world challenges.
3. Develop and refine ideas into functional prototypes using design thinking methods.

Course Outcomes:

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

1. Recognize on real-world examples of creativity, invention, and innovation,
2. Implement creative problem-solving techniques in real-life situations
3. Learn and implement various creative problem-solving techniques, such as brainstorming, lateral thinking, and design thinking.

List of Experiments:

Minimum 8-10 experiments are to be performed.

1. To discuss the definitions and distinctions between creativity, invention, and innovation.
Field: Students analyze real-world examples of creativity, invention, and innovation in various industries.
2. To break down the creative process into stages and discuss each stage in detail.
Field: Group activity where students brainstorm and identify examples of each stage in a chosen context.
3. To explore different models or analogies for the creative process
Field: Students create their own creative process model based on their understanding.
4. To discuss theories on creative potential and common blockages.
Field: Self-assessment exercises and group discussions to identify personal creative potential and perceived blockages.
5. To present common myths and misconceptions about creativity.
Field: Debate or discussion on the validity of these myths and their impact on innovation.
6. To provide a list of practical tips for discovering and applying creative potential.
Field: In-class exercises where students practice these tips and share their experiences.
7. To understand the importance of teamwork in the creative and innovation process.
Field: Group projects where students work together to solve a creative challenge or develop an innovative solution.
8. To discuss examples of nature-inspired innovations (biomimicry).
Field: Outdoor field trip or research assignment where students explore natural phenomena and brainstorm potential applications.
9. To explain the principles of idea generation and brainstorming techniques.
Field: Conduct brainstorming sessions on specific challenges or topics relevant to the course.

Semester IV

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

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	Int.	Ext.									
Theory																		
1	4SK01	Analog and Digital Electronics	2			PCC	2	2	3	60	30	10	100	40				
2	4SK02	Computer Org. and Architecture	3			PCC	3	3	3	60	30	10	100	40				
3	4SK03	Theory of Computation	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	4SKOE2	OE-2	3			OE	3	3	3	60	30	10	100	40				
6	4SK04	Business Communication*	2			AEC	2	2				50	50	25				
7	4SK05	Entrepreneurship Principles & Process*	2			EEMC	2	2				50	50	25				
Practicals																		
8	4SK06	Analog and Digital Electronics Lab			2	PCC	2	1							25	25	50	25
9	4SK07	Computer Organization and Architecture Lab			2	PCC	2	1							25	25	50	25
11	4SK08	Report Writing & Presentation Skill			4	VSEC	4	2							25	25	50	25
		Total	18		8		26	22				600					150	
															Total		750	

OE-2 :-	4SKOE2A Marketing Management	4SKOE2B Project Management	4SKOE2C Accounting & Costing	4SKOE2D Biodiversity
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Exit Option: Two relevant skill-based courses (excluding from list of courses undertaken in First to Fourth semesters) to qualify for Diploma

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

* Assessment will be based on tests, assignments etc.

B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SK01	Analog & Digital Electronics	02	00	00	02

Course Prerequisites: Basic Physics, Discrete Mathematics

Course Learning Objectives:

1. To give the introductory knowledge of PN Junction Diode, Bipolar Junction Transistor, Field Effect Transistor.
2. To explain number systems and conversion between different number systems.
3. To introduce basic knowledge about digital ICs and digital systems.

Course Outcomes:

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

1. State the basic concepts of semiconductor devices and their applications.
2. Classify different number systems and understand the basics of conversion between number systems
3. Implement different types of applications in electronic devices.
4. Differentiate between combinational circuits and sequential circuits.
5. Understand the design and operation of combinational circuits.
6. Understand the design and operation of sequential circuits.

	Subject: Analog & Digital Electronics	L
Unit 1	PN Junction Diode And Bipolar Junction Transistor: PN-Junction Diode, Characteristics and Parameters, BJT operation, BJT Voltages and Currents, BJT Amplification: Current and Voltage, BJT Switching, Common-Base Characteristics, Common-Emitter Characteristics, Common-Collector Characteristics	5
Unit 2	Field Effect Transistors: Junction Field Effect Transistors, n-Channel and p-Channel JFET, JFET Characteristics, JFET Parameters, FET Amplifications and Switching, MOSFETs: Enhancement MOSFET, Depletion-Enhancement MOSFET, Comparison of p-channel and n-channel FETs	5
Unit 3	Optoelectronic Devices: Light Units, Light-Emitting diode, Seven-Segment Displays, Photoconductive cell, Photo Diode and solar cell, Phototransistors, Opto-couplers, Photomultiplier Tube, Laser Diode.	5

Unit 4	Number System: Binary Number System, Signed and unsigned Number, Octal Number System, Hexadecimal Number System, Conversions between Number Systems, Complements Representation, BCD, Gray Code, Excess 3 Code	5
Unit 5	Minimization Techniques: Logic Gates, Boolean Algebra, Logic Operation, Axioms and Laws of Boolean Algebra, Reducing Boolean Expression, Boolean Functions and their representation, SOP Form, POS Form, Karnaugh Map (up to 4 variable), Limitation of Karnaugh Map, Quine-McCluskey Minimization Technique (up to 4 variable)	5
Unit 6	Combinational Circuit: Introduction, Design Procedure, Adders, Subtractors, Binary Parallel Adder, 4 Bit Parallel Subtractor, Look-ahead-carry Adder, BCD adder, BCD Subtractor, Multiplexer, De-multiplexer	5
	Total	30

Text Books:

1. "Electronic Devices and Circuits" by David A. Bell. 5th edition. Publisher: Oxford University Press.
2. "Modern Digital Electronics" by R.P. Jain. 3rd edition. Publisher: TMH.

Reference Books:

1. "Electronic Devices & Circuits" by Millman & Halkies. 2nd edition. Publisher: McGraw Hill.
2. "Microelectronics Circuits" by Sedra & Smith. 5th edition. Publisher: Oxford University Press.
3. "Switching Theory and Logic Design" by Anand Kumar. 3rd edition. Publisher: PHI Learning Private Limited.
4. "Digital Design: Principles and Practices" by Wakerly. 3rd edition. Publisher: Pearson Education, 2004.

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SK02	Computer Organization and Architecture	03	00	00	03

Course Prerequisites: Basic Digital Electronics, Fundamentals of Programming, Computer Fundamentals

Course Learning Objectives:

1. To discuss the basic concepts and structure of computers.
2. To analyze the memory and I/O organization.
3. To solve concepts of arithmetic operations.

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

1. Describe various types of computers, functional units, and operational concepts of computer systems.
2. Explain number systems, memory addressing techniques, and instruction sequencing.
3. Analyze memory hierarchy and organization of different memory technologies such as RAM, ROM, and cache.
4. Design a basic processing unit using hardwired and microprogrammed control techniques with appropriate instruction execution.
5. Evaluate I/O device communication methods including interrupt handling and DMA for efficient data transfer
6. Apply knowledge of binary arithmetic to perform operations like signed/unsigned addition, subtraction, multiplication, and division.

	Subject: Computer Organization and Architecture	L
Unit 1	Basic Structure of Computer: Computer Types, Functional Units, Basic Operational Concepts, Bus structures, Number Representations: Addition of positive numbers, Addition and subtraction of signed numbers.	7
Unit 2	Memory Location and Addresses : Byte addressability, Big Endian and Little Endian assignment , Memory operations, Instruction and instruction sequencing, Addressing Modes. Basic I/O Operations.	7
Unit 3	Memory Unit: Basic Concepts, Memory Hierarchy, Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Dynamic Memories, Read Only Memories, Speed, Size and Cost.	7
Unit 4	Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus organization, Hardwired Control, Complete processor, Micro programmed Control, Microinstructions.	7
Unit 5	I/O Organization: Accessing I/O Devices, Interrupts, Enabling and Disabling Interrupts, Handling Multiple Devices, DMA, I/O Hardware.	7

Unit 6	Arithmetic: Design of Fast Adders, Signed Addition and Subtraction, Multiplication of Positive Numbers, Booth Multiplier, Fast Multiplication, Integer Division.	7
	Total	42

Text Book: "Computer Organization" by Carl Hamacher, Zvonko Vranesic, and Safwat Zaky. Fifth Edition. Publisher: Tata McGraw-Hill.

Reference Books:

1. "Computer Organization and Architecture: Designing for Performance" by William Stallings. Eighth Edition. Publisher: Pearson.
2. "Computer Architecture and Organization" by John P. Hayes. Publisher: McGraw Hill Publication.
3. "Computer Organization and Design" by DA Patterson and JL Hennessy. Second Edition. Publisher: Morgan Kaufmann Publisher.

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SK03	Theory of Computation	03	00	00	03

Course Prerequisites: Discrete Mathematics, Basic Programming Concepts

Course Learning Objectives:

1. To understand different automata theory and its operation.
2. To understand mathematical expressions for the formal languages
3. To study computing machines and comparing different types of computational models.

Course Outcomes:

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

1. Describe finite automata models, language structures and state transition mechanisms.
2. Apply regular expressions and finite automata conversion techniques.
3. Analyze regular grammars, derivation methods, closure properties and characteristics of regular languages.
4. Construct context-free grammars and transform them into normal forms.
5. Design pushdown automata and perform CFG–PDA transformations.
6. Analyze Turing machines, language hierarchies, computability concepts and decidability problems.

	Subject: Theory of Computation	L
Unit 1	Finite State Machines: Alphabet, String, Formal and Natural Language, Operations, Definition and Design DFA (Deterministic Finite Automata), NFA (Non-Deterministic Finite Automata), Equivalence of NFA and DFA: Conversion of NFA into DFA, Conversion of NFA with epsilon moves to DFA.	7
Unit 2	Definition of Moore and Mealy Machines, Definition and Identities of Regular Expressions, Construction of Regular Expression of the given Language, Construction of Language from the RE. Conversion of FA to RE using Arden's Theorem, Inter-conversion RE to FA.	7
Unit 3	Regular Grammar: Closure properties of RLs (proofs not required), Regular grammar, Equivalence of RG (RLG and LLG) and FA. Derivation Process: Leftmost Derivation, Rightmost Derivation, Derivation Trees, Ambiguous grammar, Pumping lemma of RL.	7

Unit 4	Context-Free Grammar and Languages: Formal Definition of Grammar, Notations, Construction of Context-Free Grammars and Languages, Simplification of CFG, Removal of useless units, null production, and Removal of unit Production. Normal Forms of CFG: CNF and GNF. Lemma Rule in GNF. Pumping lemma of CFL.	7
Unit 5	Pushdown Automata: Introduction and Definition of PDA, Construction of PDA, Concept of DPDA, NPDA, Interconversion of PDA to CFG, CFG to PDA. Acceptance of CFL, Enumeration of properties of CFL (proofs not required), Context-Sensitive Language, Linear Bounded Automata.	7
Unit 6	Turing Machines: Formal definition of a Turing Machine, Design of TM, Types of Turing Machine. Chomsky hierarchy of languages. Decidability and Undesirability, Properties of recursive & non-recursive enumerable languages, Recursive functions. Post correspondence problem.	7
	Total	42

Text Books:

1. "Introduction to Automata Theory, Languages and Computation" by Hopcroft H.E. & Ullman J.
2. "An Introduction to Formal Languages and Automata" by Peter Linz.

Reference Books:

1. "Theory of Computation" by Rajesh K. Shukla. Publisher: CENGAGE Learning, 2009.
2. "Formal Languages and Automata Theory" by K V N Sunitha and N Kalyani. Publisher: McGraw Hill, 2010.
3. "Elements of Theory of Computation" by Lewis H.P. and Papadimition C.H.
4. "Theory of Computation" by Mishra & Chandrashekharan.
5. "Formal Languages and Automata Theory" by C.K.Nagpal. Publisher: Oxford University Press, 2011.
6. "Theory of Computation" by Vivek Kulkarni. Publisher: OUP India, 2013.

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SKOE2A	Marketing Management	03	00	00	03

Course Pre-requisites: NIL

Course Learning Objectives:

- 1: To impart the knowledge of Marketing management and the basic concepts of consumer behaviour
- 2: To impart the knowledge of basic concepts of Marketing Research, pricing and product decisions, and channels of distribution
- 3: To impart the basic knowledge of Advertising and Sales promotion strategies and Sales personnel Management
- 4: To impart the basic knowledge of International marketing, Services marketing and Online Marketing

Course Outcomes:

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

1. Understand the concepts of Marketing Management consumer behaviour
2. Apply the knowledge of Marketing Research and Pricing decisions
3. Understand the concepts of Product development and channels of distribution
4. Apply the knowledge Advertisement development & strategies
5. Understand the concepts of Sales promotion strategies and Sales personnel Management
6. Understand the concepts of International marketing, Services marketing and Online Marketing

	Subject: OE-I-Marketing Management	L
UNIT I	Marketing Management -Definition, Scope, Objectives 4 P's of Marketing Mix for Products Factors affecting consumer buying Behavior, Consumer Buying Decision Process, Customer Relationship Management	7
UNIT II	Marketing Research: Objectives and scope, Marketing research Procedure, Major techniques of Marketing Research. Pricing Decisions: Meaning, significance and objectives of Pricing, Types and strategies of Pricing. Pricing under different competitive situations	6
UNIT III	Product: Meaning, classes of Products, classification of consumer products, Product Life cycle (PLC) process, New Product Development strategy, Functions of packaging as a marketing tool Channel of distribution: Role and importance, channel selection, types of intermediaries, objectives of physical distribution	7

UNIT IV	Advertising: Definition, objectives, Advertising organization, Advertising Budget, Media planning, classes of advertising, Advertising & Ethics, Steps in making layouts, Advertising Campaign, Push and Pull strategy in advertising	6
UNIT V	Sales Promotion: Meaning, objectives, types of sales promotion schemes, Promotion Mix, Objectives of Marketing organization, types of marketing organization Sales Personnel: Role of sales manager, sales personnel recruitment, selection and training, motivation, Appraisal of performance. Expenses control	6
UNIT VI	International marketing: Environment, Marketing mix strategy for International marketing, Documents for International marketing, Payment procedure in international trade Marketing of services: Meaning, characteristics, classification of services, elements of marketing mix in service marketing: 7 P's of marketing Online marketing: Meaning, objectives, Understanding internet/ online consumers, Online Advertising, Advantages & Limitations of Online marketing	7
	Total	39

Text Books :

1. Principles of Marketing, Philip T.Kotler, Pearson.
2. Marketing Management, Biplab S. Bose, Himalaya Publishing house
- 3 . Marketing Management – Verma & Duggal - Oxford University Press

References Books:

1. K.S Chandrasekar, Marketing Management text and cases, Tata McGraw-Hill publications.
2. Kumar, R.S Case studies in marketing management.
3. Fundamentals of Marketing, Stanton, Etzel & Walker McGraw Hill

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SKOE2B	Project Management	03	00	00	03

Course Prerequisite : 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
Unit-1	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

Text Book:

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

McGraw Hill Education pvt. Ltd, New Delhi.

2. John M. Nicholas and Herman steven, “Project management for engineers, business and technology”, fourth edition, Routledge Publication, New York.

3. Prasanna Chandra, “Projects Planning, analysis, selection, financing, implementation and review”, 7th edition,

McGraw Hill Education India Pvt. Ltd., New Delhi.

4. Harold Kerzner, “Project Management system approach to planning, scheduling and controlling, second.

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SKOE2C	Accounting & Costing	03	00	00	03

Course Prerequisites: Basic Knowledge of Accounts

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.
4. To Understand the scope, objectives, and practical implications of cost accounting in relation to financial and management accounting.
5. To Discuss and demonstrate the preparation of cost sheets, unit costing, and overhead costing, including tender price calculation.
6. To Learn and apply Marginal Costing principles, break-even analysis, and understand the importance and techniques of Cost Audit.

Course Outcomes:

After completion of this course the student will 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 and Costing	
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 -	07

	Concept of depreciation; Causes of depreciation; Depreciation, depletion, amortization, and dilapidation; Depreciation accounting; Methods of recording depreciation.	
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

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SKOE2D	Biodiversity	03	00	00	03

Course Prerequisites: Nil

Course Learning Objectives:

1. To introduce the importance and ethics of environment
2. To introduce scope, principal and types of ecology
3. To explain importance and threats of biodiversity
4. To understand the importance and need of biodiversity conservation

Course outcomes: After completion of this course the student will be able to :

1. Understand the definition, importance and ethics of environment
2. Develop the knowledge of ecology and its types
3. Understand the concept, types and importance of biodiversity
4. Understand the concept and importance of conservation of biodiversity
5. Explain the Acts on biodiversity
6. Explain the national policy and sustainable utilisation of biodiversity

	Subject: Biodiversity	L
Unit-1	Ecology: Definition, Scope & principles of ecology, Types of ecology - population ecology, community ecology, Ecological Succession.	07
Unit-2	Biodiversity: Introduction, Definition, need of biodiversity, Benefits of Biodiversity.	07
Unit-3	Types of Biodiversity (Species, Genetic and ecosystem diversity) importance of Biodiversity, Threats of Biodiversity, Hotspots of Biodiversity (India). India as a mega diversity region.	07
Unit-4	Conservation of Biodiversity -In-Situ, Ex-situ conservation. Importance of biodiversity conservation, loss of biodiversity convention on biological diversity, Strategies for conservation of biodiversity.	07
Unit-5	Biodiversity Action Plan -Biodiversity legislation, The Wild Life (Protection) Act of 1972, Biological Diversity Act, 2002 Biological Diversity (Amendment) Act 2023.	07
Unit-6	Sustainable utilization of Biodiversity, National Policy and measurement estimation of the biological biodiversity, Biodiversity rules 2004.	07
	Total	42

Recommended Books :-

1. "Fundamentals of Ecology" by E. P. Odum, Revised Edition 2003.
2. "Biodiversity and Environment" by S.K. Agrawal, S. Tiwari & P.S. Dubey.
3. "The Biological diversity Act 2002 and Biological diversity rules 2004:- National Biodiversity Authority INDIA 475, 9th South cross street, Kalpalocwar Nagar, Neelangarai Chennai - 608 600041
4. "Environmental studies" by Nidhi Dhawan, Kiran Bisht, I.K. International House. Put. Ltd.

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Course code	Course Title	L	T	P	C
4SK04	Business Communication*	02	00	00	02

Course Learning Objectives:

1. To develop awareness of the complexity of the communication process.
2. To develop effective listening skills in students so as to enable them to comprehend instructions and become a critical listener.
3. To develop effective oral skills so as to enable students to speak confidently interpersonally as well as in large groups.
4. To develop effective writing skills so as to enable students to write in a clear, concise, persuasive and audience centered manner.

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

1. Describe Nature and Process of Communication.
2. Outline importance of Organizational Communication.
3. Discover the importance of Oral Communication and Applications of Conversation Control.
4. Outline guidelines for improving Listening Skills and developing Non-verbal Communication Skills.
5. Examine draft for structured business messages and cover letters.
6. Design Business Letters from standard layout and formal report using different visual aids.

	Subject: Business Communication	L
Unit-1	The Nature and Process of Communication: The Role of Communication, Defining Communication, Classification of Communication, The Purpose of Communication, The Process of Communication, The Elements of Communication, The Major Difficulties in Communication, Barriers to Communication, Conditions for Successful Communication, The Seven C's of Communication, Universal Elements in Communication	05
Unit-2	Organizational Communication: The Importance of Communication in Management, Communication Concerns of the Manager, Communication Training for Managers, Communication Structures in Organizations, Line and Staff Management, Information to be Communicated at the Workplace. Intercultural Communication Skills: Globalization and Intercultural Communication, The New Global Mantra: Go Local, Cultural Sensitivity, Developing Cultural Intelligence, Guidelines for Intercultural Communication, EMail and Intercultural Communication	05
Unit-3	Oral Communication: What Is Oral Communication? Three Aspects of Oral Communication, INTERCULTURAL COMMUNICATION, Oral Communication and Electronic Media.	05

	Conversation Skills: What is Conversation?, Social Conversation, Effective Conversation, Example: Conversation Control, Applications of Conversation Control.	
Unit-4	Listening: What Is Listening? The Process of Listening, Factors that Adversely Affect Listening, Characteristics of Effective and Ineffective Listeners, Guidelines for Improving Listening Skills, Responsive Listening Non-verbal Communication: What is Non-verbal Communication Characteristics of Non-verbal Communication, Classification of Non-verbal Communication, Responding to Power Posturing, Guidelines for Developing Nonverbal Communication Skills	05
Unit-5	Written Business Communication: The Art of Writing, The Skills Required in Written Communication, INFORMATORY WRITING, The Purpose of Writing, PERSUASIVE WRITING, Clarity in Writing, EXAMPLES OF CLEAR AND UNCLEAR WRITING, REWRITING A LETTER. Report Writing: What Is a Report? The Purpose of a Report, Kinds of Reports, The Terms of Reference, The Objectives of a Report, Planning and Organizing Information, Writing Reports, Short Management Reports, Long Formal Reports, Using Diagrams and Visual Aids in Reports	05
Unit-6	Effective Presentation: What is Effective Presentation? Essential Characteristic of good presentation, Steps to prepare presentations, guidelines for delivering presentation, tips to fight stage fright Business Etiquette: What is Business Etiquette? Cell Phone/telephone etiquette, inter organizational etiquette	05
	Total	30

Text Book: P. D. Chaturvedi and C. Mukesh, “Business Communication”, Pearson Publication.

Reference Books:

1. Bovee, Courtland, John Thill & Mukesh Chaturvedi. Business Communication Today: Dorling Kindersley, Delhi.
2. P. D. Chaturvedi & M. Chaturvedi, "Business communication: Concepts, cases and applications", Pearson Education, 2nd Edition, 2017.
3. M. Raman, & P. Singh, "Business Communication", Oxford University Press, 2nd Edition, 2012.

Term Work: Student will perform following activities:

- a) Submit the assignment based on syllabus with real time examples.

b) Identify the topic for presentation to understand the norms of Business Communication. c) Attend test to understand the syllabus thoroughly and apply to solve the problems.

Marking Scheme: (Distribution of 50 Marks)

1. Assignment Based Evaluation (15 Marks)
2. Presentation (15 Marks)
3. MCQ Test Based Evaluation (20 Marks)

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SK05	Entrepreneurship Principles and Process*	02	00	00	02

Course Learning Objectives:

1. Guide students through a comprehensive exploration of the entire process of creating a new venture
2. Lead students in the development of sound entrepreneurial strategies and the creation of detailed business plans.
3. Develop critical thinking and decision-making skills necessary for evaluating business opportunities and managing startup challenges.

Course Outcomes:

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

1. Recall and summarize the fundamental concepts related to entrepreneurship.
2. Identify and evaluate risks in entrepreneurial endeavors and implement risk control strategies.
3. Apply innovative strategies to solve challenges within an entrepreneurial context.
4. Explain the overview of entrepreneurship and its significance in the modern economy.
5. Understand new forms of organization, including startups and social enterprises, within an entrepreneurial landscape.
6. Identify opportunities, form organizations, and acquire resources to launch and grow a business.

	Subject: Entrepreneurship Principles and Processes	L
Unit 1	Spirit of Entrepreneurship: Entrepreneurship process, ecosystem, Economic relevance of Entrepreneurship, Societal & Personal Entrepreneurship Ecosystem, The Entrepreneurship Mind, Success factors to be an Entrepreneurship, Components of an Entrepreneurial Mind-set, Innovation, Innovation and Imitation, Entrepreneurs in Innovation Process, Commercialization of Innovations.	05
Unit 2	Entrepreneurship Reconsidered: Importance of Team and Special role of the CEO, Team Building, Collaboration, Cooperation, Networking, Diagnosing the Internal Capabilities, analysis, Understanding - the Market & Customer access, Industry dynamics & competitive environment, Classical Competitive analysis.	05
Unit 3	Building a New Business: Exploring the Innovation Funnel, Generation & Pre-Field Assessment of the Business Idea, Important Components of Concepts, Sales function in Business Building Process, The New Business Model.	05
Unit 4	Entrepreneurial Strategies: Strategic Thrust of the Entrepreneurial Company, Entrepreneurial Perspective, OSA Process, Key Performance Indicators, Market Segmentation, Strategic Options for Entrepreneurs – Entrepreneurial, Complementary and Competitive, Customer Understanding, Developing the Entrepreneurial Strategy.	05

Unit 5	Formulating the Business Plan: Pre-Field Work to the Business Plan, Business Plan as Road Map & Key Document, Contents of Business Plan, Projected Economics, Risk Management, Identification & Evaluation of Risk, Risk Controlling, Lesson Learned and Recommendations for Entrepreneurs.	05
Unit 6	Entrepreneurial Growth: Making transition from start-up to growth, A model of driving forces, Growth Process, Opportunity Domain. Overview of social entrepreneurship, new form of Organization, Identifying Opportunity, Forming Organization, Securing Resources, Going to Scale.	05
	Total	30

Text Books:

1. "Entrepreneurship for Engineers" by Helmut Kohlert, Dawud Fadai & Hans-Ulrich Sachs, 2nd Edition. Publisher: Oldenbourg Verlag Munchen.
2. "Entrepreneurship" by William Bygrave, Andrew Zacharakis, 2nd Edition. Publisher: John Wiley & Sons, Inc.

Reference Books:

1. "Entrepreneurship for Engineers" by Kenji Uchino. Publisher: Taylor & Francis Group, CRC Press.
2. "Entrepreneurship: Theory, Process, Practice" by Howard Frederick, Allan O'Connor, Donald Kuratko, 4th Edition. Publisher: Cengage Learning.
3. "Entrepreneurship: Owning Your Future" by Steve Mariotti, 11th Edition. Publisher: Prentice Hall.

Term Work

Student will perform following activities:

- a) Submit the assignment based on syllabus with real time examples.
- b) Identify business application domain and prepare plan for execution as well as evaluation.
- c) Attend test to understand the syllabus thoroughly and apply to solve the problems.

Marking Scheme (Distribution of 50 Marks)

1. Assignment Based Evaluation (15 Marks)
2. Business Planning Based Evaluation (15 Marks)
3. MCQ Test Based Evaluation (20 Marks)

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SK06	Analog & Digital Electronics Lab	00	00	02	01

Course Learning Objectives:

1. To give the introductory knowledge of PN Junction Diode, Bipolar Junction Transistor, Field Effect Transistor.
2. To explain number systems and conversion between different number systems.
3. To introduce basic knowledge about digital ICs and digital systems.

Course Outcomes:

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

1. Understand and demonstrate knowledge of transistors and conversion systems in electronic circuits.
2. Design and implement circuits for analog and digital electronics based on specified aims and objectives.
3. Apply theoretical concepts to practical experiments, effectively demonstrating and implementing circuit designs using appropriate electronic components.

List of Experiment:

Minimum 8-10 experiments are to be conducted based on 4SK01 Analog and Digital Electronics

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SK07	Computer Organization and Architecture Lab	00	00	02	01

Course Learning Objectives:

1. To discuss the basic concepts and structure of computers.
2. To solve concepts of arithmetic operations.
3. To understand addressing modes and memory organization.
4. To explain IO communication

Course Outcomes:

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

1. Identify and describe the basic operations and components of a computer system.
2. Execute binary arithmetic operations, including addition, subtraction, multiplication, and division.
3. Understand and apply number system conversions, including binary, decimal, and hexadecimal.

List of Experiment:

Minimum 8-10 experiments are to be conducted based on 4SK02 Computer Architecture and Organization

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B.Tech Fourth Semester (Computer Science & Engineering)

Course code	Course Title	L	T	P	C
4SK08	Report Writing & Presentation Skill	00	00	04	02

Course Learning Objectives:

1. To teach the skills using Information and Communication Technology tools.
2. To explain basics of Information Technology and report writing.
3. To explore the internet searching using ICT tools

Course Outcomes:

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

1. Understand and describe the basic concepts of Information and Communication Technology (ICT) tools and their applications.
2. Collect, organize, analyze, and evaluate information, and apply the principles of clear and concise writing to create structured reports.
3. Write effective technical reports and procedures, catering to the needs of the target audience, and present them professionally, both in writing and verbally, using ICT tools.

List of Experiment:

Minimum 8 experiments are to be performed.

1. Understand and demonstrate Technical Report Formatting in MS-Word.
2. Format Table of Content in MS-Word.
3. Perform Statistical Analysis in MS-Excel.
4. Perform Advanced Statistical Analysis in MS-Excel.
5. Create Presentation in MS PowerPoint with slide master, graphics, images, clip and multimedia features.
6. Installation of Latex Software on Windows Operating System.
7. Prepare a project report using Latex.
8. Perform different operations using NumPy Library in Python.
9. Write commands and perform operation related Python programming.
10. Perform Statistical Tool based operation in R Programming.

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B.Tech Fourth Semester (Computer Science & Engineering Honors)

Course code	Course Title	L	T	P	C
4SKH	Data Science and Analytics	03	00	00	03

Course Prerequisites: Mathematics & Statistics, Logical & Analytical Skills

Course Learning Objectives:

1. To define data science process
2. To acquire analytics applied to data science
3. To understand statistics behind data science

Course Outcomes:

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

1. Identify the basic concepts and technologies involved in dealing with Data science process.
2. Apply data management for exploring and fixing data.
3. Understand different types of statistical data analysis
4. Apply and use different technologies for data visualization
5. Demonstrate data science techniques on real time applications
6. Describe recent trends in Data Science

	Subject:Data Science & Analytics	L
Unit 1	Introduction to Data Science: Data Science, Terminology Related with Data Science, Methods of Data Repository, Personnel Involved with Data Science, Types of Data, The Data Science Process (OS P), Popular Data Science Toolkits, Familiarity with Example Applications.	07
Unit 2	Data Management: Data Management Planning, Data Management Plan, Data Collection and Management, Application Programming Interface (API), Exploring Data, Building Models, Storage Management, Importing Data.	07
Unit 3	Statistics: Introduction to Applied Statistical Techniques, Types of Statistical Data, Types Of Big Data Analytics, Collecting Data for Sampling and Distribution, Probability, Frequency Distribution, Population and Parameters, Central Tendency or Central Value, Measures Of Central Tendency, Different Types of Statistical Means	07
Unit 4	Data Visualization: Data Visualization, Importance of Data Visualization, Conventional Data Visualization Methods, Retinal Variables, Mapping Variables to Encodings.	07

Unit 5	Implementation in Python: Introduction to Python, Basic Numeric Operations, Data Types in Python, Modules, Library, Introduction to Bokeh, Applications of Data Science Technologies for Visualization, Different libraries of visualization.	07
Unit 6	Recent Trends: Recent trends in various data collection and analysis techniques, Various Big Data Visualization Tools, Visualizing Big Data, Pre-attentive Attributes, Challenges of Big Data Visualization, Potential Solutions, Future Progress of Big Data Visualization.	07
	Total	42

Text Books:

1. “Data Science and Analytics” by V.K.Jain, Khanna Publications.

Reference Books:

- 1 “Doing Data Science” by Cathy O’Neil and Rachel Schutt,, First Edition, 2014, O’reilly Publications,, ISBN:978-1-449-35865-5.
2. “Big Data, Black Book” by DT Editorial Services, ISBN:9789351197577, 2016

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