OP JINDAL UNIVERSITY

Raigarh-Chhattisgarh

Scheme and Syllabus

of

B. Tech(01UG020)

Department of

Computer Science and Engineering

School of Engineering

Batch 2020-2024

Programme Outcome (PO)

- **Engineering Knowledge and Problem Analysis** -- Apply the knowledge of engineering domain with adequate amalgamation of science, mathematics, and management to Identify, formulate, and critically analyze complex engineering problems.
- **Modern tools and techniques for investigating complex problems** – Apply appropriate tools and techniques to analyze, predict and simulate the data for valid conclusion with clear understanding of limitations.
- **Design and development of innovative systems:** design and develop system components or processes to provide solutions of complex engineering problems that meet the specified conditions of societal, health, safety, and environmental needs.
- **Communication and Teamwork:** Develop skills to communicate effectively to diverse platforms and contribute meaningfully to different capacities as a leader, team member or individual.
- **Project management and finance:** Develop and apply knowledge of engineering, management, and finance principles to handle a project in a multidisciplinary environment.
- **Life-long learning:** Acquire fundamental knowledge for lifelong learning to participate in the extensive context of socio-technological change as a self-directed member and a leader.
- **Ethics and citizenship:** Apply ethical principles and commit to professional ethics, norms, and responsibilities of the engineering practice; and act with informed awareness to participate in civic life activities.
- **Society, Sustainability and Environment:** Understand the impact of various solutions in the context of societal, economical, health, safety legal and environmental impact for sustainable development.

Programme Specific Outcome (PSO)

PSO_1: Inculcate strong fundamental knowledge and foundation skills of computer systems, hardware, software, networks, data structures, algorithms and different aspects of the core computing and allied domains.

PSO_2: Ability to analyze, design, develop and deploy elementary programs and projects, individually and collaboratively, in the areas related to web and app development, artificial intelligence and analytics, databases and cloud computing and for other IT / ITeS with proper structure and development methodologies.

PSO_3: Ability to analyze and think critically and apply emerging tools, technologies and computing knowledge under a multidisciplinary environment for creating innovative solutions and startups.

PSO_4: ability to adapt and quickly learn rapidly changing technologies and work environment to cater the contemporary needs of global IT industry and entrepreneurship.

Scheme of Teaching and Examination
B. Tech 1st Year

Academic Semester I

S. N.	Subject Code	SUBJECT	Periods per week			Credit (L+(T+P)/2)	Scheme of Examination and Marks				BoS
							PRE		ESE	Total Marks	
			L	T	P		Mid Sem	TA			
1	SOE-B-FY101	Mathematics- I	4	1	0	5	30	20	50	100	Maths
2	SOE-B-FY102	Engineering Chemistry	3	0	0	3	30	20	50	100	Chemistry
3	SOE-B-FY103	Physics- I	3	0	0	3	30	20	50	100	Physics
4	SOE-B-FY104	Basic Computing	3	2	0	4	30	20	50	100	CSE
5	SOE-B-FY105	Engineering Graphics	2	2	0	3	30	20	50	100	Mech
6	SOE-B-FY106	Basic Electrical & Electronics Engineering	3	0	0	3	30	20	50	100	EE
7	SOE-B-FY107	Basic Electrical & Electronics Engineering Lab	0	0	2	1	-	30	20	50	EE
8	SOE-B-FY108	Engineering Chemistry Lab	0	0	2	1	-	30	20	50	Chemistry
9	SOE-B-FY109	Spoken English Communication	0	0	2	1	-	30	20	50	Humanities
TOTAL			**18**	**05**	**06**	**24**	**180**	**210**	**360**	**750**	

Note: The tutorials of courses Basic Computing & Engineering Graphics shall be conducted in their respective laboratories.

Scheme of Teaching and Examination
B. Tech 1st Year

Academic Semester II

S. N.	Subject Code	SUBJECT	Periods per week			Credit (L+(T+P)/2)	Scheme of Examination and Marks				BoS
			L	T	P		PRE		ESE	Total Marks	
							Mid Sem	TA			
1	SOE-B-FY201	Mathematics- II	4	1	0	5	30	20	50	100	Maths
2	SOE-B-FY202	Physics- II	3	0	0	2	15	10	25	50	Physics
3	SOE-B-FY204	Basics of Civil Engineering	3	0	0	3	30	20	50	100	Civil
4	SOE-B-FY205	Engineering Mechanics	3	0	2	4	30	20	50	100	Mech
5	SOE-B-FY207	Environmental Studies	1	0	2	2	15	10	25	50	Chemistry
6	SOE-B-FY208	Introduction to Artificial Intelligence	2	0	2	3	30	20	50	100	CSE
7	SOE-B-FY203	Physics-II Lab	0	0	2	1	-	30	20	50	Physics
8	SOE-B-FY206	Workshop Practice	0	0	2	1	-	30	20	50	Mech
9	SOE-B-FY209	Written English Communication	0	0	2	1	-	30	20	50	Humanities
TOTAL			**16**	**01**	**12**	**22**	**150**	**190**	**310**	**650**	

Computer Science and Engineering

L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering)
Academic Semester III

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2
				L	T	P	PRE**		ESE*	Total Marks	(L+P+T)
							Mid Sem	TA			
1	SOE-B-MA302	MATH	Discrete Mathematics	3	1	0	30	20	50	100	4
2	SOE-B-CSE301	CSE	Internet Technology	2	1	0	15	10	25	50	3
3	SOE-B-CSE302	CSE	Data Structure	3	1	0	30	20	50	100	4
4	SOE-B-CSE303	CSE	Operating System	2	1	0	20	15	40	75	3
5	SOE-B-CSE304	SoM	Basics of Banking and Financial Service	2	0	0	15	10	25	50	2
6	SOE-B-CE305	Civil	Disaster Management	1	0	0	15	10	25	50	1
7	SOE-B-CSE306	CSE	Internet Technology Lab	0	0	4	0	50	25	75	2
8	SOE-B-CSE307	CSE	Data Structure Lab	0	0	2	0	30	20	50	1
9	SOE-B-CSE308	CSE	Operating System Lab	0	0	2	0	30	20	50	1
10	SOE-B-CSE309	CSE	Data Analytics with Python	0	0	4	0	50	25	75	2
11	SOE-B-CSE310	CSE	Mini Project/Case Study	0	0	2	0	15	10	25	1
12	SOE-B-CSE311	Humanities	Professional Development-1	0	0	2	0	30	20	50	1
			TOTAL	**13**	**4**	**16**	**125**	**290**	**335**	**750**	**25**

* End Semester Examination

** Progress Review Examination

Computer Science and Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B.Tech (Computer Science and Engineering)

Academic Semester IV

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit (L+T+P)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-MA402	MATH	Probability and Statistics	3	1	0	30	20	50	100	4
2	SOE-B-CSE401	CSE	Object Oriented Analysis and Design	2	0	0	15	10	25	50	2
3	SOE-B-CSE402	CSE	Microprocessor and Microcontrollers	2	1	0	20	15	40	75	3
4	SOE-B-CSE403	CSE	Database Management System	2	1	0	20	15	40	75	3
5	SOE-B-CSE404	CSE	Introduction to digital marketing and e-commerce	2	0	0	15	10	25	50	2
6	SOE-B-CSE405	CSE	MOOCS/SWAYAM/Certification/Liberal Arts	2	0	0	0	0	25	25	2
7	SOE-B-CSE406	CSE	Object Oriented Programming Lab	0	0	4	0	50	25	75	2
8	SOE-B-CSE407	CSE	DBMS Lab	0	0	4	0	50	25	75	2
9	SOE-B-CSE408	CSE	Microprocessor Lab	0	0	2	0	30	20	50	1
10	SOE-B-CSE409	CSE	Machine Learning with Python	0	0	4	0	50	25	75	2
11	SOE-B-CSE410	CSE	Mini Project / Case Study	0	0	2	0	30	20	50	1
12	SOE-B-CSE411	Humanities	Professional Development - II	0	0	2	0	30	20	50	1
			TOTAL	**13**	**3**	**18**	**100**	**310**	**340**	**750**	**25**

* End Semester Examination

Computer Science and Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering)

Academic Semester V

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+T+P)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-CSE501	CSE	Elective-I	2	1	0	20	15	40	75	3
2	SOE-B-CSE502	CSE	Software Engineering	2	1	0	20	15	40	75	3
3	SOE-B-CSE503	CSE	Analysis and Design of Algorithm	2	1	0	20	15	40	75	3
4	SOE-B-CSE504	CSE	Machine Learning	2	1	0	15	10	25	50	2
5	SOE-B-CSE505	SoM	Engineering Economics	2	0	0	15	10	25	50	2
6	SOE-B-CSE506	CSE	Elective Lab I	0	0	4	0	50	25	75	2
7	SOE-B-CSE507	CSE	Software Engineering Lab	0	0	2	0	30	20	50	1
8	SOE-B-CSE508	CSE	Machine Learning Lab	0	0	2	0	30	20	50	1
9	SOE-B-CSE509	CSE	Algorithm Design Lab	0	0	4	0	50	25	75	2
10	SOE-B-CSE510	CSE	Project/ Case Studies	0	0	4	0	30	20	50	2
11	SOE-B-CSE511	CSE	Internship/Training/Certifications	0	0	1	0	30	20	50	2
12	SOE-B-CSE512	Humanities	Professional Development	0	0	4	0	50	25	75	2
			TOTAL	**10**	**4**	**21**	**90**	**335**	**325**	**750**	**25**

* End Semester Examination
** Progress Review Examination

Elective-I

Sr. No.	Subject Code	Board of Study	SUBJECT
1.	SOE-B-CSE501 (1)	CSE	Theory of Computation
2.	SOE-B-CSE501 (2)	CSE	Internet of Things (IoT)
3.	SOE-B-CSE501 (3)	CSE	Block Chain
4.	SOE-B-CSE501 (4)	CSE	Data Warehousing & Business Intelligence

Elective Lab-I

Sr. No.	Subject Code	Board of Study	SUBJECT
1.	SOE-B-CSE506 (1)	CSE	Internet of Things (IoT)
2.	SOE-B-CSE506 (2)	CSE	Block Chain
3.	SOE-B-CSE506 (3)	CSE	Data Warehousing & Business Intelligence
4.	SOE-B-CSE506 (4)	CSE	Android Development Lab

Computer Science and Engineering
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Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering)

Academic Semester VI

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P) /2 (L+T+P)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-CSE601	CSE	Computer Networks	2	1	0	20	15	40	75	3
2	SOE-B-CSE602	CSE	Big Data & Cloud Computing	2	1	0	20	15	40	75	3
3	SOE-B-CSE603	CSE	Indian Financial System	2	0	0	15	10	25	50	2
4	SOE-B-CSE604	CSE	Professional Elective-II	2	1	0	20	15	40	75	3
5	SOE-B-CSE605	SoM	Professional Elective-III	2	1	0	20	15	40	75	3
6	SOE-B-CSE606	CSE	Computer Networks Lab	0	0	2	0	30	20	50	1
7	SOE-B-CSE607	CSE	Big Data & Cloud Computing Lab	0	0	4	0	50	25	75	2
8	SOE-B-CSE608	CSE	Elective Lab II	0	0	2	0	30	20	50	1
9	SOE-B-CSE609	CSE	Elective Lab III	0	0	2	0	30	20	50	1
10	SOE-B-CSE610	CSE	MOOCS/SWAYAM/Certification/Liberal ArtS	2	0	0	0	30	20	50	2
11	SOE-B-CSE611	CSE	Project/ Case Studies	0	0	4	0	30	20	50	2
12	SOE-B-CSE612	Humanities	Professional Development	0	0	4	0	50	25	75	2
TOTAL				**12**	**4**	**18**	**95**	**320**	**335**	**750**	**25**

* End Semester Examination
** Progress Review Examination

Professional Elective-II			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE604 (1)	CSE	Compiler Design
2	SOE-B-CSE604 (2)	CSE	Deep Learning
3	SOE-B-CSE604 (3)	CSE	Cryptography and Information Security
4	SOE-B-CSE604 (4)	CSE	Industrial Internet of Things

Professional Elective-III			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE605 (1)	CSE	Dev ops and CI/CD
2	SOE-B-CSE605 (2)	CSE	Enterprise DApps and Blockchain Technologies
3	SOE-B-CSE605 (3)	CSE	Digital Image Processing
4	SOE-B-CSE605 (4)	CSE	Ethical Hacking

Elective Lab-II			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE608 (1)	CSE	Compiler Design Lab
2	SOE-B-CSE608 (2)	CSE	Deep Learning Lab
3	SOE-B-CSE608 (3)	CSE	Cryptography and Information Security Lab
4	SOE-B-CSE608 (4)	CSE	IIoT Lab

Professional Elective-III			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE609 (1)	CSE	Dev ops and CI/ CD Lab
2	SOE-B-CSE609 (2)	CSE	Enterprise DApps and Blockchain Technologies Lab
3	SOE-B-CSE609 (3)	CSE	Digital Image Processing Lab
4	SOE-B-CSE609 (4)	CSE	Ethical Hacking Lab

Computer Science and Engineering
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Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering) Prog. Code- 01UG020

Academic Semester VII & VIII

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+P+T)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-CSE-19-F01	CSE	Long term Industrial Internship	_	_	40		300	200	500	22
2	SOE-B-CSE-19-F02	CSE	Major Project	_	_	24		150	100	250	8
3	SOE-B-CSE-19-F03(1-3)	CSE	Elective IV	3	0	0	20	15	40	75	3
4	SOE-B-CSE-19-F04(1-3)	CSE	Elective V	3	0	0	20	15	40	75	3
5	SOE-B-CSE-19-F05(1-3)	CSE	Elective VI	3	0	0	20	15	40	75	3
6	SOE-B-CSE-19-F06(1-2)	CSE	Elective lab IV	0	0	2	0	30	20	50	2
7	SOE-B-CSE-19-F07(1-2)	CSE	Elective lab V	0	0	2	0	30	20	50	2
			Total	**9**	**0**	**68**	**60**	**555**	**460**	**1075**	**43**

* End Semester Examination
** Progress Review Examination

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+P+T)
				L	T	P	PRE** Mid Sem	PRE** TA	ESE*	Total Marks	
	Academic Semester VII										
1	SOE-B-CSE-19-F01	CSE	Long term Industrial Internship	–	–	40		300	200	500	22
	Academic Semester VIII										
1	SOE-B-CSE-19-F02	CSE	Major Project	–	–	24		150	100	250	8
2	SOE-B-CSE-19-F03(1-3)	CSE	Elective IV	3	0	0	20	15	40	75	3
3	SOE-B-CSE-19-F04(1-3)	CSE	Elective V	3	0	0	20	15	40	75	3
4	SOE-B-CSE-19-F05(1-3)	CSE	Elective VI	3	0	0	20	15	40	75	3
5	SOE-B-CSE-19-F06(1-2)	CSE	Elective lab IV	0	0	2	0	30	20	50	2
6	SOE-B-CSE-19-F07(1-2)	CSE	Elective lab V	0	0	2	0	30	20	50	2
			Total	**9**	**0**	**28**	**60**	**255**	**260**	**575**	**21**

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+P+T)
				L	T	P	PRE** Mid Sem	PRE** TA	ESE*	Total Marks	
	Academic Semester VII										
1	SOE-B-CSE-19-F03(1-3)	CSE	Elective IV	3	0	0	20	15	40	75	3
2	SOE-B-CSE-19-F04(1-3)	CSE	Elective V	3	0	0	20	15	40	75	3
3	SOE-B-CSE-19-F05(1-3)	CSE	Elective VI	3	0	0	20	15	40	75	3
4	SOE-B-CSE-19-F06(1-2)	CSE	Elective lab IV	0	0	2	0	30	20	50	2
5	SOE-B-CSE-19-F07(1-2)	CSE	Elective lab V	0	0	2	0	30	20	50	2
			Total	**9**	**0**	**4**	**60**	**105**	**160**	**325**	**13**
	Academic Semester VIII										
1	SOE-B-CSE-19-F01	CSE	Long term Industrial Internship	–	–	40		300	200	500	20
2	SOE-B-CSE-19-F02	CSE	Major Project	–	–	24		150	100	250	8
			Total	**0**	**0**	**64**		**450**	**300**	**750**	**28**

OR

Elective IV	
SOE-B-CSE-19-F03(1)	Human computer Interaction
SOE-B-CSE-19-F03(2)	Distributed System
SOE-B-CSE-19-F03(3)	Software Project Management

Elective V	
SOE-B-CSE-19-F04(1)	Soft Computing
SOE-B-CSE-19-F04(2)	Cyber Forensics and Malware
SOE-B-CSE-19-F04(3)	Semantic web and Social Network

Elective VI	
SOE-B-CSE-19-F05(1)	Signal Processing and data Analytics
SOE-B-CSE-19-F05(2)	Mobile Application Development
SOE-B-CSE-19-F05(3)	Natural Language Processing

Elective lab V	
SOE-B-CSE-19-F06(1)	Soft Computing Lab
SOE-B-CSE-19-F06(2)	Cyber Forensics Lab

Elective lab VI	
SOE-B-CSE-19-F07(1)	Natural Language Processing Lab
SOE-B-CSE-19-F07(2)	Signal Processing and data Analytics Lab

Detailed Syllabus

Semester-I

S. N.	Subject Code	SUBJECT	Periods per week			Credit (L+(T+P)/2)	Scheme of Examination and Marks				BoS
			L	T	P		PRE		ESE	Total Marks	
							Mid Sem	TA			
1	SOE-B-FY101	Mathematics- I	4	1	0	5	30	20	50	100	Maths
2	SOE-B-FY102	Engineering Chemistry	3	0	0	3	30	20	50	100	Chemistry
3	SOE-B-FY103	Physics- I	3	0	0	3	30	20	50	100	Physics
4	SOE-B-FY104	Basic Computing	3	2	0	4	30	20	50	100	CSE
5	SOE-B-FY105	Engineering Graphics	2	2	0	3	30	20	50	100	Mech
6	SOE-B-FY106	Basic Electrical & Electronics Engineering	3	0	0	3	30	20	50	100	EE
7	SOE-B-FY107	Basic Electrical & Electronics Engineering Lab	0	0	2	1	-	30	20	50	EE
8	SOE-B-FY108	Engineering Chemistry Lab	0	0	2	1	-	30	20	50	Chemistry
9	SOE-B-FY109	Spoken English Communication	0	0	2	1	-	30	20	50	Humanities
TOTAL			**18**	**05**	**06**	**24**	**180**	**210**	**360**	**750**	

Note: The tutorials of courses Basic Computing & Engineering Graphics shall be conducted in their respective laboratories.

Programme	:	**B. Tech**	**Semester**	:	**I**
Name of the Course	:	**Mathematics-I**	**Course Code:**		**SOE-B-FY101**
Credits	:	**5**	**No of Hours**	:	**5 Hrs./Week**
Max Marks	:	**100**			

Course Description:

Learning Objective 1. Find the Rank and Inverse of matrix by using Elementary Transformations. 2. Solve systems of linear equations (homogeneous & non-homogeneous), Eigen values and Eigen vectors of matrix. 3. Find the nth derivative by using Leibmitz's, Taylor's and Maclaurin's Theorem. 4. Differentiation of functions having more than one variable. 4. Integration of functions having nth power, double and triple integral and applications. 5. Gradient, divergence and curl, line integral, Surface integral and Volume integral. 6. Relation between line integral, Surface integral and Volume integral.

Course Outcomes:

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

CO Number	Course Outcome
CO1	Find Rank and Inverse of matrix by using Elementary Transformations and Solve systems of linear equations
CO2	Understand applications in Engineering Problems
CO3	Understand Successive Differentiation, Leibmitz's Theorem for nth derivative of two functions.
CO4	Understand Taylor's and Maclaurin's Theorem and tracing of curves.
CO5	Understand Limits, continuity and differentiability of function of several variables.
CO6	Understand Partial derivatives, Maxima and minima of function of two or more variables.
CO7	Understand Reduction formulae, Double and triple integrals, Change of order of integrations. Beta and Gamma functions; Applications to area and volume.
CO8	Understand Beta and Gamma functions, Applications to area and volume.
CO9	Understand Gradient, divergence and curl and Properties of gradient, divergence and curl.
CO10	Understand Line integral, Surface integral, Volume integral, Green's theorem in a plane; Gauss's Divergence theorem; Stoke's theorem.

Syllabus

Unit-I: Linear Algebra

Matrix algebra; Elementary transformations; Inverse of a matrix; Rank of matrix; Systems of linear equations (homogeneous & non-homogeneous); Eigen values and Eigen vectors; Cayley-Hamilton theorem; Applications of matrices in Engineering.

Unit-II: Differential Calculus

Successive differentiation; Leibnitz's theorem; Taylor's and Maclaurin's series; Radius of curvature; Curve tracing.

Unit-III: Multivariable Calculus

Limits, continuity and differentiability of function of several variables; Partial derivatives; Maxima and minima of function of two or more variables; Method of Lagrange's multipliers; Differentiation under integral sign

Unit-IV: Integral Calculus

Reduction formulae; Double and triple integrals; Change of order of integrations; Beta and Gamma functions; Applications to area and volume

Unit-V: Vector Calculus

Scalar and vector point functions; Gradient, divergence and curl; Properties of gradient, divergence and curl; Line integral; Surface integral; Volume integral; Green's theorem in a plane; Gauss's Divergence theorem; Stoke's theorem.

Textbooks:

- Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons.
- B. S. Grewal, "Higher Engineering Mathematics", 38th edition, Khanna Publishers.
- Louis A. Pipes, "Applied mathematics for Engineers & Physicists", Mc Graw Hill.
- R. K. Jain, S. R. K. Iyengar, "Advanced Engineering Mathematics" Narosa Publishing House.

Reference Books:

- Peter V. O'Neil, "Advance Engineering Mathematics", Thomson (Cengage) Learning, 2007.
- Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas, "Calculus", 11th Edition, Pearson.
- D. Poole, "Linear Algebra: A Modern Introduction", 2nd Edition, Brooks/Cole, 2005.
- Veerarajan T., "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.
- Ray Wylie C, Louis C Barret, "Advanced Engineering Mathematics", 6th Edition, Tata Mc-Graw-Hill.
- P. Sivaramakrishna Das, C. Vijayakumari, "Engineering Mathematics", 1st Edition, Pearson India Education Services Pvt. Ltd.

CO - PO Correlation

Course Name: MATHEMATICS- I								
	Program Outcomes (POs)							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**	**2**		**1**	**2**		**2**	**1**
CO2:	**2**					**1**		**2**
CO3:	**1**		**1**		**1**		**1**	
CO4:	**1**				**2**			
CO5:	**1**	**2**	**2**	**2**			**2**	**1**
CO6:	**1**				**2**	**2**		
CO7:	**1**	**1**	**1**					**1**
CO8:	**1**		**1**			**1**	**2**	
CO9:	**2**			**1**	**1**			**1**
CO10:	**1**		**1**		**1**		**1**	

Note: 1: Low, 2: Moderate, 3: High.

Programme	**:**	**B. Tech**	**Semester**	**:**	**I**
Name of the Course:		**Engineering Chemistry**	**Course Code:**		**SOE-B-FY102**
Credits	**:**	**3**	**No of Hours**	**:**	**3 Hrs./Week**
Max Marks	**:**	**100**			

Course Description:

This course aims at giving students theoretical understanding about the basic concepts of Chemistry and to acquire the skills required for an engineer. Reaction rates and factors that influence the reactions and the importance & utility related to it is introduced. The importance of water in industrial usage, significance of corrosion control to protect the structures, polymers and their usage as an important material to be studied. The students will gain knowledge about fuel, characteristics and ranking.

Course Outcomes:

Students will be able to

CO Number	Course Outcome
CO 1	Demonstrate an understanding of scientific facts and concepts, scientific methods and techniques, scientific terminology, and methods of presenting scientific information
CO 2	Apply and use scientific facts and concepts, scientific methods and techniques, scientific terminology to communicate effectively and apply appropriate methods to present scientific information
CO 3	Facilitate the application of chemical principles in engineering and technology for future technopreneurs and researchers

Syllabus

Unit-I: Reaction Kinetics

Factors affecting rate of reaction (reactant concentrations, temperature, physical states and surface areas, solvent and catalyst); Rate of reaction, mathematical expression, units, instantaneous & average rate; Rate Law-Differential & Integrated Rate law, order and molecularity, determination of rate law- Differential, Integral, Half-life, Initial rate & graphical method, rate constants (up to second order with one reactant only); Half-lives and radioactive decay kinetics (carbon dating); Collision model of reaction kinetics, activation energy, Arrhenius equation; Catalysis.

Unit-II: Corrosion Chemistry

Corrosion fundamentals (causes, consequences & driving force); Theories of Corrosion: Dry/ Chemical Corrosion & Wet/ Electrochemical corrosion; Forms of corrosion- Galvanic, Concentration Cell / Differential aeration, wire-fence, waterline, pitting, crevice, stress corrosion, corrosion fatigue, microbial & soil corrosion; Factors affecting corrosion: nature of the metal & corroding environment: Corrosion Control- Proper design, materials selection, protective coatings, use of inhibitors, modifying/ alteration of

environment, cathodic protection (sacrificial anodic & impressed current cathodic).

Unit-III: Water Chemistry

Introduction, sources of water, impurities present in water & their effect, requirement of boiler feed water; Alkalinity – types & determination (including numerical problems); Hardness - definition, types, determination; Water softening process- Lime and Soda, Zeolite & Ion Exchange Process (including numerical problems); Boiler problems (causes & removal) - sludge and scale, caustic embrittlement, boiler corrosion, priming and foaming; Conditioning of boiler feed water (carbonate, phosphate, colloidal & calgon conditioning).

Unit-IV: Fuels Chemistry

Introduction (definition & classification, characteristics, combustion); Calorific value (HCV & LCV) & its determination - by Dulong's formula & Bomb Calorimeter (principle & working); Coal, ranking & analysis - proximate & ultimate analysis and their importance in ranking; Coke, importance as fuel, manufacturing & carbonization- high temp & low temp carbonization.

Unit-V: Polymer Chemistry

Fundamentals (nomenclature, degree of polymerization, monomer units & classification), Polymerization- Addition, Condensation & Co-polymerization; glass transition temperature, tacticity & Ziegler-Natta catalyst; Preparation, properties, and technical application of major polymers (polyethylene, PVC, Teflon, Nylon 6,6, Bakelite); Introduction to Resin, Types of Resins, Thermoplastic & thermosetting Resin, Industrial applications of resin; Elastomers, natural rubber & vulcanization process.

Textbooks:

- P.C. Jain, Monica Jain, "Engineering Chemistry", 2008
- Dara, S.S., Umare, S.S., "A textbook of Engineering Chemistry", S Chand, 2013
- Palanna O.G, "Engineering Chemistry", Mc Graw Hill Edu., 2017

Reference Books

- J. C. Kuriacose, J. Rajaram, "Chemistry in Engineering and Technology", (Vol-2), Tata McGraw Hill.
- M.M. Uppal, Revised by S.C. Bhatia, "Engineering Chemistry", Khanna Publishers.
- Trethewey, Chamberlain, "Corrosion for Science and Engineering", 2nd Edition, Pearson Education 1998
- Fontana , "Corrosion Engineering", 3rd Edition, McGraw Hill, 1986
- Roberge, "Corrosion Engineering", McGraw Hill, 2008
- Laidler, K.J., Harcourt, "Principles of Chemistry", Brace & World, New York, 1966
- Moore, W.J., "Physical Chemistry", Prentice-Hall, 1962

CO - PO Correlation

Course Name: Engineering Chemistry								
	Program Outcome							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1	**2**	**1**						
CO2	**1**	**2**						
CO3		**1**	**1**					

Note: 1: Low 2.: Moderate 3: High.

Programme	:	**B. Tech**	**Semester**	:	**I**
Name of the Course	:	**Physics-I**	**Course Code:**		**SOE-B-FY103**
Credits	:	**3**	**No of Hours**	:	**3 Hrs./Week**
Max Marks	:	**100**			

Course Description:

Applied Physics is a science course for students interested in the technical fields. This course is designed for the student who needs a broad understanding of physics and the ability to apply those principles in the work force. The Physics-I course is basically fundamentals of electronics, theory and applications of laser, concepts of Newton's law of motion, parameter of Mechanics, interference of light, good conditions for interference and its engineering applications. The purpose of studying Physics-I is to introduce the mind to the scientific method of analysis through which, the practical problems can be identified, explanations generated, and logical solutions selected which in essence are requisites for the development of good engineering sense.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand basics of Solid State Physics.
CO2	Know the fundamental principles of semiconductors
CO3	Understand the interference from wave optics concepts and know its applications.
CO4	Acquire knowledge and understanding of fundamental principles of modern physics relevant to problems of Electrical and Electronics Engineering

Syllabus:

Unit-I: Solid State Theory:

Formation of energy bands in metals, Classification of solids on the basis of energy band diagram, Conductivity of Semiconductors, mobility in conductor & semiconductor.

Unit II: Electronics:

Electrons and holes in an intrinsic semiconductors, Donor and acceptor impurities, Fermi level, Carrier densities in semiconductor, Hall effect, Diffusion, Recombination, Junction Diode, PN junction characteristic, Effect of Temperature, Depletion Layer, Breakdown Mechanism: Zener and Avalanche Breakdown, Half wave and full wave rectifiers, filters, Zener diode as a regulator, Transistors (PNP & NPN) Operation, CE, CB, CC configuration.

Unit-III: Lasers:

Principles and working of laser, population inversion, Laser characteristics, components of laser, Einstein's coefficients, He-Ne laser, Ruby laser, Laser applications.

Unit-IV: General Mechanics:

Central and non-central forces, Inverse square force, Potential energy function F = -grad V, equipotential surfaces and meaning of gradient. Conservative and non-conservative forces, Conservation laws of energy & momentum, Harmonic oscillator, damped harmonic motion forced oscillations.

Unit-V: Interference of light:

Superposition of Waves, Conditions for Interference, Methods of formation of coherent sources, Theory of Interference, Fresnel's Biprism, Newton's ring, Diffraction grating, Rayleigh's criterion of resolution, Engineering applications of Interference phenomenon.

Textbooks:

- Beiser, "Perspectives in Modern Physics", McGraw Hill, 1969.
- Lengyel, "Introduction to Laser Physics", Wiley Interscience 1971.
- E. Siegman, "An Introduction to Laser and Masers", McGraw Hill 1971.
- S. H. Patil, "Elements of Modern Physics", Tata McGraw Hill, 1989.

Reference Books:

- P. Malvino, "Electronic Principles", Tata McGraw-Hill, 1979.
- H. V. Malmstadt, "Electronics for Scientists", New York: W. A. Benjamin, 1962.
- J. W. Goodman, "An Introduction of Fourier Optics", McGraw Hill, N. Y, 1968.

CO-PO & PSO Correlation

Course Name: Physics-I (SOE-B-FY103)								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	2	2	1					
CO2:	2	2	2					
CO3:	2	2	1					
CO4:	2	2	2					

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**I**
Name of the Course	:	**Basic Computing**	**Course Code:**		**SOE-B-FY104**
Credits	:	**4**	**No of Hours**	:	**4 Hrs./Week**
Max Marks	:	**100**			

Course Description:

This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build problem solving skills by using C programming.

Course Outcomes:

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

CO Number	Course Outcome
CO1	Makes students gain a broad perspective about the uses of computers in engineering industry.
CO2	Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.
CO3	Develops the ability to analyze a problem, develop an algorithm to solve it.
CO4	Develops the use of the C programming language to problem solving and develops the basic concepts and terminology of programming in general.
CO5	Introduces the more advanced features of the C language for implementation in diverse platforms.

Syllabus:

Unit-I: Introduction to Computers

Basic Concepts, Evolution, Computer Organization, Peripheral Devices, Software – System Software, Application Software, Computer Languages – Low Level, Machine Level and High Level Languages, Compiler and Assembler, Microprocessors, Memory, Technological Trends. Algorithms and Flow Chart: Algorithm and its characteristics, flowchart, Algorithm involving Decisions and Loops, Problem solving methods. Pseudo code, top down & bottom up approaches of program design

Unit-II: Introduction to C

History of C, Features of C Language, Structure of a C program, Basic Input Output Execution of C Program- Compiling, Linking, debugging, and running a program. Variables, Constants and Operators: C character set – Tokens, Constants Keywords, identifiers, and Variables. Data types – Data type Qualifiers, Declaration of variables, Arithmetic, Logical, Assignment, Relational, Increment and Decrement, Conditional, Bit wise, Special Operator, Precedence and Associativity

Unit-III: Looping and Functions

Branching & Looping: Introduction – Simple if statement, if-else, else-if ladder, nested if-else, Switch statement, go to statement. Loops - while, do-while, for loop, nested loops infinite loops Functions: Introduction to functions – Declaration, definition and calling of function, Function arguments and return value, scope and lifetime of variables call by value, call by reference. Storage classes. Recursion. Library functions

Unit-IV: Arrays and Pointers

Arrays: Declaration and initialization of one dimensional, two dimensional and character arrays, accessing and manipulating array elements, array applications - matrix operations, searching, sorting. String manipulations. Pointers: Pointers concepts, pointers and function arguments, pointer arithmetic

Unit-V: Structures and File Handling Structure

Structure declaration, definition, initialization and accessing. Structure Assignment, Nested Structure, Structures and Functions, Structures and arrays. File Handling: Concept of a file – Data Organization, reading, writing, manipulating and troubleshooting, file types, file opening modes.

Textbooks:

- Yashvant Kanetkar, “Let us C”, BPB Publications.
- Raja Raman V., "Fundamental of Computers", 4th edition, Prentice Hall of India, New Delhi.

Reference Books:

- B. W. Kernighan & D.M. Ritchie, “C Programming Language”.
- Byron Gottfried, “Programming with C (SCHAUM’s Outlines Series)”.

CO-PO Correlation

Course Name: Basic Computing								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**			**1**	**3**			
CO2:	**1**		**2**	**2**				
CO3:	**3**		**1**	**1**	**2**		**2**	
CO4:	**2**			**1**				
CO5:		**1**			**1**		**2**	**3**

Note: 1: Low, Note – 1: Low, 2: Moderate, 3: High

Programme	:	**B. Tech**	**Semester**	:	**I**
Name of the Course	:	**Engineering Graphics**	**Course Code:**		**SOE-B-FY105**
Credits	:	**3**	**No of Hours**	:	**3 Hrs./Week**
Max Marks	:	**100**			

Course Description:

The course in Engineering Graphics is aimed at inculcating the ability of imagination in the mind of the students, to improve their visualization skills and logical thinking, to build in them a capability of communicating through this unique language of engineers by learning conventional graphical techniques as well as computer-aided drawing skills, to develop interpretation competencies of professional drawings, to transfer an abstract object onto the paper through drawing.

Course Outcomes:

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

CO Number	Course Outcome
CO1	Gain knowledge of Fundamentals of Engineering drawing.
CO2	Draw orthographic projections of lines, planes, and solids
CO3	Draw sections of solids and development of lateral surfaces including cylinders, cones, prisms, and pyramids.
CO4	Construct isometric scale, isometric projections, and views.
CO5	Draw projections of lines, planes, solids, and sections of solids including cylinders, cones, prisms, and pyramids using AutoCAD.

Syllabus:

Unit-I: Fundamentals of Engineering Drawing:

Introduction to Drawing instruments & their uses, Engineering Lettering, Drawing sheet - Layout of drawing sheets, sizes of drawing sheets, Line – Types of lines and their applications in Engineering Drawing, Dimensioning. Introduction to scales.

Engineering Curves: Conic sections and Basic construction of Cycloid, Involutes.

Introduction to Computer-Aided Drafting (CAD):

Basic Drawing and Editing Commands, Dimensioning, Knowledge of setting up layers, Text. **(To be covered with CAD package)**

Unit-II: Projections of Points

Introduction to projections, Projection of points in all four quadrants.

Projections of Lines

Projections of lines (by First angle projection method only) parallel to one or both the reference planes, perpendicular to one of the reference planes. Projections of lines inclined to either horizontal plane or vertical plane and both the planes i.e., oblique lines.

Trace of a line.

Unit-III: Projection of Planes

Projections of planes (by First angle projection method only) inclined to either horizontal plane or vertical plane and both the planes i.e., Oblique planes. Use change of positions or Auxiliary plane method.

Projection of Solids

Introduction to Solids, Types of Solids, Projection of Solids inclined to one and both the reference plane. Use change of positions or Auxiliary plane method.

Unit-IV: Section of Solids

Projections of geometric solids cut by plane perpendicular to at least one reference plane (Exclude Curved Section Plane).

Development of Surfaces

Methods of development of lateral surfaces of various solids, development of surfaces of cut solids.

Unit-V: Orthographic Projection

Orthographic projections of given pictorial view by First angle method of projections only. Drawing of orthographic projections using Auto CAD **(only for Term Work)**

Isometric Projection

Introduction, Isometric scale, Isometric projection and Isometric views of solids and objects.

Text books:

- N. D. Bhatt, V.M. Panchal, "Engineering Drawing, Plane and Solid Geometry", Charotor Publication House, Anand, Gujarat, India.
- K. C. John, "Engineering Graphics for Degree", PHI Learning Pvt. Ltd. New Delhi, 2009
- A. R. Bapat, "Engineering Graphics", Allied Publications, New Delhi, India.
- D. N. Johle, "Engineering Drawing", S. Chand and Company Ltd., New Delhi, India.

Reference Books:

- W. J. Luzadder, "Fundamental of Engineering Drawing", Prentice Hall of India.
- Basudeb Bhattacharyya, "Machine Drawing Include Auto CAD Supplements", Oxford University Press, India.
- French, Vierck, "Graphic Science", Mc- Graw Hill international
- K. Venugopal, "Engineering Drawing and Graphics", New Age Publication.
- R. K. Dhawan, "Engineering Drawing", S. Chand and Company Ltd., New Delhi, India.

- N. B. Shaha and B. C. Rana, Engineering Drawing, Person Education.

CO-PO Correlation

Course Name: Engineering Graphics								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	3		2	3	3			
CO2:	3	3	2	3	2			
CO3:	3	3	2	3	2			
CO4:	3	3	2	3	2			
CO5:	3	2	2	3	3			

Note: 1: Low, Note – 1: Low, 2: Moderate, 3: High

Programme	:	**B. Tech**	**Semester**	:	**I**
Name of the Course	:	**Basic Electrical and Electronics Engineering**	**Course Code:**		**SOE-B-FY106**
			No of Hours	:	**3 Hrs./Week**
Credits	:	**3**			
Max Marks	:	**100**			

Course Description:

The subject curriculum focuses on fundamentals of electrical and electronic circuits. It covers the DC and AC electrical circuit analysis, magnetic circuit analysis and description of basic electronics components and their applications.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the basic concepts of Core Electrical Engineering subjects.
CO2	Analyse different network theorems.
CO3	Draw phasor diagram for various electrical circuits.
CO4	Understand the fundamental of semiconductor devices.

Syllabus:

Unit-I: DC Electrical Circuit Analysis:

Voltage and current sources, dependent and independent sources, Source Conversion, Star-delta and delta-star conversions, Ohm's Law, Kirchhoff's Laws & their limitations, Nodal analysis, loop analysis and Mesh current methods, Superposition principle, Thevenin's and Norton's theorems, Maximum power transfer theorem.

Unit-II: AC Circuits:

Single- phase AC Circuits: Single phase emf generation, average and effective values of sinusoids, R.M.S. value, form factor and peak factor of AC quantity, Concept of phasor diagram, Concept of Power factor, impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series, parallel and series-parallel circuit and Resonance condition.

Unit-III: Magnetic Circuits:

Basic definitions, magnetization characteristics of Ferro magnetic materials, self-inductance and mutual inductance, energy in linear magnetic systems, coils connected in series, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Induced voltage, fundamental laws of electromagnetic Induction, direction of induced E.M.F.

Unit-IV: Semiconductor Diodes:

Introduction to semiconductor, Formation of P-N Junction, P-N Junction Diodes; Semiconductor Diodes, V-I Characteristics, Effect of Temperature on V-I Characteristics, Ideal Diode, Diode equation, Diode Resistance, Transition and Diffusion Capacitance. Light Emitting Diode, Zener Diode, Photodiode. Applications of Diodes.

Unit-V: Transistors:

Transistor: Introduction, Construction, Types: npn and pnp, Current components. Transistor as amplifier, Transistor Characteristics. Digital logic fundamentals, Boolean Algebra, truth table, Logic Gates.

Text Books:

- E. Hughes, "Electrical Technology", ELBS, 1997.
- B L Theraja, "Electrical technology, Basic Electrical Engineering", Volume 1, S Chand.
- Jacob Millman & Halkias, "Integrated Electronics: Analog & Digital Circuit Systems", TMH.
- Boylestad, Nashelsky, "Electronic Devices and Circuit Theory".

Reference Books:

- Charles, Sadiku, "Fundamentals of Electric circuits", TMH, Third Edition.
- V. D. Toro, "Basic Electrical Engineering", PHI, 2000.

CO-PO Correlation:

Course Name: Basic Electrical and Electronics Engineering								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**	**2**	**2**			**2**		
CO2:	**3**	**3**	**2**					
CO3:	**3**	**3**	**3**					
CO4:	**3**	**3**	**3**					

Note: 1: Low 2.: Moderate 3: High

Programme :	**B. Tech**	**Semester** :	**I**
Name of the Course:	**Basic Electrical and Electronics Engineering Lab**	**Course Code:**	**SOE-B-FY107**
		No of Hours :	**1 Hrs./Week**
Credits :	**1**		
Max Marks :	**50**		

Course Description:

The response of Electrical Circuit can be verified practically by applying different theorems and fundamental techniques. The students will become sure that the theoretical tricks which they have learned from books are true. The students will become competent in the field of circuit analysis.

Course Outcomes:

After learning the course, the students should be able to:

CO Number	Course Outcome
CO1	Understand the basic circuit concepts and verification of network theorems.
CO2	Understand the application of different tools and electrical meters
CO3	The knowledge about the component of electronic and electrical circuit.

Syllabus:

List of Experiments:

- Study of Electrical Safety precautions.
- Study of CRO, DSO, Function Generator, Multimeter, Power supply.
- To verify KCL and KVL.
- To verify Thevenin's and Norton's Theorem.
- To verify Superposition Theorem.
- Determine resonant frequency of series R-L-C circuit.
- To measure Current, Power, Voltage and Power Factor of series R-L-C Circuit.
- To measure the armature and field resistance using Ohm's law.
- Determine the VI Characteristics of PN junction Diode
- Design and study the characteristics of Common Emitter configuration of NPN transistor
- Design and study the characteristics of Common Collector Configuration of NPN transistor
- Study Different logic gates and verify their truth table.

Reference Books:

- P. S. Dhogal, "Basic Practical in Electrical Engineering", Standard Publishers Distributors, 2004

- **Equipment's/Machine/Software required:** Different types of meters, resistors, DC supply, variac, transformers, rheostat. Some experiments can be done by MATLAB.

CO-PO & PSO Correlation:

	Course Name: Basic Electrical and Electronics Engineering Lab							
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**	**2**	**2**			**2**		
CO2:	**3**	**3**	**2**					
CO3:	**3**	**3**	**3**					
CO4:	**3**	**3**	**3**					

Note: 1: Low 2: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**I**
Name of the Course	:	**Engineering Chemistry Lab**	**Course Code:**		**SOE-B-FY108**
			No of Hours	:	**1 Hrs./Week**
Credits	:	**1**			
Max Marks	:	**50**			

Course Description:

This Engineering Chemistry Laboratory is common to first year branches of UG Engineering. The course enables students to

- Apply and use knowledge, methods and techniques for analysis
- Develop an ability to analyze, evaluate and synthesize scientific information
- Develop experimental and investigative scientific skills

Course Outcomes:

Students will be able to

CO Number	Course Outcome
CO 1	Understand the use of instruments, sensors and methods for analyzing various parameters
CO 2	Collect, process and analyze data using ICT tools

Syllabus:

List of Experiments

- Determination of type and extent of Alkalinity in the given sample of water using hydrochloric acid solution (acid-base titration)
- Determination of chloride ion content in a given water sample by Mohr's method (AgNO3, Cl- titration)
- Determination of the Dissolved Oxygen in a given water sample by Wrinkler's method using Std. Sodium thiosuphate solution (iodometric titration)
- Determination of temporary & permanent hardness in water sample by EDTA method (complexometric titration)
- Determination of order and rate law expression of acid decomposition of thiosulfate ion solution (kinetics study)
- Determination of the concentration of unknown solution of an electrolyte by conductivity measurement (using data loggers with conductivity probe and drop counters)
- Determination of equivalence point and concentration of acid by pH measurement (using data loggers with pH probe and drop counters)
- Demonstration of different types of Corrosion of metals
- Kinetics ICT Exercise: Determination of order and rate constant of reaction using a spreadsheet and graphical techniques
- Acid & Base ICT Exercise: Determination of equivalence point and concentration of acid (or base) using spreadsheet and graphical techniques.

Reference Books:

- C.N.R. Rao, U. C. Agrawal, "Experimental in General Chemistry", East–West Press.
- ILPC, Wilkinson G., Murrillo, C.A., Bochmann, "Wiley Advance Practical Chemistry".
- Svehla, G. Vogel's, "Qualitative Inorganic Analysis", Pearson Education, 2012.
- Mendham, J. Vogel's, "Quantitative Chemical Analysis", Pearson, 2009.
- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J., Smith, P.W.G., "Textbook of Practical Organic Chemistry", Prentice-Hall, 5th edition, 1996.
- F.W. Billmeyer, John Wiley & sons, "Text Book of Chemical Science" 1994.
- Vogel's, Revised Textbook by G.H. Jeffery, J. Bassett, J. Mendham, R.C. Denney "Quantitative Chemical Analysis (Latest ed.)",.
- O.P. Vermani, A. K. Narula, "Applied Chemistry: Theory and Practice (Latest ed.)".
- Dr. Sudha Rani, "Laboratory manual on Engineering Chemistry", S. Chand and Company.
- S.S. Dara, "A Textbook on Experiments and Calculations in Engineering Chemistry", Dhanapat Rai Publishing Company Pvt. Ltd..

CO - PO & PSO Correlation

Course Name: Engineering Chemistry Lab								
	Program Outcome							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1	**2**	**2**						
CO2	**1**	**1**						

Note: 1: Low 2: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**I**
Name of the Course	:	**Spoken English Communication**	**Course Code:**		**SOE-B-FY109**
			No of Hours	:	**2 Hrs. /Week**
Credits	:	**1**			
Max Marks	:	**50**			

Course Description:

This course examines the process of spoken communication in English language with an emphasis to develop fluency in it. Through individual and group activities, students work on improving pronunciation, practice conversation strategies and delivering oral presentation.

Course Outcome:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Reduce anxiety by recognizing and using communication strategies.
CO2	Apply principles of effective and ethical speaking during conversation at the various situations.
CO3	Formulate the speech according to the purpose, audience and time constraints
CO4	To recognize and use effectively non-verbal clues in communication
CO5	Give effective presentation.

Syllabus

Unit-I: Basics of Communication

Introduction to Communication, Types of Communication, Barriers to Communication, Listening Skill.

Unit-II: Grammar in Use

Sentence Structures, Determiners and Preposition, Modals in Conversational Usage, Voice, Punctuation.

Unit-III: Oral Communication

Speaking: An Overview, Combating Stage Fright, Describing Objects/Situations/People, Delivering Just-a-minute Sessions, Dialog delivery, one to one conversation

Unit-IV: Body Language

Body Language - the role of body postures, movements, gestures, facial expressions, dress and make up in effective communication, Conduct while facing interviews,

Unit-V: Professional Presentation

Presentation, Power point Presentation, Group Discussion, Role Plays, Delivering Different Types of Speeches.

Texts Books:

- Geoffrey N. Leech, Jan Svartvik, Longman, "A Communicative Grammar of English"
- Shalini Verma, "Technical Communication for Engineers", Vikas Publishing House.
- Gangal J.K, "A Practical Course in Spoken English", Prentice Hall India Learning Private Limited.

Reference Books:

- by Aysha Viswamohan, "English for Technical Communication", McGraw Hill Education.
- Madan Sood, "Comprehensive English Grammar", Goodwill Publishing House.
- Alison Reid, "Spoken English", Goodwill Publishing House.
- Nurnberg, M, M. Rosenblum, "All about Words: An Adult Approach to Vocabulary Building", W.R. Goyal Publishers & Distributors.
- Wren & Martin, "High School English Grammar and Composition", S Chand Publication.

CO-PO Correlation

Course Name: Spoken English Communication (SOE-B-FY109)								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:				2	1	1	1	
CO2:				3	1	2		
CO3:				3	2		2	
CO4:				3	1		1	
CO5:				3	1	1	1	

Note: 1: Low 2: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**II**
Name of the Course	:	**Mathematics-II**	**Course Code:**		**SOE-B-FY201**
Credits	:	**5**	**No of Hours**	:	**5 Hrs. / Week**
Max Marks	:	**100**			

Course Description:

Learning Objective 1. Evaluate first order differential equations including separable, homogeneous, exact, and linear. 2. Show existence and uniqueness of solutions. 3. Solve second order and higher order linear differential equations. 4. Create and analyze mathematical models using higher order differential equations to solve application problems such as harmonic oscillator and circuits. 5. Solve differential equations using variation of parameters 6. Solve linear systems of ordinary differential equations.

Course Outcomes:

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

CO	Course Outcome
CO1	Understand ordinary differential equation.
CO2	Understand applications in Engineering Problems
CO3	Understand higher order differential equation with constant coefficient.
CO4	Understand simultaneous linear equations with constant coefficients.
CO5	Understand Linear partial differential equation of first order.
CO6	Understand Non-homogeneous linear partial differential equations
CO7	Understand Euler's Formula, Functions having points of discontinuity Understand Fourier series, Linear and quasi linear equations
CO8	Understand Harmonic analysis.
CO9	Understand Method of separation of variables; Solution of heat equation.
CO10	Understand Wave equation; Laplace equation & Poisson's equation

Syllabus:

Unit-I: Ordinary Differential Equation of First order

Review of ordinary differential equation of first order; non linear differential equation of first order and their applications to engineering problems (viz. Simple electrical circuits, Heat conduction problem, Rate of decay of radio-active material, Chemical reactions and solutions, etc.).

Unit-II: Differential Equation of Higher order

Linear differential equations of higher order with constant coefficients; Method of variation of parameters; Cauchy's & Legendre's linear equations; simultaneous linear equations with constant coefficients; Applications to engineering problems.

Unit-III: Partial Differential Equation

Formation of partial differential equation; Linear partial differential equation of first order; Standard forms; Charpit's method; Homogeneous linear partial differential equations with constant coefficients; Non-homogeneous linear partial differential equations.

Unit-IV: Fourier series

Euler's Formula; Functions having points of discontinuity; Change of interval; Even and odd functions; Half range series; Harmonic analysis.

Unit-V: Application of Partial Differential Equation

Method of separation of variables; Solution of heat equation; Wave equation; Laplace equation & Poisson's equation

Textbooks:

- Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons.
- B. S. Grewal, "Higher Engineering Mathematics", 38th edition, Khanna Publishers.
- B. V. Rammana, "Higher Engineering Mathematics",Tata Mc Graw Hill.
- R. R. Greenberg, "Advance Engineering Mathematics", Pearson Publication.
- MD Rai Singhania, "Ordinary and Partial Differential Equations", S. Chand & Sons.

Reference Books:

- Peter V. O'Neil, "Advance Engineering Mathematics", Thomson (Cengage) Learning, 2007.
- Maurice D. Weir, Joel Hass, Frank R. Giordano, "Thomas, Calculus", 11th Edition, Pearson.
- D. Poole, "Linear Algebra: A Modern Introduction", 2nd Edition, Brooks/Cole, 2005.
- Veerarajan T., "Engineering Mathematics for first year", Tata Mc Graw-Hill, New Delhi, 2008.
- P. Sivaramakrishna Das, C. Vijayakumari, "Engineering Mathematics", 1st Edition, Pearson India Education Services Pvt. Ltd

CO-PO Correlation

Course Name : MATHEMATICS- II [SOE-B-FY201]								
	Program Outcomes (POs)							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**	**1**		**2**	**1**		**1**	**1**
CO2:	**1**					**1**		**1**
CO3:	**1**		**1**		**1**		**1**	
CO4:	**2**				**2**			
CO5:	**2**	**2**	**2**	**2**			**1**	**1**
CO6:	**1**				**2**	**1**		
CO7:	**2**	**1**						**1**
CO8:	**1**		**1**			**1**	**2**	
CO9:	**2**			**1**	**1**			**1**
CO10:	**1**		**1**		**1**		**1**	

Note: 1: Low 2.: Moderate 3: High.

Programme	:	**B. Tech**	**Semester**	:	**II**
Name of the Course	:	**Physics-II**	**Course Code:**		**SOE-B-FY202**
Credits	:	**2**	**No of Hours**	:	**2 Hrs. / Week**
Max Marks	:	**100**			

Course Description:

Applied Physics is a science course for students interested in the technical fields. This course is designed for the student who needs a broad understanding of physics and the ability to apply those principles in the work force. The Physics-II course is basically fundamentals of X-rays, its characteristics, its production method and uses, basics of nuclear energy and nuclear reactor, concepts of relativity its applications, formulation and solving the engineering problems on electromagnetism, Introduction to quantum physics and application in 1D and Various interpretations about the origin of Universe. The purpose of studying Physics-II is to develop the basic knowledge on the development and time-to-time applications of physics in diverse field.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Acquire knowledge Atomic and Nuclear physics and explore their technological applications in diverse fields.
CO2	Acquire knowledge of basic principles of Relativity and able to differentiate between classical and quantum mechanics.
CO3	Knowledge of propagation of electromagnetic energy through transmission lines and the design of propagation medium based on the requirements.
CO4	Gain basic knowledge of quantum mechanics and origin of Universe.

Syllabus:

Unit-I: Atomic & Nuclear Physics:

X-rays, Properties of X-rays, Bragg's law, Bragg's X-ray spectrometer, Characteristic X-ray spectrum, Moseley's law, Daune-Haun't criteria. Nuclei: properties, Mass defect, Binding energy, Criteria of Critical mass, Nuclear cross section, Nuclear fission: Controlled and uncontrolled chain reaction, Nuclear reactor and its site selection, Nuclear fusion, stellar energy (C-N cycle and P-P cycle).

Unit-II: The theory of relativity

Frame of reference, Galileo's Transformations, Michelson-Morley experiment and its negative result, Einstein's theory of relativity (postulates), Lorentz Transformation, Time dilation, Length contraction, Twin's Paradox, Doppler's effect, Addition of Velocities, Relativistic mass- Variation of Mass with Velocity, Equivalence of mass and energy.

Unit-III: Electromagnetism

Motion of Charged Particles in crossed electric & magnetic fields, Velocity Selector & Magnetic focusing, Gauss law, continuity equation, in consistency in Ampere's Law, Maxwell's equations (differential and integral forms), propagation of plane electromagnetic waves in conducting and nonconducting medium. Gradient, divergence, and curl of scalar and vector fields, Formulation and solving the engineering problems on electromagnetism.

Unit-IV: Quantum mechanics:

Introduction to quantum physics, black body radiation, photon concept, de Broglie hypothesis, wave-particle duality, verification of matter waves, wave function and its properties, Phase & group velocity, Uncertainty principle, Schrodinger's equation and its application to particle in 1-D box.

Unit-V: Origin of Universe:

Various interpretations about the origin, Big Bang Theory, Large Hadron Collider (LHC) experiment, Hawkins theory about the universe.

Textbooks:

- Beiser, "Perspectives in Modern Physics", McGraw Hill, 1969.
- M.A. Preston and R.K. Bhaduri, "Structure of the nucleus", Addison- Wesley, 1975.
- M.K. Pal, "Theory of Nuclear Structure", Affiliated East West Press, 1982.
- S. H. Patil, "Elements of Modern Physics", Tata McGraw Hill, 1989.

Reference Books:

- A.K. Ghatak, S. Loknathan, "Quantum Mechanics, Theory and Applications", McMillan India, 1984.
- Michael Sayer, Abhai Mansingh, "Measurement, Instrumentation and experiment design in physics and engineering", Prentice Hall of India Pvt. Ltd., New Delhi – 110 001, 2003.
- P. Sivaramakrishna Das, C. Vijayakumari, "Engineering Mathematics", 1st Edition, Pearson India Education Services Pvt. Ltd.

CO-PO & PSO Correlation

Course Name: Physics-II (SOE-B-FY202)								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	2	2	2					
CO2:	2	2	2					
CO3:	2	2	2					
CO4:	2	2	2					

Note: 1: Low 2.: Moderate 3: High

Programme : B. Tech **Semester : II**
Name of the Course: Physics-II Lab **Course Code: SOE-B-FY203**
Credits : 1 **No of Hours : 1 Hrs. / Week**
Max Marks : 50

Course Description:
This course deals with practical knowledge of basic physics including mechanics, optics and electronics.

Course Outcomes:
After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Gain practical knowledge of mechanics
CO2	Aquire hands-on experience of optics experiments using laser.
CO3	Gain knowledge of measuring moment of inertia of fly wheel, acceleration due to gravity, frequency of AC signal, and viscosity of different liquids.

Syllabus:

At least ten experiments are to be performed by each student from the following list.

- Determination of wavelength of given light by Newton's ring method.
- Determination of grating element of diffraction grating using He-Ne laser source.
- Determination of NA (Numerical Aperture) of an optical fiber.
- Determination of e/m by Thomson method.
- Determination of AC frequency using Sonometer.
- Determination of energy gap of semiconductor diode.
- To study solar cell characteristics.
- To study the characteristics of PN junction diode.
- To determine the divergence of laser beam.
- To study the Hall effect.
- To study the transistor characteristics in CE mode.
- Determination of wavelength of He-Ne laser using diffraction grating.

CO-PO & PSO Correlation

Course Name: Physics-II Lab								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**	**3**	**2**	**2**	**3**			
CO2:	**2**		**2**			**2**		
CO3:		**2**	**2**			**1**		

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**II**
Name of the Course	:	**Basics of Civil Engineering**	**Course Code:**		**SOE-B-FY204**
			No of Hours	:	**3 Hrs. / Week**
Credits	:	**3**			
Max Marks	:	**100**			

Course Description:

Civil Engineering as a profession; General introduction to history of civil engineering; types and classification of buildings; setting out of buildings; building materials- various types of bricks, various types of cements, natural and fly ash aggregates, cement mortar and concrete, TMT and structural steel; Overview of foundation engineering; Introduction to traffic and transportation engineering; Case studies of some advance technologies in civil engineering.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Explain the importance of civil engineering in the infrastructural development of the society.
CO2	Illustrate the types, uses and properties of various civil engineering materials, foundations, traffic and plans of civil engineering structures.
CO3	Understand the latest technologies in the construction of different civil engineering structures.

Syllabus:

Unit-I: Civil Engineering Materials

Masonry Materials: Types and characteristics of burnt clay and fly ash bricks, AAC blocks, paver blocks; various bonds in masonry.

Cement: Raw materials, Initial and final setting times, types and manufacturing process of cements.

Aggregate: Coarse and fine aggregates and their characteristics.

Steel: Difference among cast-iron, wrought iron, steel, mild steel, tor-steel and 550D grade of steel.

Mortar and Concrete: Proportions of cement mortar and concrete and their characteristics, self-healing concrete.

Activity: Industrial visit to any one of following (student will submit visit report)

1. Brick manufacturing plant
2. Cement manufacturing plant
3. Steel rolling mill.

Unit-II: Building Plans:

Components of residential, industrial, commercial and public buildings. Concepts of smart buildings and smart city.

Activity: Study of architectural principles of any one in following (student will submit a report)

1. Central jail building
2. Church
3. Auditorium
4. Industrial building
5. Power station
6. Software technology park
7. Naya Raipur development authority, smart city

Unit-III:

Basic concepts of transportation and traffic engineering, signage and signals. Kinetic roadway and walk ways, automation in tunnelling and bridge construction.

Activity: Case study any one of following (student will submit a report)

1. Warli Bandra sea link
2. Britain France chunnel
3. Pumbam bridge

Unit-IV: Civil Engineering Foundations

Various types of foundations for high rise building, bridges, dams, roads.

Activity: Case study of any one of following (student will submit a report)

1. Burj Khalifa,
2. Petronas towers
3. Statue of unity
4. Swaminarayan temple of the Bochasanwasi in Dubai
5. Flipkart headquarters at Bangalore

Unit-V: Advance Technologies in Civil Engineering

Modular construction, cloud collaboration, supply chain management in civil engineering. Introduction to software in civil engineering, photovoltaic glassing, augmented and virtual reality in civil engineering. Overview of total station and application of drones in civil engineering.

Activity: Any one case study in (student will submit a report)

1. Cloud collaboration in civil engineering,
2. Supply chain management in civil engineering,

3. Software application in civil engineering
4. Application of drones in civil engineering

Textbooks:

- Chen,W.F., Liew, J.Y.R., "The Civil Engineering Handbook", 2nd Ed., CRC Press, Taylors and Francis, (2002).
- Kandya A.A., "Elements of Civil Engineering", Charotar Publishing House, (2015).

Reference Books:

- Gopi, S., "Basic Civil Engineering", 1st Ed., Pearson Publishers, (2009).
- Ahuja, T.D., Birdi, G.S., "Civil Engineering (Building Construction)", 8th Ed., Rajsons Publications Pvt. Ltd., (2018).
- Relevant BIS codes and CPWD Manuals.

CO–PO & PSO Correlation

	Program Outcomes (Basics of Civil Engineering)							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	3		2			1		1
CO2:	3					1		
CO3:	3	3	2			1		1

Note: 1: Low 2.: Moderate 3: High

Programme	: **B. Tech**	**Semester**	: **II**
Name of the Course	: **Engineering Mechanics**	**Course Code:**	**SOE-B-FY-205**
Credits	: **4**	**No of Hours**	: **4 Hrs. / Week**
Max Marks	: **100**		

Course Description:

This course helps in understanding the various types and system of forces. Resolution and addition of forces. It helps the way to apply the condition of equilibrium in various forces system. It also helps in understanding the friction, centroid, and center of gravity etc. At last, it helps in understanding the concept of kinetics of rigid body and energy principle.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand various force system and apply various concepts to solve problems related with force.
CO2	Understand the different structures like Frame, Trusses, and structures.
CO3	Understand the role of friction and its industrial applications.
CO4	Understand and apply the concept of kinetics and energy principles.

Syllabus:

Unit-I:

Definitions of mechanics, statics, dynamics, characteristics of a force, principle of transmissibility, Composition and resolution of forces, moment of forces. System of Coplanar forces: Introduction to coplanar & non-coplanar force system. Forces and their components. Moment of the force about a point, couple. Resultant of coplanar force system: Resultant of concurrent forces, parallel forces, non-concurrent non-parallel system of forces. Varignon's theorem.

Unit-II:

Equilibrium of coplanar force system: Meaning of equilibrium, free body diagrams, equilibrium of concurrent, parallel and non-concurrent non-parallel (general) system of forces. Types of supports, determination of reactions at supports for various types of determinate beams. Analysis of pin jointed frame / truss: Perfect truss, Imperfect truss, Analysis of truss by method of joints and method of sections.

Unit-III: Friction

Definition of friction, force of friction, Limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction and coefficient of friction. Cone of friction, types of friction, laws of friction, advantages and disadvantages of friction. Equilibrium of bodies on level plane, external force applied on horizontal and inclined up and down. Equilibrium of bodies on inclined plane external forces is applied parallel to the plane, horizontal and inclined to inclined plane.

Unit-IV: Centroid

Definition, centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite figure.

Centre of Gravity: CG of simple solids such as cylinder, sphere, hemisphere. Cone, cube, and rectangular block. Centre of gravity of composite solids.

Moment of inertia: of plane areas, parallel axis theorem. Introduction to polar moment of inertia, product of inertia and mass moment of inertia. Problems on moment of inertia of composite areas.

Unit-V: Kinetics of particles:

Newton's laws of motion, D' Alembert's principle, equation of dynamic equilibrium linear motion, curvilinear motion. Kinetics of rigid bodies, D' Alembert's principle for bodies under rotational motion about a fixed axis.

Energy principles: Work done by a force, potential and kinetic energy, power, work energy equation, principle of conservation of energy.

Text Books:

- B.C. Punmia, "Theory of structures", Laxmi Publication.
- by A.K. Tayal, "Engineering Mechanics (Statics and Dynamics)", Umesh Pub.,
- K.L. Kumar, "Engineering Mechanics", Tata McGraw Hill.

Reference Books

- R.C. Hibbeler ,"Engineering Mechanics (Statics and Dynamics)", Pearson
- Meriam, Kreige, "Engineering Mechanics", John Wiley and sons
- Cengel, Boles, "Therodynamics", TMH
- S. Rajasekharan, G. Shankara Subramaniyam, "Essential of Engg. Mechanics", Vikas Publications.
- Beer, Johnson, "Engineering Mechanics", Tata McGraw Hill
- F.L. Harper, "Engineering Mechanics", Raw Publication.

CO-PO & PSO Correlation

Course Name: Engineering Mechanics								
Program Outcomes								
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**		**1**			**1**		**1**
CO2:	**2**		**1**					**1**
CO3:	**2**		**1**					**1**
CO4:	**2**		**1**					**1**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**II**
Name of the Course	**:**	**Workshop Practice**	**Course Code:**		**SOE-B-FY-206**
Credits	**:**	**1**	**No of Hours :**		**1 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description:

The course deals with the study of workshop practice which includes safety precautions, identification of tools used in workshop and components. Further it includes identification of different parts of machines, materials and tools.

Course Outcomes:

After Completion of the course Students will be able to:

Course Outcome	Details
CO1	Identify and understand the importance of various electrical and electronics components and tools.
CO2	To acquire measuring skills.
CO3	Understand basic construction and operation of various laboratory equipment.
CO4	Understand modern manufacturing operations, including their capabilities, limitations, and how to design economically.
CO5	Learn how to analyze products and be able to improve their manufacturability and make the cost-effectively

List of experiment

1. Study of electrical safety precautions. Study and identification of tools.
2. Identification and testing of various Electrical and electronics components Resistor, Inductor, Capacitor, Diode, Transistor (PNP &NPN), Transformer, Breadboard)
3. To calculate the value of resistance using color coding.
4. To study and perform different types of house wiring.
5. To study the different part of Electric motor & Transformer.

6. Design and fabrication of DC Power supply.
7. Study of brick masonry bonds.
8. Concrete preparation and workability test.
9. To prepare a job on lathe with straight or plain turning, facing & chamfering operations.
10. To prepare a job on lathe with step turning, knurling & grooving operations.
11. To prepare a T-Lap joint by using carpentry tools.
12. To Prepare Cross-Lap joint by using carpentry tools.
13. To prepare a Butt-Joint with help of electric arc welding.
14. To Prepare a Lap-Joint with help of electric arc welding.

Text Book &Reference Books:

1. Practical in Electrical Engineering, "Dr N. K. Jain Dhanpat Rai & Sons".
2. Electric Wiring, "Mr. S. Samaddar New Central Book Agency (P) Ltd., Calcutta."
3. Chapman, W.A.J. and Arnold E., "Workshop Technology" Vol. I & III, Viva Low price student Edition, 1998.
4. Chaudhary, Hajra, "Elements of Workshop Technology" Media Promoters & Publishers, 1997.
5. Raghuwanshi, B.S., "Workshop Technology" Vol -I &II, Dhanpat Rai and Sons 1998.

CO-PO/PSO Mapping

Course Name: Workshop Practice								
	Program Outcome							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1	3	3	1	0	0	1	0	0
CO2	2	2	2	1	1	1		
CO3	1	1	1	1	1	1		
CO4	2		2		1	3		2
CO5			2		2	3		2

Note: 1: Low 2: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**II**
Name of the Course	:	**Environmental Studies**	**Course Code:**		**SOE-B-FY207**
Credits	:	**2**	**No of Hours**	:	**2 Hrs. / Week**
Max Marks	:	**50**			

Course Objectives:

The course will empower the undergraduate students by helping them to Gain in-depth knowledge on natural processes and resources that sustain life. Understand the consequences of human actions on the web of life and quality of human life. Develop critical thinking for shaping strategies for environmental protection, conservation of biodiversity, environmental equity, and sustainable development. Acquire values and attitudes towards understanding complex environmental-economic-social challenges, and active participation in solving current environmental problems and preventing the future ones. Adopt sustainability as a practice in life, society, and industry.

Course Outcomes (CO)

Students will be able to

CO Number	Course Outcome
CO 1	Gain in-depth knowledge on natural processes and resources that sustain life.
CO 2	Understand the consequences of human actions on the web of life and quality of human life.
CO 3	Develop critical thinking for shaping strategies for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.
CO 4	Acquire values and attitudes towards understanding complex environmental-economic-social challenges, and active participation in solving current environmental problems and preventing the future ones.
CO 5	Adopt sustainability as a practice in life, society, and industry.

Syllabus

Unit-I: Ecology and Bio-Diversity

Ecology, Environment & Ecosystem, Biotic & Abiotic Components; Structure & functions of Ecosystem, Productivity, Decomposition, Energy Flow, Nutrient cycling, Food Chain & Food Web, Ecological Pyramids; Ecological succession; Bio-diversity: Concept, Importance, and Threats & Conservation

Unit-II: Environment and Natural Resources

Earth's Environment: Atmosphere, Lithosphere, Hydrosphere & Biosphere, functions and related problems; Environmental degradation and its causes; Natural resources, Renewable and Non-renewable Resources & associated problems; Study of major

Resources on Earth (overview): Forest, Water, Mineral, Food, Energy and Land.

Unit-III: Air Pollution

Classification of air pollutants, sources and effects of CO, SOx, NOx, Hydrocarbons, PM, Acid Rain, Ozone, Photochemical Smog & Peroxy Actyl Nitrate (PAN). Earth's energy balance, Green House Effect, Global warming; Stratospheric Ozone & its Depletion; Lapse rate & Temperature Inversion; Ambient Air Quality standard; Air pollution Control Techniques for Gaseous and Particulate air pollutants & equipment used.

Unit-IV: Water Pollution & Soil Pollution

Point & non-point source; Water pollutants & types, sources and effects; Water Quality measurement, Dissolved Oxygen, BOD & COD; Wastewater Management, Primary, Secondary & Tertiary stages: Objective, Process overview and Equipment used. Soil formation, composition & profile; Sources of Soil pollution & effect; Solid Waste Management: Objective, Process & Disposal Techniques.

Unit V: Sustainability & Social issues and Environment

Concept of Sustainable Development (SD), models, indicators and principles of Sustainability. Water conservation- Rain water harvesting, Watershed management. Population Growth, variation among nations, Population explosion, Family Welfare Programme; Environment and human health

Text Books:

- Kurian Joseph, R. Nagendran, "Essentials of Environmental Studies", 1st Edition, Pearson Education, 2004.
- A. K. Dey, "Environmental Chemistry", New Age International Publishers.
- Smriti Srivastava. "Environment & Ecology", S.K. Kataria & Sons, New Delhi.

References Books:

- Keerthinarayana, Daniel Yesudian, "Environmental Science and Engineering", 1st Edition, Hi-Tech publications, 2004.
- Erach Bharucha, "A Text Book for Environmental Studies", Text Book of University Grants Commission, 2004.
- Peavy, H.S., D.R. Rowe, T. George, "Environmental Engineering", New York: Mc Graw Hill, 1987.
- Metcalf, Eddy, "Wastewater Engineering: Treatment and Reuse", New Delhi, Tata McGraw Hill, 2003.
- W.P. Cunningham, Mary Ann Cunningham, "Principles of Environmental Science Inquiry & Applications", Tata Mc Graw Hill Publishing Company Ltd..

CO- PO & PSO Correlation

Course Name: Environmental Studies								
	Program Outcome							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1	**1**						**1**	
CO2							**1**	**1**
CO3	**1**		**1**			**1**		**1**
CO4				**1**				**1**
CO5			**1**			**1**		**1**

Note: 1: Low 2: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester:**	**II**
Name of the Course	**:**	**Introduction to Artificial Intelligence**	**Course Code:**	**SOE-B-FY208**
			No of Hours :	**3 Hrs. / Week**
Credits	**:**	**3**		
Max Marks	**:**	**100**		

Course Description:

In this course, students will study the most fundamental knowledge for understanding AI. The course will introduce some basic search algorithms for problem solving, Computing methods like Hard computing & soft computing, various soft computing approaches for learning through neural network. Hands-on with Python programming will enable students to develop AI applications.

Course Outcomes:

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

CO Number	Course Outcome
CO1	Understand the basics of Artificial Intelligence.
CO2	Understand overview of problem solving through search methods.
CO3	Understand the difference between Hard and Soft computing approaches.
CO4	Understand basic Neural network structure and activation functions.
CO5	Understand how to implement the AI concepts using Python programming.

Syllabus:

Unit-I: Overview and search techniques

Introduction to AI, AI Definition, Philosophy of AI, Related Fields: Robotics, Machine Learning, Data Science, Deep Learning, Applications: Self Driving Cars, Content Recommendation System, Video/Image processing.AI problem Solving and Games, A* Search.

Unit-II: Machine Learning and Knowledge Representation Odds and Probability:

Why probability matters, Various examples like card playing, Dice, Uncertainty in real life like train ticket confirmation. How to deal with uncertainty, Odds and Expected outcomes, Bayes Rule, Prior and Posterior odds: Basic Principles. Application areas of Bayes classification. Knowledge representation in AI, Types of Knowledge in AI

Unit-III: Advanced Topics in Machine Learning Data Preparation:

Validation, Dimensionality, Missing, Values, Dimensionality, Encoding, Basics of confusion matrix Classification in Machine Learning, MNIST Data set identification, Supervised, Unsupervised and Reinforced Learning.

Unit–IV Introduction to Artificial Neural Network Neural Network Basics

Elements of Neural Network, Why Develop Artificial Neural Networks: Modelling Key features, How Neural networks are Built: Weights and Input, Activation and Output: Identity Function, Step function, Sigmoid Function. Perceptron, Neural Network, Neural Network classifier. Advanced Neural network techniques: Convolutional Neural Network, Generative adversarial networks (GANs), Deep Learning: It's application on data processing.

Unit–V Application and Case Studies in AI Case study:

Auto Driving Cars, Smart Home and IoT Applications, Robotics, Mine Detections, Medical Diagnosis, Applications in multiple domains. Smart City, Implications of AI, Predicting the Future and Social Implications

Textbooks:

- Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India.
- S. Rajashekran and G.A. Vijayalakshmi, "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and applications", Prentice Hall of India.
- Nischay Kumar Hegde, "Python Programming Fundamentals", Educreation Publishing.
- Swapan Kumar Sarkar, "A Textbook of Discrete Mathematics", S. Chand Publishing.
- Kenneth H. Rosen, "Discrete Mathematics and its Applications", McGraw-Hill Publication.

Reference Books:

- Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.
- Nils J. Nilsson, "Principles of Artificial Intelligence", Narosa Publishing house.
- Jacek M. Zurada, "Introduction to Artificial Neural Network", West Publishing Company.

CO-PO Correlation

Course Name: Basic Computing								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**2**				**3**		**2**	**1**
CO2:	**1**			**2**				**2**
CO3:	**3**			**1**		**2**		
CO4:		**1**	**2**		**3**			
CO5:	**3**		**1**	**2**				**3**

Programme	**: B. Tech**	**Semester :**	**II**
Name of the Course	**: Written English Communication**	**Course Code:**	**SOE-B-FY209**
		No of Hours :	**2 Hrs. / Week**
Credits	**: 1**		
Max Marks	**: 50**		

Course Description:

The purpose of the course is to acquire accuracy and clarity in written communication. It helps to develop written text of varying lengths and styles that communicate effectively accurately and appropriately across various situations.

Course Outcome:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Communicate by writing clearly and precisely without errors
CO2	Draft various business correspondence in correct styles and format
CO3	To prepare various forms of the report
CO4	Know the principles of effective written communication
CO5	Develop advance corporate writing skills

Syllabus

Unit-I: Basics of Writing

An introduction to writing: Definition, Characteristics of effective writing, Principles of writings(7C's), Modes of Writing: Narrative, Descriptive, Argumentative, Expository.

Unit-II: Grammar in Use

Sentence structure, Subject-Verb concord, Tenses, Voice, Narration, Identifying common errors in writings, Précis writings, Paragraph writings.

Unit-III: Letter Writing

Types of letters, Elements of letters, Styles of letter writing, Basics of official correspondence, Preparation of Resume and Job application, Quotation, Order, Complaint letter.

Unit-IV: Report Writing

Characteristics of good report, Elements of report, Preparation and writings of report, Use of illustrations in reports, Preparation of Bibliography and References.

Unit-V: Corporate Writing

Notice, Agenda and Minutes Writing techniques, Tenders, Advertising, Sales Letter

Texts Books:

- Geoffrey N. Leech and Jan Svartvik, "A Communicative Grammar of English", Longman.
- M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw Hill Company limited New Delhi.
- Krishna Mohan, Meera Banerjee, "Developing Communication Skills", Mc Millan India Ltd, New Delhi

Reference Books:

- John Fisk, "Introduction to Communication studies", RotledgeLondon
- D.H.Menzel, H.M.Jonest, "Writing Technical Papers", Mc GrawHill . New Delhi.
- F.T.Wood, "A Remedial English Grammar for Foreign Students", Mc Millan India Ltd.
- W. Stannard Allen, "Living English Structure", Orient Longman London Fourth edition.
- Shalini Verma, "Technical Communication for Engineers", Vikas Publishing House.

CO-PO Correlation

Course Name : Written English Communication (SOE-B-FY209)								
	Program Outcomes							
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CO1:	**1**			**2**	**1**	**1**	**1**	
CO2:				**3**	**2**	**1**	**1**	
CO3:	**1**		**1**	**2**	**2**	**1**		
CO4:				**2**	**1**			
CO5:				**3**	**2**	**2**	**2**	

Note: 1: Low, 2: Moderate, 3: High

Computer Science and Engineering

L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering)
Academic Semester III

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2
							PRE**		ESE*	Total Marks	
				L	T	P	Mid Sem	TA			
1	SOE-B-MA302	MATH	Discrete Mathematics	3	1	0	30	20	50	100	4
2	SOE-B-CSE301	CSE	Internet Technology	2	1	0	15	10	25	50	3
3	SOE-B-CSE302	CSE	Data Structure	3	1	0	30	20	50	100	4
4	SOE-B-CSE303	CSE	Operating System	2	1	0	20	15	40	75	3
5	SOE-B-CSE304	SoM	Basics of Banking and Financial Service	2	0	0	15	10	25	50	2
6	SOE-B-CE305	Civil	Disaster Management	1	0	0	15	10	25	50	1
7	SOE-B-CSE306	CSE	Internet Technology Lab	0	0	4	0	50	25	75	2
8	SOE-B-CSE307	CSE	Data Structure Lab	0	0	2	0	30	20	50	1
9	SOE-B-CSE308	CSE	Operating System Lab	0	0	2	0	30	20	50	1
10	SOE-B-CSE309	CSE	Data Analytics with Python	0	0	4	0	50	25	75	2
11	SOE-B-CSE310	CSE	Mini Project/Case Study	0	0	2	0	15	10	25	1
12	SOE-B-CSE311	Humanities	Professional Development-1	0	0	2	0	30	20	50	1
			TOTAL	**13**	**4**	**16**	**125**	**290**	**335**	**750**	**25**

* End Semester Examination

** Progress Review Examination

Programme	**:**	**B. Tech.**	**Semester**	**:**	**III**
Name of the Course:		**Discrete Mathematics**	**Course Code:**		**SOE-B-MA302**
Credits	**:**	**4**	**No of Hours :**		**4 Hrs. / Week**
Max Marks	**:**	**100**			

Course Description:

This course will discuss fundamental concepts in discrete mathematics with emphasis on their applications to computer science. Example topics include logic and Boolean circuits; sets, functions and relations; analysis techniques based on counting methods and recurrence equations; trees and more general graphs.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	To formulate logic expression for variety of applications
CO2	To use Algebraic structures for problem solving
CO3	To describe and manipulate sequences
CO4	To analyse and solve counting problems on finite and discrete structures
CO5	To apply graph theory in solving computing problems

Syllabus:

Unit-I: Mathematical logic

Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

Unit-II: Relations

Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: lnverse Function Composition of functions, recursive Functions, Lattice and its Properties. Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

Unit-III: Recurrence Relation

Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of non-homogeneous Recurrence Relation.

Unit-IV: Combinatorics

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion. Pigeon hole principles and its application.

Unit-V: Graph Theory

Notations & terminology directed and undirected graphs, incidence and degrees, Sub-graphs, Walks paths, cycles, circuits, components, connectedness algorithms, shorter path algorithm. Euclidian and Hamiltonian graphs, the traveling Salesman Problem, Trees: Spanning trees, rooted trees and binary trees.

Text Books:

- A. Doerr, K. Levasser, "Applied Discrete Structures for Computer Science".
- B Kolman, R.C. Busby, "Discrete Mathematical Structures for Computer Science".
- Kenneth H Rosen, "Discrete Mathematics and its Applications with Combinatorics and Graph Theory", 7th Edition, TMH.

Reference Books:

- J.P. Trembley, R. P. Manohar, "Discrete Mathematical Structures with Application to Computer Science".
- C. Liu, "Elements of Discrete Mathematics".

CO-PO & PSO Correlation

Course Name: Discrete Mathematics												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2	1				1			2			
CO2:	2	2	1			1			2	2		
CO3:	2	2	1			1			2	2		
CO4:	1		2			1			1			1
CO5:	1		2			1			2	2		

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech.**	**Semester**	**:**	**III**
Name of the Course:		**Internet Technology**	**Course Code:**		**SOE-B-CSE301**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description:

The aim of this course is to provide the conceptual and technological developments in the field of Internet and web designing with the emphasis on comprehensive knowledge of Internet, its applications and the TCP/IP protocols widely deployed to provide Internet connective worldwide. The World Wide Web with its widespread usefulness has become an integral part of the Internet. Therefore, this course also puts emphasis on basic concepts of web design.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Develop proficiency in webpage development and website management
CO2	Develop proficiency in creating dynamic Web Interface
CO3	Write server and client sides scripts and manage websites
CO4	Design a web page using image, audio and video editing tools

Syllabus:

Unit-I: Internet Technology and Protocol:

Basics of Web and Network, Internet Protocols, FTP, HTTP, HTTPS, Email protocols – SMTP, POP3, IMAP4, MIME6, Router, E-mail Addresses, Resources Addresses, Application areas: E-commerce, Education Entertainment such as games and gambling, Impact of Internet on Society – Crime on/through the Internet.

Unit-II: Introduction to Web Design:

Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept, Designing Tools.

Unit-III: Web Systems Architecture:

Architecture of Web based systems- client/server (2-tier) architecture, 3-Tier architecture, Building blocks of fast and scalable data access: - Caches-Proxies- Indexes-Load Balancers- Queues, Web Application architecture (WAA), Web Platform Architecture (WPA).

Unit-IV: Web Servers:

Web servers –HTTP request types – System architecture – Accessing web servers- IIS – Apache web server. Search Engines, integrity of information, databases online.

Web Publishing and Browsing: Overview, Web hosting, Components of Web Publishing, Document management, Web Page Design, Consideration and Principles, Browser, HTTP, Publishing Tools.

Unit-V: Web Security:

Overview of Internet Security, Security policies / Privacy / Identification / Authentication / Access control. Hardware and software, Risk assessment, vulnerabilities. Threats and attack methods such as Viruses, Spam, Root kits, "phishing", Firewalls – spyware plug-ins.

Text books:

- M. L. Young, "The Complete reference to Internet", Tata McGraw Hill, 2019.
- Godbole A.S., Kahate A., "Web Technologies", Tata McGrawHill, 2019.
- Jackson, "Web Technologies", Pearson Education, 2019.

Reference Books:

- B. Patel, Lal B. Barik," Internet & Web Technology ", Acme Learning Publishers.
- Leon, Leon, "Internet for Everyone", Vikas Publishing House.
- Dan Brown, "Communicating Design: Developing Web Site Documentation for Design and Planning".

CO-PO & PSO Correlation

Course Name: Internet Technology												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:		**2**	**1**			**2**			**2**			**1**
CO2:	**1**	**3**	**2**			**2**			**2**	**2**		**1**
CO3:	**1**	**3**	**2**			**2**			**2**	**2**		**1**
CO4:	**1**	**3**	**2**			**2**			**2**	**2**		**1**

Note: 1: Low, 2: Moderate, 3: High

Programme	**:**	**B. Tech.**	**Semester**	**:**	**III**
Name of the Course:		**Data Structure**	**Course Code:**		**SOE-B-CSE302**
Credits	**:**	**4**	**No of Hours :**		**4 Hrs. / Week**
Max Marks	**:**	**100**			

Course Description:

This course emphasizes on logical structure of data, it's physical representation and techniques for program development and debugging. In this course, students will also learn how to select best suited data structure to solve a particular problem. This course is also about the computational complexities of different data structures.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Identify the correctness of the algorithms.
CO2	Analyze the times complexity of the algorithms using asymptotic analysis.
CO3	Compare between different data structures. Pick an appropriate data structure for a design situation.
CO4	Analyze/ summarize searching and sorting techniques.
CO5	Employ and map suitable algorithms to solve engineering problems.

Syllabus:

Unit-I: Introduction

Introduction: Basic Terminology, Data types and its classification, Abstract Data Types. Time and Space Analysis of Algorithms, Asymptotic Notations - Average, best and worst case analysis, Simple recurrence relations and use in algorithms, Sorting and Searching algorithms.

Unit-II: Linear Data Structure:

Arrays, Stacks, Queues, Linked Lists Arrays, Sparse Matrices, Stacks, Recursion, Queues, Types of queues, linked list, Generalized linked list, Application: Garbage collection and compaction, Conversion of Infix to Postfix Expressions, Polynomial Arithmetic etc.

Unit-III: Non-linear Data Structure:

Trees, Binary Trees, Tree Traversal, Threaded Binary trees, Binary Search Tree (BST), balanced trees - AVL Trees, B-trees, B+ tree. Application: Huffman coding Algorithm etc.

Unit-IV: Nonlinear Data Structure: Graphs

Graphs, Directed graph, Undirected graph, Traversal, Application of Graphs: Shortest path - Minimal spanning tree etc.

Unit-V: Hashing

Introduction, types, Collision Resolution Strategies, NP-completeness.

Text books:

- Alfred. V. Aho, John. E. Hopcroft, Jeffrey. D. Ullman, "Data Structures and Algorithms", Addison-Wesley Publications.,1985
- Horowitz, Sahani, “Fundamentals of data Structures”, Galgotia Publication Pvt. Ltd., N Delhi.

Reference books:

- Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, Asia.1994.
- Jean-Paul Tremblay, Paul. G. Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hill second edition, 1991.
- Thomas. H. Cormen, Charles. E. Leiserson, Ronald. L. Rivest, "Introduction to Algorithms", PHI 1998.
- Lipschutz, “Data structure (Schaum)”, TMH
- R. Kruse et al, “Data Structures and Program Design in C”, Pearson Education Asia, Delhi-2002.

CO-PO & PSO Correlation

Course Name: Data Structure												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2	1				1			2			
CO2:	2	2	1			1			2	2		
CO3:	2	2	1			1			2	2		
CO4:	1		2			1			1			1
CO5:	1		2			1			2	2		

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech.**	**Semester**	**:**	**III**
Name of the Course:		**Operating System**	**Course Code:**		**SOE-B-303**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Descriptions:

This course will provide an introduction to operating system design and implementation. The course starts with evolution and then covers the major components of operating systems. The discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping) and file systems. Linux / Unix is studied at the end as a case study.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Gain an insight into how programming languages, operating systems, and architectures interact and provide an environment to the user
CO2	Get an idea regarding tradeoffs that can be made between performance and functionality during the design and implementation of an operating system.
CO3	Get knowledge about different functions of operating system i.e. Process Management, resource management
CO4	Be able to conceptualize the components involved in designing a contemporary Operating system
CO5	Be able to understand the theoretical approaches and practical implementations of OS functionalities

Syllabus:

Unit–I: Operating System Introduction:

Operating systems objectives, functions, architecture, structures, operations, Evolution, services, Design and Implementation issues, System calls, System programs, Virtual machine. History of UNIX, Philosophy, Terminology, Distributions, Community

Unit–II: Process Scheduling and Threads

Processes: Process Concept, Process States, Process State Transition Diagram, Process Control Block (PCB), Process Scheduling Concepts, Threads and their management. Scheduling: Scheduling concepts, Performance criteria, Scheduling algorithms, Multiprocessor scheduling. Process management in Linux: Boot process, Init process, Foreground and Daemon process, Scheduling of processes at command.

Unit–III: Process Coordination:

Process Synchronization: Critical section problem, software and hardware solutions, semaphores, monitors, atomic transactions, classical synchronization problems. Deadlock: characterization, Prevention, Avoidance and Detection, Recovery, combined approach to handle deadlocks. Process Control in UNIX/Linux: Process abstraction, System Call: fork, wait etc. Process groups, Zombies and Orphans, Connecting processes, Signal handling

Unit–IV: Memory and File Systems:

Memory Management: Virtual Memory Concepts, Partitioning, Cache memory, File System: File concept, File organization and access mechanism, File directories, File allocation methods, free space management. File and Directory System in UNIX/Linux: Directory types, mode, Opening and Closing files, Directory Navigation, File access rights, file sharing, Modifying file attributes.

Unit–V: Security, Protection and Networking Tools

Introduction, Threats and attacks, Security violation through parameters, Computer virus and worms Security design principle, Authentication, Protection mechanisms, Data encryptions, Digital signature Networking in Linux: TCP/IP Basics, IP address resolving, SSH: Secure Shell, SSH Tools,

Text Books:

- Silberschatz, Galvin, “Operating System Concepts”, Wiley India, 8th edition.
- William Stalling, “Operating System”, 6th edition, Pearson Education.
- SumitabhaDas, “Unix Concepts and Application”, 4th Edition, TMH.

Reference Books:

- Andrew S. Tanenbaum, “Modern Operating Systems”, 4th Edition, Pearson Education.
- Achyut S Godbole, Atul Kahate, “Operating System”, 3rd edition, TMH.
- Rosen and Kenneth, “UNIX: The Complete Reference”, 2nd Edition, McGraw Hill.

CO-PO & PSO Correlation

Course Name: Operating System												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1					1			3			
CO2:	1		2							2		
CO3:	2								2			
CO4:	1	1	1						1	2	2	
CO5:	1		3							2		

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech.**	**Semester**	**:**	**III**
Name of the Course:		**Basics of Banking and Financial Service**	**Course Code:**		**SOE- B-CSE304**
			No of Hours :		**2 Hrs. / Week**
Credits	**:**	**2**			
Max Marks	**:**	**50**			

Course Objectives:

Objective: To impart knowledge about the basic principles of banking and Financial Services.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the Indian banking system.
CO2	Understand the Indian financial markets and services.
CO3	Compare between different services offered by Indian banks.
CO4	Employ different services offered by Indian banks and financial institutions to get benefits.

Syllabus:

Unit-I: Introduction

Origin of banking: definition, banker and customer relationship, General and special types of customers, Types of deposits, Origin and growth of commercial banks in India. Financial Services offered by banks, changing role of commercial banks, types of banks.

Unit-II: Internet Banking

Meaning, Benefits, Home banking, Mobile banking, Virtual banking, E-payments, ATM Card/Biometric card, Debit/Credit card, Smart card, NEFT, RTGS, ECS (credit/debit), E-money, Electronic purse/E-Wallets, Digital cash.

Text Books:

- Parameswaran. R, Natrajan. S, "Indian Banking System", S. Chand,2010
- Gordon, Natarajan, "Financial Markets and Services", Himalaya Publication

Reference Books:

- Bhole, Mahakud, "Financial Institutions and Markets", McGraw Hill Publications
- Jeff Madura, "Financial Institutions and Markets", Cengage Publications.

CO-PO & PSO Correlation

Course Name: Basics of Banking and Financial Service												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:				1							1	
CO2:				1			1					1
CO3:						1						1
CO4:							1				1	

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**III**
Name of the Course	:	**Disaster Management**	**Course Code:**		**SOE-B-CE-305**
Credits	:	**1**	**No of Hours :**		**1 Hrs. / Week**
Max Marks	:	**50**			

Course Description:

Taking this course will help you prepare a fully functional disaster preparedness plan, to include packing lists, a communication plan, a financial plan, and even a technology plan. If you live in areas where tornados, hurricanes, earthquakes, or other disasters are common, this is the course for you. In addition, this course will cover topics that help you understand what the benefits a safe room can provide for your safety. Even for those not in these areas, this course still provides insight into what to do for man-made disasters such as terrorist attacks, chemical spills, and fires. Don't wait until disaster strikes, strike first and get prepared.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Differentiate the types of disasters, causes and their impact on environment and society
CO2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.
CO3	Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

Syllabus:

Unit-I: Understanding Disasters

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity, Disaster and Development, and disaster management.

Unit-II: Types, Trends, Causes, Consequences and Control of Disasters

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends, Emerging Risks of Disasters, Climate Change and Urban Disasters

Unit-III: Disaster Management Cycle and Framework

Disaster Management Cycle, Paradigm Shift in Disaster Management, Pre-Disaster: Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System, Preparedness, Capacity Development; Awareness During Disaster, Evacuation, Disaster Communication, Search and Rescue, Emergency Operation Centre, Incident Command System, Relief and Rehabilitation, Post-disaster, Damage and Needs Assessment, Restoration of Critical Infrastructure, Early Recovery, Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action

Unit-IV: Disaster Management in India

Disaster Profile of India, Mega Disasters of India and Lessons Learnt, Disaster Management Act 2005, Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter-Governmental Agencies

Unit-V: Applications of Science and Technology for Disaster Management

Geo-informatics in Disaster Management (RS, GIS, GPS and RS), Disaster Communication System (Early Warning and Its Dissemination), Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters, S&T Institutions for Disaster Management in India.

Text Books:

- Singhal J.P., "Disaster Management", Laxmi Publications, 2010.
- Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012.

Reference Books:

- Gupta Anil K, Sreeja S. Nair, "Environmental Knowledge for Disaster Risk Management", NIDM, New Delhi, 2011
- Kapur Anu, "Vulnerable India: A Geographical Study of Disasters", IIAS and Sage Publishers, New Delhi, 2010.

CO-PO & PSO Correlation:

Course Name : Disaster Management (SOE-B-CE305)												
	Program Outcomes									PSOs		
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**3**	**1**	**2**	**2**	**2**
CO2:	**3**	**1**	**2**	**3**	**2**	**3**	**2**	**3**	**1**	**2**	**2**	**2**
CO3:	**3**	**2**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**III**
Name of the Course:		**Internet Technology Lab**	**Course Code:**		**SOE-B-CSE306**
Credits	**:**	**2**	**No of Hours :**		**2 Hrs. / Week**
Max Marks	**:**	**75**			

Course Descriptions:
This lab introduces intermediate to web design techniques. Lab includes advanced markup language, multimedia technologies, usability and accessibility practices, and techniques for the evaluation of web design. Upon completion, students should be able to employ advanced design techniques to create high impact and highly functional websites.

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

CO Number	Course Outcome
CO1	Understand how different web sites have a different purpose and different design. Thoroughly learn HTML through hands-on training
CO2	Understand how to make dynamic web pages through the use of scripting

The following concepts will be covered in the lab:

- **HTML:** HTML Attributes, Images, Links, Creating Tables, HEAD Elements, Using Frames, Using Forms and Input elements.
- **CSS:** CSS Styling (Background, Text Format, Controlling Fonts), CSS Properties, working with block elements and objects, working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties).
- **Java Script:** Basic Syntax, Control Structures, Writing Functions, working with Arrays, The Document Object Model, Events Handling, Using Browser Objects, Object Oriented in JavaScript.
- **Perl:** CGI Programming, Understanding Scalar Values, Perl Variables, Basic Operators and Control Flow, Conditional Statements, Looping Statements, Lists and Array Variables Key features.

Reference Books:

- Thomas A Powell, "The Complete Reference, HTML & CSS", 5th Edition TMH.
- Thomas A Powell, "The Complete Reference, JavaScript", 3rd Edition, TMH.

CO-PO & PSO Correlation

Course Name: Internet Technologies Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**						**1**	**2**	**2**	
CO2:	**2**	**1**	**3**						**2**	**2**	**1**	
CO3:	**1**										**1**	
CO4:	**1**		**1**								**1**	
CO5:	**1**		**3**							**1**	**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme :	**B. Tech**	**Semester :**	**III**
Name of the Course:	**Data Structure Lab**	**Course Code:**	**SOE-B-CSE307**
Credits :	**1**	**No of Hours :**	**2 Hrs./ Week**

Max Marks : 50

Course Descriptions:

The objective of this lab is to teach students various data structures and to explain them algorithms for performing various operations on these data structures. This lab complements the data structures course. Students will gain practical knowledge by writing and executing programs using various data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Arrays, records, linked structures, stacks, queues, trees, and graphs, etc.
CO2	Apply different data structures in real applications.

The following concepts will be covered in the lab:

- Implementation of linear data structure using Arrays and perform its various operations.
- Implementation of recursion.
- Implementation of the Queue: Linear Queue, Circular Queue, D-queue and Priority Queues.
- Implementation of Stack & perform infix to postfix conversion.
- Implementation of Linked list: Singly, Doubly and Circular Linked list.
- Representation of a polynomial using Linked list and write functions for polynomial addition.
- Implement and analyze the various Searching algorithms i.e. Linear, Binary and Hashing.
- Implement and analyze the various Sorting algorithms i.e. Selection, Insertion, Bubble,
- Quick, Merge, Heap, Radix sort etc.
- Implementation of Tree and its applications i.e. Spanning tree, Binary Search Tree, AVL tree and Tree traversal etc.
- Representation of Graph and Implement some of its application i.e. Shortest path.

Text Books:

- Deepali Srivastava, S. K. Srivastava, “Data Structures Through C in Depth”, BPB Publication.

- Data Structures and Algorithms Made Easy
- John R. Hubbard, "Fundamentals of Computing with C++" , Schaum's Outline.

Reference Books:

- Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language", Pearson Publication.
- Byron Gottfried, "Programming with C", Schaum's Outline Series.
- Seymour Lipschutz, "Data Structures", Schaum's Outline Series.

CO-PO & PSO Correlation

Course Name: Data Structure Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**	**2**		**2**	**2**		**1**	**2**	**2**	
CO2:	**3**	**3**	**2**	**2**		**1**			**2**	**2**	**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**III**
Name of the Course:		**Operating System Lab**	**Course Code:**		**SOE-B-CSE308**
Credits	**:**	**1**	**No of Hours :**		**1 Hrs./ Week**
Max Marks	**:**	**50**			

Course Descriptions:

This lab course complements the operating systems course.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand and implement basic services and functionalities of the operating system using system calls and able to Understand the benefits of thread over process and implement synchronized programs using multithreading concepts
CO2	Use modern operating system calls and synchronization libraries in software/ hardware interfaces
CO3	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority
CO4	Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.

The following concepts will be covered in the lab:

- Simulation of the following cpu scheduling algorithms:
  - FCFS
  - SJF
  - Round Robin
  - Priority
- Simulation of the file allocation strategies:
  - Sequential
  - Indexed
  - Linked
- Simulation of MVT and MFT
- Simulation of File Organization techniques
  - Single level directory
  - Two level
  - Hierarchical
  - DAG
- Simulation of Bankers Algorithm for Deadlock Avoidance
- Simulation of Bankers algorithm for Deadlock Prevention
- Simulation of all page replacement Algorithms
  - FIFO
  - LRU
  - LFU

- Simulation of Paging Technique of memory management.

Reference Books:

- P.C.P Bhatt, "An Introduction to Operating Systems", 2nd edition, PHI.
- Andrew S Tanenbaum, "Modern Operating Systems", 3rd Edition, PHI.

CO-PO & PSO Correlation

Course Name: Operating System Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**	**2**		**2**	**2**		**1**	**2**	**2**	
CO2:	**2**	**2**	**2**	**2**		**1**			**2**	**2**	**2**	
CO3:			**1**					**1**			**3**	
CO4:	**1**				**2**			**2**			**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B.Tech.**	**Semester :**	**III**
Name of the Course:		**Data Analytics with Python Lab**	**Course Code:**	**SOE-B-CSE309**
			No of Hours :	**2 Hrs./ Week**
Credits	**:**	**2**		
Max Marks	**:**	**75**		

Course Descriptions:

This course gives exposure on Solving of data science problems to students. Course also builds conceptual and practical understanding of the classification and Regression Model.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	demonstrate proficiency with statistical analysis of data.
CO2	Students will develop the ability to build and assess data-based models
CO3	demonstrate skill in data management
CO4	apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

The following concepts will be covered in the lab:

- Read and Write operations on different types of datasets and visualize data
- Correlation and covariance analysis
- Classification model
- Regression model
- Clustering model

Reference Books:

- David Ascher, Mark Lutz, “Learning Python”, Publisher O’Reilly Media.
- Reema Thareja, “Python Programming using Problem Solving approach”, Oxford University press
- Wes Mckinney “Python for Data Analysis”, 1st edition, Publisher O’Reilly Media.
- Allen Downey, Jeffrey Elkner, Chris Meyers, “Learning with Python”, Dreamtech.
- David Taieb, “Data Analysis with Python: A Modern Approach”, 1st Edition, Packt Publishing

CO-PO & PSO Correlation

Course Name: Data Analytics with Python Lab												
	Program Outcomes								**PSOs**			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**	**2**		**2**	**2**		**1**	**2**	**2**	
CO2:	**2**	**2**	**2**	**2**		**1**			**2**	**2**	**2**	
CO3:			**1**					**1**			**3**	
CO4:	**1**				**2**			**2**			**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech.**	**Semester**	**:**	**III**
Name of the Course:		**Mini Project**	**Course Code**	**:**	**SOE-B-CSE310**
Credits	**:**	**1**	**No of Hours**	**:**	**1 Hrs. / Week**
Max Marks	**:**	**25**			

Course Description:

The project work can be an investigative analysis of a technical problem in the relevant area, planning and/or design project, experimental project or computer application based project on any of the topics. Project evaluation committee consisting of three or four faculty members specialized in the various fields shall study the feasibility of each project work before giving consent.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	gain in-depth knowledge and use adequate methods in the major subject/field of study.
CO2	create, analyze and critically evaluate different technical/research solutions
CO3	clearly present and discuss the conclusions as well as the knowledge and arguments that form the basis for these findings
CO4	identify the issues that must be addressed within the framework of the specific dissertation in order to take into consideration
CO5	apply principles of ethics and standards, skill of presentation and communication techniques.

Contents

Each student group consisting of not more than four members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project batches are expected to fix their topics, complete preliminary studies like literature survey, field measurements etc. Student shall study the topic of project work and define problem statement.

The student shall evolve design and/or do experimental study and/or fabricate engineered device to obtain solution to the identified problem. The student shall prepare a report and shall present a seminar based on work done at the end of semester.

CO-PO/PSO Mapping

CO Number	Program Outcome								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	3	2	2	2	-	2	2	2	3	2	2	2
CO2	3	2	1	1	1	1	1	2	2	3	1	1
CO3	1	2	1	3	2	-	-	1	1	3	2	1
CO4	1	1	1	-	1	-	3	2	1	2		2
CO5	-	1	-	3	2	-	3	1	1	3	1	

Note: 1: Low 2: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester :**	**III**
Name of the Course:		**Professional Development-I**	**Course Code:**	**SOE-B-CSE311**
			No of Hours :	**1 Hrs. / Week**
Credits	**:**	**1**		
Max Marks	**:**	**50**		

Course Description:

Information is crucial to an organization and when this information is communicated in writing, the quality of such communications can have a significant impact on business performance and decision making. Effective business writing is concise, accurate, unambiguous, logical and easily understood. This Professional Development (Business Writing Skills) course teaches the best practices students must know to be able to write clear, effective, professional business documents. This course will help students to develop the skills necessary for successful business writing – be it reports, business proposals and official communication.

Another purpose of this course is to equip the students with the nuances of the English language which includes proficiency in vocabulary and its effective usage in speaking and writing. It further helps them to prepare for various competitive exams and to keep up with the increasing demand for English in Indian society and at the global level. It also develops their overall confidence and personality.

Course Outcomes:

CO Number	Course Outcome
CO1	To make student understand the benefits and usage of effective communication and business communication context by removing barriers of communication
CO2	To make students conversant with the basic forms, formats and techniques of business writings
CO3	To make students proficient in vocabulary and its effective usage of English in speaking and writing.
CO4	To make students proficient in reading comprehension to stand out in any competitive exam

Syllabus:

Unit-I: Communication in Business

Business Communication-functions and principles of communication (7C's of communication), Types of Communication, Context of communication, Medium of communication, Barriers to communication.

Unit–II: Elements of Business Writing

Business letter -principles of business writing; Elements of letter writing and styles of writing, Resume, covering letter.

Unit–III: Competitive English I

Enhance word Power, Synonyms and Antonyms, one-word substitution, error detection, rearrangement of sentence, paragraph, jumbled parts, idioms and phrase

Unit-IV: Competitive English II

Reading comprehension, Theme detection, deriving conclusion from passages, Comprehension of Unseen Passages, Précis writing.

Unit–V: BUSINESS PROPOSALS AND REPORTS

Project proposals- characteristics and structure, Project reports – types- characteristics – structure, Process and mechanics of report writing- visual aids- abstract - executive summary- recommendation Writing- definition of terms.

Text Books:

- Raman, Meenakhshi, Prakash Singh, "Business Communication", O U P, New Delhi, 2008.
- Lesikar, Raymond V., John D Pettit, Mary E FlatlyLesikar's, "Basic Business Communication", 10th edition, Tata McGraw-Hill, New Delhi, 2007.
- Gerson, Sharan J., and Steven M Gerson, "Technical Writing: Process and Product" Pearson Education, New Delhi, 2008.
- Murphy, Herta, Herbert W Hildebrandt, Jane P Thomas, "Effective Business Communication", 7th edition, Tata McGraw-Hill, New Delhi.
- Bovee, Courtland and John V Thill, "Business Communication Today", 8th edition, Pearson Education, New Delhi, 2008.

Reference Books

- Stuart Bonne E., Marilyn S Sarow, Laurence Stuart, "Integrated Business".
- John Wiley, "Communication in a Global Market Place", 3rd edition, India, New Delhi, 2007.
- Guffey, Mary Ellen, "Business Communication: Process and Product", 3rd edition, Thomson and South-western, 2004.
- Fiske, john, "Introduction to Communication Studies", Rotledge London, 1990.
- Geoffrey Leech, Jan Svartvik, "A Communicative Grammar of English", ELBS Longman, England.
- Bill Scott, "The Skills of Communicating", Jaico Publishing House, Mumbai, 2004.
- Gartside L, "Model Business Letters", Pitman, London, 1992.
- T.L.H. Smith, "The English Errors of Indian Students", Pearse, I.E.S., Oxford University Press, Madras- Latest Edition.

- P.R. Sarkar, "Grammar and Composition", Anand Marg Publications, Kolkata

CO-PO & PSO Correlation

Course Name: Professional Development-I												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:		**2**		**3**		**1**	**2**					**1**
CO2:		**1**		**2**		**1**	**1**					
CO3:				**3**		**2**	**2**					**1**
CO4:				**1**		**1**	**1**					

Note: 1: Low 2.: Moderate 3: High

Computer Science and Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B.Tech (Computer Science and Engineering)

Academic Semester IV

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit (L+T+P)/2
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-MA402	MATH	Probability and Statistics	3	1	0	30	20	50	100	4
2	SOE-B-CSE401	CSE	Object Oriented Analysis and Design	2	0	0	15	10	25	50	2
3	SOE-B-CSE402	CSE	Microprocessor and Microcontrollers	2	1	0	20	15	40	75	3
4	SOE-B-CSE403	CSE	Database Management System	2	1	0	20	15	40	75	3
5	SOE-B-CSE404	CSE	Introduction to digital marketing and e-commerce	2	0	0	15	10	25	50	2
6	SOE-B-CSE405	CSE	MOOCS/SWAYAM/Certification/Liberal Arts	2	0	0	0	0	25	25	2
7	SOE-B-CSE406	CSE	Object Oriented Programming Lab	0	0	4	0	50	25	75	2
8	SOE-B-CSE407	CSE	DBMS Lab	0	0	4	0	50	25	75	2
9	SOE-B-CSE408	CSE	Microprocessor Lab	0	0	2	0	30	20	50	1
10	SOE-B-CSE409	CSE	Machine Learning with Python	0	0	4	0	50	25	75	2
11	SOE-B-CSE410	CSE	Mini Project / Case Study	0	0	2	0	30	20	50	1
12	SOE-B-CSE411	Humanities	Professional Development - II	0	0	2	0	30	20	50	1
			TOTAL	**13**	**3**	**18**	**100**	**310**	**340**	**750**	**25**

* End Semester Examination

Programme :	**B. Tech**	**Semester :**	**IV**
Name of the Course:	**Probability and Statistics**	**Course Code:**	**SOE-B-MA402**
Credits :	**4**	**No of Hours**	**4 Hrs. / Week**
Max Marks :	**100**		

Course Description

The course is related to Probability and Statistics of both function of a single variable as well as functions of several variables. The purpose of studying probability and statistics is to introduce the mind to the scientific method of analysis through which the practical problems can be identified, explanations generated, and logical solutions selected which in essence are requisites for the development of good engineering sense.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	The students will be able to formulate the real world problems
CO2	They will be able to draw conclusions out of the curves made by using above mentioned techniques
CO3	They will be able to solve problems of multiple domains

Syllabus:

Unit-I: Linear Algebra

Definition and examples of vector spaces, Subspaces, Linear span, Linear combination, Linear dependence, independence and their basic properties, Basis, Dimension, Linear transformations and their representation as matrices, Quadratic Forms, Rank of matrices, Solving system of linear equations, Gauss elimination method.

Unit-II: Statistics

Descriptive measures: Measures of central tendency; Measures of dispersion; Measures of skewness and Measures of kurtosis, Curve fitting: Method of group averages, Method of least squares

Unit-III: Probability

Basic probability theory; Axiom of probability; Some elementary theorems; Conditional probability; Bayes' theorem. Discrete Random variables; Discrete probability distribution; Continuous Random variables; Continuous probability distribution; Expectation; Variance; Standard deviation; Moments; Moments generating function; Coefficient of skewness and coefficient of kurtosis; Binomial, Poisson, Normal and Exponential Distribution.

Unit-IV: Sampling, Estimation and Testing of Hypothesis

Sampling: Sampling Distribution of the Mean, Sampling Distribution of the Variance, chi-square, t and F distribution

Point and Interval Estimation: Point Estimation Methods by Method of Moments and Maximum Likelihood. Confidence Intervals for mean and variance of various distribution, Maximum Likelihood Estimators of Certain Functions of Parameters.

Hypothesis Testing: Tests of Statistical Hypotheses for Single-Sample Case and Multiple-Sample Case, Tests Concerning Means, Tests Concerning Differences Between Means, Tests Concerning Variances, Tests Concerning Proportions.

Unit-V: Regression and Correlation

Scatter plots, Simple linear regression, Multiple regression, Drawing Conclusions, Regression diagnostics, Outliers and influence, Data Mining Approach to regression, logistic regression, Correlation, Introduction to Classification modelling (Machine Learning Approach)

Text Books:

- Stephen Andrilli, David Hecker, “Elementary Linear Algebra”, 4th Edition, Academic Press
- Spence, Friedberg, “Elementary Linear Algebra: A Matrix approach”, PEARSON
- N G Das, “Statistical Methods”, McGraw Hill
- S C Gupta, “Fundamentals of Statistics”, Himalaya Publishing House
- Babatunde A. Ogunnaike, “Random Phenomena Fundamentals of Probability and Statistics for Engineers”.

Reference Books:

- Richard L. Scheaffer, Madhuri S. Mulekar, James T. McClave, “Probability and Statistics for Engineers”, 5th Edition by Brooks/Cole, Cengage Learning.
- Sheldon M. Ross, “Introduction to Probability and Statistics for Engineers and Scientists”, Elsevier Academic Press.
- Walter A. Rosenkrantz, “Introduction to Probability and Statistics for Science, Engineering, and Finance”, CRC Press
- John E. Freund's, “Mathematical Statistics with Applications Irwin Miller Marylees Miller”, 8th Edition, PEARSON Publication.

CO-PO & PSO Correlation

Course Name: Probability and Statistics												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**2**	**1**						**2**			**1**
CO2:	**1**		**2**						**2**			**1**
CO3:	**1**	**2**	**2**						**2**			**1**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Object Oriented Analysis and Design**	**Course Code:**		**SOE-B-CSE401**
			No of Hours :		**2 Hrs./Week**
Credits	**:**	**2**			
Max Marks	**:**	**50**			

Course Description:

This course emphasizes on analyze and design an application, system, or business by applying object-oriented programming and virtual model.

Course Outcomes:

Successful completion of the course, the student will able to:

CO Number	Course Outcome
CO1	Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
CO2	Get an understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
CO3	Make use of members of classes found in the Java API
CO4	Use testing and debugging tools to automatically discover errors of Java programs as well as use versioning tools for collaborative programming/editing.
CO5	Develop programs using the Java Collection API as well as the Java standard class library.

Syllabus:

Unit–I: Introduction

Structure of complex system, Attributes, Object model: evaluation, application; Concept of class object, nature, classification, Properties of OOP, etc.

Unit-II: Software development life Cycle

Introduction, Phases, Types of Models and their applications

Unit-III: Modelling

Modelling: Object, Dynamic, Functional etc. Structured vs. Object Oriented Analysis

Unit-IV: UML

Diagrams: class, object, Use case, state, Activity etc. Rules, Notations

Unit-V: Object-oriented design

Stages, System Design, Object-Oriented Decomposition, Concurrency, Pattern, etc.

Text books:

- Brett D. McLaughlin, David West, Gary Pollice "Head First Object-Oriented Analysis and Design".
- Kathy Sierra, Bert Bates, "Head First Java".

Reference books:

- Balaguruswamy, "Programming with JAVA", TMH.
- Bhave &. Patekar, "Programming with Java", Pearson Education.

CO-PO & PSO Correlation

Course Name: Object Oriented Analysis and Design												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1			2						1		
CO2:		1				2			2		1	
CO3:			1		3			2				2
CO4:		2						3			2	
CO5:				1		2			1			

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Microprocessor and Microcontrollers**	**Course Code:**		**SOE-B-CSE402**
			No of Hours	**:**	**3 Hrs. /Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

The purpose of this course is to teach students the fundamentals of microprocessor and microcontroller systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microprocessor/controller implementation. Advanced microcontrollers are often much more powerful, comparable to the very advanced microprocessors. The AVR and ARM processors are of this category.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the evolution of processor architectures
CO2	Write simple programs in assembly language of Pentium processor
CO3	Interface peripheral devices and memory with microcontrollers
CO4	Program an ARM processor for various Applications

Syllabus:

Unit-I:

Brief introduction to 8085 CPU Architecture, Pin configuration, Addressing Modes Registers, Memory Addressing Instructions Set.

Unit-II:

THE 8086 ARCHITECTURES: Pin diagram of 8086 and description of various signals. Architecture block diagram of 8086 & description of sub-blocks such as EU & BIU & of various registers; Description of address computations & memory segmentation; Program relocation; addressing modes; Instruction formats. Instruction set of 8086.

Unit-III:

Microcontrollers: Type, processor architecture memory type, hardware features, 8051 Processor architecture, Addressing modes, 8051InstructionSet– Data movement Instruction, arithmetic instruction, Logic instruction, Branch group Instruction.

Unit-IV:

8051 software and programming: Memory interfacing and address decoding, programming Input/Output port/timer/ADC/DAC, Serial data communication controller and interrupt controller for different application with respect to instrumentation & control.

Unit-V:

ARM Processor Fundamentals: Registers, current Program Status Registers, Pipeline Exceptions, Interrupts and Vector Table. Architecture Revisions, ARM Processor families, ARM instruction set, Thumb Instruction Set-Exceptions Handing Interrupts, Interrupt Handling schemes, firmware, Embedded Operating systems. Caches-cache architecture, Cache policy.

Text books:

- Brey, "The Intel Microprocessors 8086- Pentium processor", PHI
- A.K. Ray, K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGrawHill,2000.
- Badri Ram, "Advanced Microprocessors and Interfacing", TMH
- Triekel, Singh, "The 8088 & 8086 Microprocessors- Programming, Interfacing, Hardware & Applications", PHI.
- D.B. Hall, "Microprocessor and Interfacing", McGraw Hill
- Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, "ARM System Developer's Guide, Designing and Optimizing System Software", Elsevier, 2004.

Reference books:

- Yu-Chang Liu, Glenn, A Gibson, "Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design", PHI.
- "Microsoft MASM Reference Manual", Published by Microsoft Corporation (Softcopy of Document available with MASM Software)
- "Assembler Inside & Out", Harley Hahn Pub. Osborn MgGrawHill, Burkley USA.

CO-PO & PSO Correlation

Course Name: Microprocessor and Microcontrollers												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**			**2**						**1**		
CO2:		**1**				**2**			**2**		**1**	
CO3:			**1**		**3**			**2**				**2**
CO4:		**2**						**3**			**2**	

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Database Management System**	**Course Code:**		**SOE-B-CSE403**
			No of Hours :		**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

This course offers lecture, laboratory, and online interaction to provide a foundation in data management concepts and database systems. It includes representing information with the relational database model, manipulating data with an interactive query language (SQL). It also includes database applications, security, and integrity and privacy issues.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Design the relational database for various applications.
CO2	Perform CRUD operations on database. (Create, Retrieve, Update, Delete)
CO3	Understand & implement the principles of transaction management, database recovery, security etc.
CO4	Understand the concurrency control mechanism for database.
CO5	Analyze multidimensional data with data cube.

Syllabus:

Unit-I: DBMS concepts and architecture

Database approach v/s Traditional file system, Advantages, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Database Structure, Functions of DBA and designer, ER data model: Entitles and attributes, Entity types, Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various Data Model.

Unit-II: Relational Data Models

Introduction to the Relational Model, Integrity Constraints, Querying on relational database, Logical database Design, Introduction to Views, Relational Algebra, and Relational calculus. SQL Queries, Nested subqueries, Aggregate functions, NULL values, Set operations, Logical connectivity's, Joins, SQL Triggers and Active Data bases.

Unit-III: Database Design

Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency, preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies. Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

Unit-IV: Transaction management and Concurrency control

Transaction management: ACID properties, Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Unit-V: File indexing techniques and current trends in Database

File Organization and Indexing, Clusters, Indexes, Hashing and Tree Base Indexing. Database Security, current trends in Databases: Parallel databases, spatial databases, Distributed Databases, Introduction to DWDM.

Text Books:

- Silberschatz, Korth, "Data base System Concepts", 6th edition, McGraw Hill.
- Elmasri Navathe, "Fundamentals of Database Systems", Pearson Education.

Reference Books:

- Rini Chakrabarti, Shilbhadra Dasgupta, "Advanced Database Management System", Wiley India Pvt. Limited
- Peter Rob, Carlos Coronel, "Data base Systems design, Implementation, and Management", 7th Edition.
- Raghurama Krishnan, Johannes Gehrke, "Data base Management Systems", TATA McGraw Hill, 3rd Edition.
- M. Tamer Özsu, Patrick Valduriez, "Principles of Distributed Database Systems", Springer Science & Business Media, 24-Feb-2011

CO-PO & PSO Correlation

Course Name: Database Management System												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1	1	2	2		2	2		1	2	2	
CO2:	3	3	2	2		1			2	2	2	
CO3:			3					1			3	
CO4:	1				2			3			2	1
CO5:				1		2	2	1		2		2

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Introduction to Digital Marketing and E-commerce**	**Course Code:**		**SOE-B-CSE404**
			No of Hours :		**2 Hrs. / Week**
Credits	**:**	**2**			
Max Marks	**:**	**50**			

Course Description:

The course is designed to give a clear picture about the electronic business environment to the students. The most important point is to make the students understand and apply digitalization in business using electronic platform.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the role of ecommerce and digital marketing strategies in overall business and marketing strategies
CO2	Articulate the value of integrated marketing campaigns across SEO, Paid Search, Social, Mobile, Email, Display Media, Marketing Analytics

Syllabus:

Unit-I: Electronic Commerce

Introduction, functions, advantages and disadvantages of electronic commerce, Electronic commerce V/s traditional commerce, progress of electronic commerce in India, electronic commerce model. Evolution of internet, components of internet world, internet infrastructure, internet service providers, World wide web. Building Website, Component of Website, Designing of Website, Types of Web Pages, Process of setting of Website. Types of SCM, benefits of SCM, functions of SCM, benefits of using the internet in SCM. Types of electronic payment, the traditional payment system, the step of electronic payment system, net banking, m-wallet.

Unit-II: Digital Marketing

Online shopping – Online purchasing, electronic market, three models of electronic market, electronic market dimension, market category, interactive marketing, one to one marketing, pull and push technology, B2B hubs, B2B market place, role of B2B market place. Introduction to CRM, marketing automation, components of CRM, CRM architecture, E-CRM. Introduction to Digital Marketing, Search engine optimization, email marketing, banner advertising, social media marketing.

Text Books:

- C.V.R. Murthy, "E-Commerce", Himalaya Publication
- Chan, Lee, Dillon, "E-Commerce Fundamental and Application", Chang, Wiley

Reference Books:

- Ian Dodson, "The Art of Digital Marketing", Wiley
- P.T. Joseph, "E-Commerce – A Managerial Prospective", PHI

CO-PO & PSO Correlation

Course Name: Introduction to Digital Marketing and E-commerce												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:				**1**							1	
CO2:	**1**			**1**								1

Note: 1.: Low 2.: Moderate 3.: High

Programme :	**B. Tech**	**Semester :**	**IV**
Name of the Course:	**MOOCS/ SWAYAM/ Certification/ Liberal Arts (Cloud Computing)**	**Course Code:**	**SOE-B-CSE405**
Credits :	**2**	**No of Weeks :**	**2 Hrs. / Week**
Max Marks :	**25**		

Course Description:

This course is designed to introduce the concepts of Cloud Computing and Big Data as a new computing paradigm. The course will expose students to different views of understanding the Cloud Computing and Big Data such as theoretical, technical and commercial aspects.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Differentiate different computing techniques.
CO2	Identify the appropriate cloud services for a given application
CO3	Compare various cloud computing providers/ Software.
C04	Handle Open Source Cloud Implementation and Administration.

Syllabus:

Unit–I: Introduction of Computing:

New Computing Paradigms & Services: Cloud computing, Edge computing, Grid computing, Utility computing, Cloud Computing Architectural Framework, Cloud Deployment Models, Virtualization in Cloud Computing, Parallelization in Cloud Computing, Security for Cloud Computing, Cloud Economics.

Unit-II: Service Models:

Cloud Service Models: SaaS, IaaS, PaaS, Service Oriented Architecture, Elastic Computing, On Demand Computing, Cloud Architecture, and Introduction to virtualization. Types of Virtualizations, Grid technology, Browser as a platform, Web 2.0, Autonomic Systems, Cloud Computing Operating System

Unit–III:

Introduction to Big Data, Challenges, Volume- Variety- Velocity- Veracity, Ecosystem; Google's Solution Vs Hadoop, Hadoop: Ecosystem, Architecture, Cluster.

Unit-IV:

Introduction to Map Reduce, Information retrieval through Map Reduce, Hadoop File System, GFS, Page Ranking using Map Reduce.

Unit–V:

Case studies- Apache Spark, Machine Learning, VMware.

Text Books:

- Rajkumar Buyya, "Cloud Computing Principles and Paradigms", Wiley.
- Tom White, "Hadoop – The Definitive Guide" 4th edition, O Reillly.
- Kai Hwang, "Distributed and Cloud Computing", Mk Publication.

Reference Books:

- George Reese, "Cloud Application Architectures", O'Reillly.
- Tim Mather, Subra Kumaraswamy, "Cloud Security and Privacy", O Reilly.

CO-PO & PSO Correlation

Course Name: MOOCS/ SWAYAM/ Certification/ Liberal Arts (Cloud Computing)												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1	1	2	2		2	2		1	2	2	
CO2:	3	3	2	2		1			2	2	2	
CO3:			3					1			3	
CO4:	1				2			3			2	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Object Oriented Programming Lab**	**Course Code:**		**SOE-B-CSE406**
			No of Hours	**:**	**2 Hrs. / Week**
Credits	**:**	**2**			
Max Marks	**:**	**25**			

Course Descriptions:

The course will provide foundational knowledge of classes and objects, interface and inheritance, handling exception and multithreading, I/O stream and JDBC, Designing GUI using AWT and SWING.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Implement classes and objects,
CO2	Implement interface and inheritance.
CO3	Implement exception handling and multithreading
CO4	Implement input and output stream and JDBC

The following concepts will be covered in the lab:

- Implementation of Classes and Objects.
- Implementation of Interface and Inheritance.
- Implementation of Multithreading concepts.
- Implementation of File Handling.
- Implementation of JDBC concept.
- Implementation of GUI using AWT and SWING classes

Text Books:

- Herbert Shildt, “The Complete reference Java”, 7th Edition, McGraw-Hill, 2007.
- E. Balagurusamy, “Programming with Java”, 3rd Edition, McGraw-Hill, 2007.

Reference Books:

- Eckel, Bruce, “Thinking in Java: Exploratory Data Analysis in Python”, 4th edition, 2008.

CO-PO & PSO Correlation

Course Name: Object Oriented Programming Lab												
	Program Outcomes								**PSOs**			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**	**2**		**2**	**2**		**1**	**2**	**2**	
CO2:	**3**	**3**	**2**	**2**		**1**			**2**	**2**	**2**	
CO3:			**3**					**1**			**3**	
CO4:	**1**				**2**			**3**			**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech(01UG020)**	**Semester :**	**IV**
Name of the Course:		**DBMS Lab**	**Course Code:**	**SOE-B-CSE407**
Credits	**:**	**2**	**No of Hours :**	**2 Hrs. / Week**
Max Marks	**:**	**75**		

Course Descriptions:

This course offers a foundation in data management concepts and database systems. It includes implementation of DDL, DML and DCL with an interactive query language (SQL).

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Infer database language commands to create simple database.
CO2	Analyse the database using queries to retrieve records.
CO3	Apply PL/SQL for processing database
CO4	Analyse front end tools to design forms, reports and menus
CO5	Develop solutions using database concepts for real time requirements.

The following concepts will be covered in the lab:

- Implementation of DDL commands - overview of using sql tool, data types in sql, creating tables (along with primary and foreign keys), altering tables and dropping tables.
- Implementation of DML commands- insert, select, update, delete etc.
- Implementation of queries using any, all, in, exists, not exists, union, intersect, constraints etc.
- Implementation of sub queries (nested, correlated) and joins (inner, outer and equi).
- Implementation of queries using count, sum, avg, max, min, group by, having, views creation and dropping.
- Implementation of triggers - creation of trigger, insertion using trigger, deletion using trigger, updating using trigger.
- Implementation of procedures- creation of stored procedures, execution of procedure, and modification of procedure.
- Implementation of cursors- declaring cursor, opening cursor, fetching the data, closing the cursor.

CO-PO & PSO Correlation

Course Name : DBMS Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**3**				**2**			**2**	**2**	**1**	**1**
CO2:	**1**	**3**				**1**			**2**	**2**	**1**	**1**
CO3:	**1**	**3**							**1**	**2**		
CO4:	**1**	**3**				**1**			**1**	**2**	**1**	
CO5:	**1**	**3**				**1**			**1**	**2**	**1**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Microprocessor Lab**	**Course Code:**		**SOE-B-CSE-408**
Credits	**:**	**1**	**No of Hours :**		**2 Hrs. / Week**
Max. Marks	**:**	**50**			

Course Objectives:

- To study programming based on 8086 microprocessors and 8051 microcontrollers.
- To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
- To study modular and Dos/Bios programming using 8086 microprocessors.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051 microcontrollers.

Course Descriptions:

The laboratory augments the lecture course in Microprocessors and microcontrollers by providing experience with microprocessors kits. The laboratory introduces to handle arithmetic operations using assembly language programming in TASM and training boat.

Course Outcomes:

CO Number	Course Outcome
CO1	Demonstrate ability to handle arithmetic operations using assembly language programming in TASM and training boards
CO2	Demonstrate ability to handle logical operations using assembly language programming in TASM
CO3	Demonstrate ability to handle string instructions using assembly language programming in TASM
CO4	Demonstrate ability to handle sorting operations and using assembly language programming in TAS

The following concepts will be covered in the lab:

Program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers, program using 8085 Microprocessor for addition and subtraction of two BCD numbers, multiplication and division of two 8 bit numbers using 8085, largest and smallest number in an array of data using 8085 instruction set, array of data in ascending and descending order, Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set, initiate 8251 and to check the transmission and reception of character, interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes, DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave, Serial communication between two 8085 through RS-232 C port.

Additional Programs

- Read a character from a keyboard and display it on Screen
- Display a string on screen
- To check for a Password

Text Books:

- Dr. Vibhav Kumar Sachan, "Digital Electronics & Microprocessor Principle, Design and Programing", 2019
- Nikitas A Alexandridis, "Microprocessor system design concepts", 1984

CO-PO & PSO Correlation

Course Name: Microprocessor Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**1**	**2**					**1**	**2**	**1**	
CO2:	**2**	**3**	**1**	**2**					**2**	**3**	**1**	
CO3:	**1**		**2**								**3**	
CO4:	**1**										**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Machine Learning with Python**	**Course Code:**		**SOE-B-CSE409**
			No of Hours :		**2 Hrs. / Week**
Credits	**:**	**2**			
Max. Marks	**:**	**75**			

Course Descriptions:

The laboratory augments the lecture course in Artificial Intelligence (AI) and Machine Learning (ML) by providing experience with different programming techniques. The laboratory introduces Commonly used AI and ML algorithms for various application domains.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Explain artificial intelligence, its characteristics and its application areas
CO2	Select and apply appropriate algorithms and AI techniques to solve complex problems
CO3	Solve different classification and regression problems using various supervised learning algorithms
CO4	Apply clustering algorithms to real life datasets

The following concepts will be covered in the lab:

- Implementation of searching techniques.
- Implementation of TSP using heuristic approach
- Implementation of Simulated Annealing Algorithm
- Implementation of Hill-climbing to solve 8- Puzzle Problem
- Implementation of Data classification using Naïve Bayes classifier
- Implementation of Data classification using K-Nearest Neighbor classifier
- Implementation of K-Means Clustering Algorithm
- Implementation of Hierarchical Clustering Algorithm
- Implementation of Linear Regression

Text Books:

- Kevin Warwick, “Artificial Intelligence: The Basics”.
- S. Russel, P. Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education
- Mark Fenner, “Machine Learning with Python for Everyone”, Pearson

Reference Books:

- David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.
- Saikat Dull, S. Chjandramouli, Das, "Machine Learning", Pearson
- R. O. Duda, P. E. Hart and D.G. Stork, "Pattern Classification", John Wiley, 2001
- G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem-solving", 4th Edition, Pearson Education.
- J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

CO-PO & PSO Correlation

Course Name: Machine Learning with Python												
	Program Outcomes								**PSOs**			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**	**2**		**2**	**2**		**1**	**2**	**2**	
CO2:	**3**	**3**	**2**	**2**		**1**			**2**	**2**	**2**	
CO3:			**3**					**1**			**3**	
CO4:	**1**				**2**			**3**			**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Mini Project**	**Course Code:**		**SOE-B-CSE410**
Credits	**:**	**1**	**No of Hours :**		**1 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description:
The project work can be an investigative analysis of a technical problem in the relevant area, planning and/or design project, experimental project or computer application based project on any of the topics. Project evaluation committee consisting of three or four faculty members specialized in the various fields shall study the feasibility of each project work before giving consent.

Course Outcomes:
After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	gain in-depth knowledge and use adequate methods in the major subject/field of study.
CO2	create, analyze and critically evaluate different technical/research solutions
CO3	clearly present and discuss the conclusions as well as the knowledge and arguments that form the basis for these findings
CO4	identify the issues that must be addressed within the framework of the specific dissertation in order to take into consideration
CO5	apply principles of ethics and standards, skill of presentation and communication techniques.

Contents
Each student group consisting of not more than four members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project batches are expected to fix their topics, complete preliminary studies like literature survey, field measurements etc. Student shall study the topic of project work and define problem statement. The student shall evolve design and/or do experimental study and/or fabricate engineered device to obtain solution to the identified problem. The student shall prepare a report and shall present a seminar on the basis of work done at the end of semester.

CO-PO/PSO Mapping
Mini Project

CO Number	Program Outcome								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	3	2	2	2	-	2	2	2	3	2	2	2
CO2	3	2	1	1	1	1	1	2	2	3	1	1
CO3	1	2	1	3	2	-	-	1	1	3	2	1
CO4	1	1	1	-	1	-	3	2	1	2	1	1
CO5	-	1	-	3	2	-	3	1	1	3	2	3

Note: 1: Low 2: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**IV**
Name of the Course:		**Professional Development- II**	**Course Code:**		**SOE-B-CSE411**
Credits	**:**	**1**	**No of Hours:**		**1 Hrs. / Week**
Max Marks	**:**	**50**			

Course Descriptions:

'Effective Speaking Skills' course is designed to teach students to apply theories and principles of effective interpersonal and public speaking. This course provides instruction and experience in preparation and delivery of speeches within a public setting and group discussion. Emphasis is on research, preparation, delivery, and evaluation of informative, persuasive, and special occasion public speaking. Upon completion, students should be able to prepare and deliver well-organized speeches and participate in group discussion with appropriate audiovisual support. Students should also demonstrate the speaking, listening, and interpersonal skills necessary to be effective communicators in academic settings, in the workplace, and in the community.

Course Outcomes

Students will be able to

CO Number	Course Outcome
CO 1	Choose a topic and formulate the speech according to the purpose, audience, and time constraints.
CO 2	Employ vocal variety in rate, pitch, and intensity as suitable to the message, occasion, and audience.
CO 3	Use strategies and skills to manage communication anxiety
CO 4	Present speeches using an extemporaneous style with effective transitions that, establish connectedness, movement from one idea to another, and clarify relationships
CO 5	Use knowledge of digital presentation tools to create and make effective presentations, Participate in GD effectively and face interviews confidently

Syllabus:

Unit-I: Speaking- An overview:

Speaking: An Overview, Listening Effectively, Non-Verbal Communication, Art of Persuasion.

Unit-II: Dynamics of Professional Speaking:

Introduction, Combating Stage Fright, Describing Objects/Situations/People, Delivering Just-a-minute Sessions, Delivering Different Types of Speeches.

Unit - III Professional Presentations:

Planning of a Presentation, Designing of a Presentation, Preparing Power Point Slides for Presentations, Individual and Group Presentations, Making Presentation.

Unit - IV Group Discussions:

Introduction, GD and Debate, Types of GD, Personality Traits to be evaluated, Dynamics of Group Behaviour, DOs and DON'Ts of GD.

Unit - V Job Interviews:

Introduction, Process, Stages in Job Interviews, Types, Desirable Qualities, Preparation, Tips for Success.

Text Books:

- Jeff Butterfield, "Soft Skills for Everyone", CENAGE LEARNING, Delhi, 2014.
- Sanjay Kumar, Pushp Lata, "Communication Skills", New Delhi: Oxford University Press, 2011.
- Pushp Lata, Sanjay Kumar, "Communicate or Collapse: A Handbook of Effective Public Speaking, Group Discussion and Interviews", New Delhi: Prentice Hall of India, 2007.
- Dale Carnegie, "The Art of Public Speaking", New Delhi: Ocean Paperbacks, 2016.

Reference Books:

- Stephen E. Lucas, "The Art of Public Speaking", 3rd Edition, Singapore: McGraw-Hill, 1989.
- Sonya Hamlin, "How to Talk so People Listen", New York: Throson, 1993.
- Jeff Davidson, "The Complete Guide to Public Speaking", Manjul Books PVT. Bhopal, 2006.
- Turk, "Effective Speaking", Cristopher, Second Indian Reprint, Taylor and Francis Group, Delhi, 2010.

CO-PO & PSO Correlation

Course Name: Professional Development-II												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:		2		3		1	2					1
CO2:		1		2		1	1					
CO3:				3		2	2					1
CO4:				1		1	1					
CO5:				1		2	4					

Note: 1: Low 2.: Moderate 3: High

Computer Science and Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering)

Academic Semester V

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+T+P)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-CSE501	CSE	Elective-I	2	1	0	20	15	40	75	3
2	SOE-B-CSE502	CSE	Software Engineering	2	1	0	20	15	40	75	3
3	SOE-B-CSE503	CSE	Analysis and Design of Algorithm	2	1	0	20	15	40	75	3
4	SOE-B-CSE504	CSE	Machine Learning	2	1	0	15	10	25	50	2
5	SOE-B-CSE505	SoM	Engineering Economics	2	0	0	15	10	25	50	2
6	SOE-B-CSE506	CSE	Elective Lab I	0	0	4	0	50	25	75	2
7	SOE-B-CSE507	CSE	Software Engineering Lab	0	0	2	0	30	20	50	1
8	SOE-B-CSE508	CSE	Machine Learning Lab	0	0	2	0	30	20	50	1
9	SOE-B-CSE509	CSE	Algorithm Design Lab	0	0	4	0	50	25	75	2
10	SOE-B-CSE510	CSE	Project/ Case Studies	0	0	4	0	30	20	50	2
11	SOE-B-CSE511	CSE	Internship/Training/Certifications	0	0	1	0	30	20	50	2
12	SOE-B-CSE512	Humanities	Professional Development	0	0	4	0	50	25	75	2
			TOTAL	**10**	**4**	**21**	**90**	**335**	**325**	**750**	**25**

* End Semester Examination
** Progress Review Examination

Elective-I

Sr. No.	Subject Code	Board of Study	SUBJECT
1.	SOE-B-CSE501 (1)	CSE	Theory of Computation
2.	SOE-B-CSE501 (2)	CSE	Internet of Things (IoT)
3.	SOE-B-CSE501 (3)	CSE	Block Chain
4.	SOE-B-CSE501 (4)	CSE	Data Warehousing & Business Intelligence

Elective Lab-I

Sr. No.	Subject Code	Board of Study	SUBJECT
1.	SOE-B-CSE506 (1)	CSE	Internet of Things (IoT)
2.	SOE-B-CSE506 (2)	CSE	Block Chain
3.	SOE-B-CSE506 (3)	CSE	Data Warehousing & Business Intelligence
4.	SOE-B-CSE506 (4)	CSE	Android Development Lab

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Theory of Computation**	**Course Code:**		**SOE-B-CSE501(1)**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

This module introduces the theory of computation through a set of abstract machines that serve as models for computation - finite automata, pushdown automata, and Turing machines - and examines the relationship between these automata and formal languages. Additional topics beyond the automata classes themselves include deterministic and nondeterministic machines, regular expressions, context free grammars, undecidability, and the P = NP question.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the concept of abstract machines and their power to recognize the languages.
CO2	Understand the Finite state machines for modeling and solving computing problems.
CO3	Design context free grammars for formal languages.
CO4	Distinguish between decidability and undecidability.
CO5	Gain proficiency with mathematical tools and formal methods.

Syllabus:

Unit-I:

Review of mathematical preliminaries, Relations, Functions, Set Theory, Predicate and Propositional Calculus, Principle of mathematical induction/strong mathematical induction.

Unit-II:

Formal Languages, Phrase structured grammar and their classification, Chomsky hierarchy, closure properties of families of languages, regular grammar, properties of regular sets, finite automata NFA, DFA & 2DFA, FSM with output Determinism and Non determinism, FA minimization and related theorems.

Unit-III:

Context free grammar and their properties, derivation tree, simplifying CFG, unambigufying CFG, CNF and GNF of CFG, push down automata, Two-way PDA, relation of PDA with CFG, Determinism and Non determinism in PDA and related theorems.

Unit-IV:

Concept of Linear Bounded Automata, Context sensitive grammar and their equivalence; unrestricted grammars and their equivalence with TM, determinism and non-determinism in TM, TM as acceptor/generator/algorithms and related theorems, Multi tape, multi-track TM, automata with two push down store and related theorems.

Unit-V:

Introduction to Complexity theory, Introduction to recursive function theory, recursively enumerable sets, recursive sets, partial recursive sets, Russell's paradox, Church's hypothesis, post correspondence problem, undecidability and some non-computable problems.

Textbooks:

- John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", 3nd Edition, Pearson Education.
- Michael Sipser, "Introduction to the Theory of Computation", 3rd edition, Cengage Learning.
- John C Martin, "Introduction to Languages and The Theory of Computation", TMH.
- Daniel I.A. Cohen, "Introduction to Computer Theory", John Wiley.

Reference Books

- Lewish Papadimitra, "Theory of Computations", Prentice Hall of India, New Delhi.
- Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill.
- Hopcropt, Rajeev Motwani, Ullman, "Introduction to Automata Theory, Languages and Computation".

CO-PO & PSO Correlation

Course Name: Theory of Computation												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2								3	1		
CO2:	3								2	2		
CO3:			2						1	1		
CO4:	2								2	1		
CO5:		2	1						1	1		

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Internet of Things (IoT)**	**Course Code:**		**SOE-B-CSE501(2)**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables students to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand Internet of Things and its hardware and software components.
CO2	Understand Interface ,I/O devices, sensors & communication modules.
CO3	Analyze data from various sources in real-time and take necessary actions in an intelligent fashion.
CO4	Remotely monitor data and control devices .
CO5	Develop real life IoT based project using Arduino or Raspberry PI boards.

Syllabus:

Unit-I: Introduction

IoT definition, Characteristics, IoT conceptual and architectural framework, Physical and logical design of IoT, IoT enablers, Modern day IoT applications, M2M communications, IoT vs M2M, IoT vs WoT, IoT reference architecture, IoT Network configurations, IoT LAN, IoT WAN, IoT Node, IoT Gateway, IoT Proxy, IPv4 vs IPV6.

Unit-II: Sensors and actuators:

Sensor, Basic components and challenges of a sensor node, Sensor features, Sensor resolution; Sensor classes: Analog, Digital, Scalar, Vector Sensors; Sensor Types, bias, drift, Hysteresis error, quantization error; Actuator; Actuator types: Hydraulic, Pneumatic, electrical, thermal/magnetic, mechanical actuators, soft actuators.

Unit-III: IoT Architecture and components

IoT Components, Functional components of IoT, IoT service oriented architecture, IoT challenges, 6LowPAN, IEEE 802.15.4, ZigBee and its types, RFID Features, RFID working principle and applications, NFC (Near Field communication), Bluetooth, Wireless Sensor

Networks and its Applications.

Unit-IV: IoT Protocols

MQTT, MQTT methods and components, MQTT communication, topics and applications, SMQTT, CoAP, CoAP message types, CoAP Request-Response model, XMPP, AMQP features and components, AMQP frame types.

Unit-V: IoT Platforms

Arduino, Raspberry Pi Board, Other IoT Platforms; Data Analytics for IoT, Cloud for IoT, Cloud storage models & communication APIs, IoT case studies.

Text Books:

- Pethuru Raj, Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 1st edition, 2017.
- Honbu Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC press, 1st edition, 2012.
- Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 1st edition, 2014.
- Mung Chiang, Bharath Balasubramanian, Flavio Bonomi, "Fog for 5G and IoT (Information and Communication Technology Series)", Wiley series, 1st edition, 2017.
- Alan A. A. Donovan,Brian W. Kernighan, "The Go Programming Language", Addison-Wesley Professional Computing Series, 1st edition, 2015.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.

Reference Books

- David Easley, Jon Kleinberg, "Networks,Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things –Key applications and Protocols", Wiley, 2012.
- Vijay Madisetti, ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
- Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
- CunoPfister, "Getting Started with the Internet of Things", O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1
- Dr. SRN Reddy, Rachit Thukral, Manasi Mishra, "Introduction to Internet of Things: A practicalApproach", ETI Labs

CO-PO & PSO Correlation

Course Name: Internet of Things (IoT)												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**1**							**2**	**1**	**1**	
CO2:	**1**	**1**							**1**	**1**	**1**	
CO3:	**2**	**3**							**2**	**2**		
CO4:	**2**	**2**				**2**			**3**	**2**	**2**	
CO5:	**3**	**3**				**1**			**3**	**3**	**3**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Block Chain**	**Course Code:**		**SOE-B-CSE501 (3)**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

This course provides a broad overview of the essential concepts of Blockchain technology by initially exploring Bitcoin followed by the Ethereum platform to lay the foundation necessary for developing applications and programming. The students will learn about the decentralized peer-to-peer network, an immutable distributed ledger and the trust model that defines a Blockchain. This course enables you to explain basic components of a Blockchain (transaction, block, block header, and the chain), its operations (verification, validation, and consensus model), underlying algorithms, and essentials of trust (hard fork and soft fork).

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Introduce and define Blockchain, explain Blockchain types, Platforms, Components and Its Applications
CO2	Understand and explain about the various cryptography used in Blockchain along with Bitcoin Platform.
CO3	Discuss the innovation of the Smart Contract, Ethereum Blockchain, review its protocol, and explore the payment model for code execution in solidity
CO4	Discuss the concepts used in various Consensus Protocols and Blockchain Security Threats
CO5	Understand the need of Enterprise Blockchain Platforms, its features and should be able to propose Blockchain based solution for a given Use Cases.

Syllabus:

Unit-I: Introduction to Blockchain and Applications

Introduction to Blockchain and Distributed Ledger, Blockchain Properties, Types of Blockchain, Features, Blockchain Platforms, Generalized Architecture of Blockchain Platform, Applications of Blockchain

Unit-II: Blockchain Foundational Concepts & Bitcoin Platform

Bitcoin Architectures: Distributed peer-to-peer network, nodes, consensus protocol, mining: Type, Process, Bitcoin Crypto: Hashing, Digital Signatures, Wallet and

Transactions in Bitcoin.

Unit-III: Smart Contract and Ethereum Platform

Introduction Ethereum, Architecture, Smart Contracts, Elements of Smart Contracts, Ethereum Operations, Incentive Model, Transactions in Ethereum, Introduction Solidity.

Unit-IV: Consensus Protocols and Security Issues

Trust Essentials: Decentralized Systems, Consensus Protocols: Proof-of-Work (PoW), Proof-of-Stake (PoS), Delegated Proof-of-Stake (DPoS), Proof-of-Burn (PoB), Byzantine Fault Tolerance (BFT), Practical Byzantine Fault Tolerance (PBFT), Proof-of-Activity (PoA), Proof of Elapsed Time (PoET). Blockchain Security Threats, Challenges and Issues.

Unit-V: Enterprise Blockchain Platforms and Blockchain Use Cases

Introduction to Enterprise Blockchain Platforms and tools: Hyperledger, Corda, Ripple, Staler, Blockchain Use Cases in Finance and Banking, International Trade, Supply-Chain, Healthcare and Pharmaceuticals, Energy and Power, Government public services and Defense.

Text Books:

- Debjani Mohanty, "Blockchain from Concept to Execution: BitCoin, Ethereum, Quorum, Ripple, R3 Corda, Hyperledger Fabric/Saw Tooth/Indy, Multi Chain, IOTA, CoCo", BPB Publications, 2018.
- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder. "Bitcoin and cryptocurrency technologies: a comprehensive introduction". Princeton University
- Andreas M. Antonopoulos, Gavin Wood Ph.D., "Mastering Ethereum: Building Smart Contracts and DApps", O'Reilly Media, 2018
- Ashwani Kumar, "Hyperledger Fabric In-Depth Learn, Build and Deploy Blockchain Applications Using Hyperledger Fabric", BPB PUBN, 2020.
- Debajani Mohanty, "R3 Corda for Architects and Developers with Case Studies in Finance, Insurance, Healthcare, Travel, Telecom, and Agriculture", Apress, 2019

Reference Books

- Imran Bashir, "Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained", Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017
- Kenny Vaneetvelde, "Ethereum Projects for Beginners: Build Blockchain-based Cryptocurrencies, Smart Contracts, and DApps", 2018
- Andreas M. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", 1st Edition, O'Reilly Media, 2014
- Jamiel Sheikh, "Mastering Corda Blockchain for Java Developers", O'Reilly Media, 2020

CO-PO & PSO Correlation

Course Name: Block chain												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**								**3**		**1**	**2**
CO2:	**2**								**3**		**1**	**2**
CO3:	**2**	**3**	**3**						**3**	**3**	**3**	**2**
CO4:	**2**								**3**		**1**	**2**
CO5:		**3**	**3**	**1**	**1**	**2**			**3**	**1**	**1**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester :**	**V**
Name of the Course:		**Data Warehousing & Business Intelligence**	**Course Code:**	**SOE-B-CSE501(4)**
			No of Hours :	**3 Hrs. / Week**
Credits	**:**	**3**		
Max Marks	**:**	**75**		

Course Description

This course provides the student within depth knowledge of Data Warehousing principles, Data Warehouse techniques, and Business Intelligence systems. The course introduces the topics of Data Warehouse design, Extract-Transform-Load (ETL), Data Cubes, and Data Marts. Students will create Business Intelligence using Data Warehouses with several OLAP and analytical tools.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	To Critically assess the methodologies and techniques pertaining to implementing data warehouse and business intelligence solutions in order to develop effective implementation decision support strategies in disparate business contexts.
CO2	To Apply pertinent theories, methodologies and strategies to implement solutions to complex data warehousing and business intelligence problems
CO3	To Evaluate and consider data quality issues through the investigation and critical assessment of the principles and techniques relating to data extraction, cleansing, integration, and transformation
CO4	To Contextualize and research the relevance of data warehouses and business intelligence solutions in terms of meeting business requirements.

Syllabus:

Unit-I: Introduction

Data Warehousing – Introduction, Overview and Concepts: Need for data warehousing, Basic elements of data warehousing, Architecture and Infrastructure, Data Design and Data Representation, OLAP in data warehouse – ROLAP, MOLAP, HOLAP, Various Data Warehouse Schemas.

Unit-II: Introduction to Data Mining

Data Mining Primitives, Languages, and System Architectures, Knowledge Discovery in Databases (KDD), Frequent Item set Generation, Representation of Frequent Item sets, Association rule Generation, Apriority Algorithm, Tree Based Algorithms etc.

Unit-III: Classification

Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers, Bayesian Classifiers, Estimating Predictive accuracy of classification methods, Improving accuracy of clarification methods, Evaluation criteria for classification methods, Multiclass Problem.

Unit-IV: Clustering Techniques

Overview, features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitioned Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis.

Unit-V: Business intelligence

Decision Making and Decision Support Systems, Business Intelligence Concepts and Platform Capabilities, Data Visualization and Dashboard Design, Business Performance Management Systems.

Text Books:

- J. Han, M. Kamber, "Data Mining: Concepts and Techniques", 2nd Edition, Morgan Kaufmann, 2006.
- Arun K Pujari, "Data Mining Techniques", University Press.

Reference Books:

- W. H. Inmon, "Building the Data Warehouse", 3rd edition.
- Anahory, Murray, "Data warehousing in the real world", Pearson Education/Addison Wesley.
- Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Published by Prentice Hall.

CO-PO & PSO Correlation

Course Name: Data Warehousing & Business Intelligence												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1	2	1			1			1	2		
CO2:	1	2				1			1	2		
CO3:	1	2	1			1			1	2		
CO4:	1		2			1			1	2		

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Software Engineering**	**Course Code:**		**SOE-B-CSE502**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

This course offers lectures, tutorials, case studies, laboratory, and online interaction to provide a foundation in software engineering concepts. It includes representing information with the traditional and modern approaches in software engineering including knowledge of CASE tools. This course further explains concepts of software development process, agile, scrum and DevOps development process, software project management, software requirement and design engineering, development, quality assurance, automated testing, operational support and software maintenance.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
CO2	Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
CO3	Understand Agile, Scrum and DevOps Methodologies in software development projects.
CO4	Will have experience and/or awareness of testing problems and will be able to develop test-cases and testing report.
CO5	Understand the techniques for estimation, design, testing and quality management of large software development projects.

Syllabus:

Unit-I: Introduction Software Engineering

Introduction to Software Engineering. Problems and challenges, Software Development Life Cycle, Software engineering Tools, Software process models.

Unit-II: Software Standards and Project Management

Introduction to Software Engineering Standards, Software Project Management Project management and Software metrics, Agile Methodology, Scrum Framework, Scrum in Agile.

Unit-III: Software Requirement and Design

Requirements engineering, Requirements specification: Functional and non-functional requirements, Requirements analysis, verification and validation Introduction to Software design principles, Microservices architecture style, software modelling and UML.

Unit-IV: Software Implementation, Testing and Quality Assurance

Implementation issues, testing concepts, Test-driven development, Manual Testing Vs Automated Testing, Testing Tools, Quality Assurance and Risk Management.

Unit-V: Software Operation Support and Maintenance

Introduction to DevOps, DevOps practices and adoption, container, orchestration system, DevOps automation, Support and Issue tracking systems.

Text Books:

- Ian SomMerville, "Software Engineering", 9th edition, Pearson Edu, 2010
- Roger P, "Software Engineering – A Practitioner's Approach", 7th edition, Pressman, 2010.
- Grady Booch, James Rambaugh, Ivar Jacobson, "The unified modeling language user guide", 2nd Edition, Pearson Education, 2005.
- Roman Pichler, "Agile Product Management with Scrum: Creating Products that Customers Love", Addison-Wesley Professional, 2010.
- Gene Kim, Jez Humble, Patrick Debois, John Willis, "The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations", 2016.

Reference Books:

- Hans Van Vliet, "Software Engineering: Principles and Practices"–, 2008.
- Richard Fairley, "Software Engineering Concepts", 2008.
- James F. Peters, Witold Pedrycz, John Wiley, "Software Engineering, an Engineering approach".
- Kenneth S. Rubin, Addison-Wesley, "Essential Scrum: A Practical Guide to the Most Popular Agile Process", 2012
- Emily Freeman, "DevOps for Dummies", Wiley, 2019
- Joakim Verona, "Practical DevOps", Packt Publishing, 2016

CO-PO & PSO Correlation

Course Name: Software Engineering												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1	3	1			1			2	2	1	1
CO2:	1	2							1		1	
CO3:	2	2				1			1		1	1
CO4:	1	2	1			1			1	1	1	1
CO5:	2	3				2			1	2	2	2

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Analysis and Design of Algorithm**	**Course Code:**		**SOE-B-CSE503**
			No of Hours :		**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description

Algorithms are the soul of computing. This course introduces basic methods for the design and analysis of efficient algorithms emphasizing methods useful in practice. Different algorithms for a given computational task are presented and their relative merits evaluated based on performance measures.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Analyse the performance of algorithms.
CO2	Choose appropriate algorithm design techniques for solving problems
CO3	Understand how the choice of data structures and the algorithm design methods impact the performance of programs.

Syllabus:

Unit-I Introduction:

Algorithm, Properties, Representations of Algorithms and Testing Algorithms, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notations-Big Oh Notation, Omega Notation, Theta Notation and Little Oh Notation, Limiting Behaviors of Asymptotic Notations, Solving Recurrence Relations-Substitution Method, Master Method and Recursion Tree Methods.

Unit-II:

Disjoint Sets, Spanning Trees, Connected and Biconnected Components: Disjoint set operations, Union and find algorithms, spanning trees, connected components and biconnected components.

Unit-III: Divide and Conquer:

General method, Application- Binary Search, Quick Sort, Merge Sort, Strassen's Matrix Multiplication. Greedy Method: General Method, Applications-0/1 Kpsack Problem, Job Sequencing with Deadlines, Minimum Cost Spanning Trees, Single source shortest path problem.

Unit-IV: Dynamic Programming:

General Method, Applications-Matrix Chain Multiplication, Optimal Binary Search Trees, 0/1 Knapsack Problem, all pair shortest path problem, Travelling salesman problem.

Unit-V: Backtracking:

General Method, Applications- n – queen's problem, Sum of subsets problem, Graph Coloring, Hamiltonian Cycle Np-Hard and NP-Complete Problems: Basic Concepts, Non-Deterministic Algorithms, NP-Hard and NP-Complete Classes, Cock's Theorem

Text Books:

- Ellis Horowitz, Sartaj Sahni, S. Rajasekharan, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.
- T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to Algorithms", 3rd Edition, PHI.
- P. H. Dave, H.B. Dave, "Design and Analysis of Algorithms, 2nd edition, Pearson Education.

Reference Text Books:

- M. T. Goodrich and R. Tomassia, "Algorithm Design: Foundations, Analysis and Internet examples", John Wiley and sons.
- S. Sridhar, "Design and Analysis of Algorithms", Oxford Univ. Press.
- Aho, Ullman, Hopcroft, "Design and Analysis of algorithms", Pearson Education.
- R. Neapolitan and K. Imipour, "Foundations of Algorithms", 4th edition, Jones and Bartlett Student edition.

CO-PO & PSO Correlation

Course Name: Analysis and Design of Algorithm												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2	3				2			3	3	2	1
CO2:	2	2				2		1	3	2	2	2
CO3:	2	2	2			2			3	2	2	2

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Machine Learning**	**Course Code:**		**SOE-B-CSE504**
Credits	**:**	**2**	**No of Hours :**		**2 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description

Machine learning is the science of getting computers to act without being explicitly programmed. In the past decade, machine learning has given us self-driving cars, practical speech recognition, effective web search, and a vastly improved understanding of the human genome. Machine learning is so pervasive today that you probably use it dozens of times a day without knowing it. This course provides a broad introduction to machine learning. The course will also draw from numerous case studies and applications, so that you'll also learn how to apply learning algorithms to building smart robots (perception, control), text understanding (web search, anti-spam), computer vision, medical informatics, audio, database mining, and other areas.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Use and Understand techniques, mathematical concepts, and algorithms used in machine learning.
CO2	Design and implement machine learning solutions to classification, regression, and clustering problems
CO3	Evaluate and interpret the results of the algorithms.

Syllabus:

Unit-I: Regression Models

Linear Regression: model representation, model learning, data preparation, multi-collinearity problem: detection and correction, assumptions, simple linear regression: coefficient estimation: correlation and gradient descent method, least square method: coefficient calculation, normal distribution, testing for linearity requirement. Polynomial Regression: Introduction, choosing the right degree, moderation. Coefficient of Determination, Base line model, Basic Characteristics (R2), Fraction of Variance Unexplained (FVU), adjusted R2, bias and variance, Regularization L1 and L2, Ridge Regression, Lasso Regression, sparsity, Regression Result Interpretation- Residuals, Coefficients, State the Hypotheses, S-Value (Standard Error of the Estimate), T-Test, P-value, Residual Standard Error, F-Statistic.

Unit-II: Model Assessment and Selection

Model complexity, Bias-Variance trade-off, a closer look at confusion matrices, the kappa statistic, Sensitivity and specificity, Precision and recall, The F-measure, the effective number of parameters, Visualizing performance: ROC curves, The holdout method, Cross-validation, Bootstrap sampling.

Unit-III: Supervised Learning

Supervised Learning: Logistic regression, logit function, polynomial logistic regression, cut off, likelihood, LL, performance evaluation: confusion matrix, error rate, equal cost, unequal cost, Null deviance, Residual deviance, Akanke Information Criterion (AIC), F-1 measure, over sampling, multiclass classification (Multinomial Classification), softmax function, cross entropy, loss function.

Unit-IV: Unsupervised Learning

Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Measuring similarity with distance, choosing an appropriate k, Locally Weighted Regression, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Unit-V: Decision tree and Bayesian Learning

Decision Tree learning – Introduction, Decision tree representation, divide and conquer, choosing the best split, pruning, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Issues in decision tree learning

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypothesis for predicting probabilities, Bayes optimal classifier, Naïve Bayes classifier, an example learning to classify, training, performance evaluation.

Text Books:

- Tom Mitchell, “Machine Learning”, 1st Edition, McGraw- Hill, 1997.
- Brett Lantz, “Machine Learning with R”, 2nd edition, PACKT
- Gareth James, “An Introduction to Statistical Learning”, Springer
- Christopher M. Bishop, “Pattern Recognition and Machine Learning (Information Science and Statistics)”, Springer.

Reference Books

- Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, “Foundations of Machine Learning (Adaptive Computation and Machine Learning series)”, MIT Press.
- Ethen Alpaydin, “Introduction to Machine Learning”, 2nd edition.
- Luis Pedro Coelho,“Building Machine Learning System with Python”, PACKT

- Yanchang Chao, "Data Mining Applications with R", Elsevier
- Luis Torgo, "Data Mining with R case studies", CRC Press

CO-PO & PSO Correlation

Course Name: Machine Learning												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**3**				**2**			**3**	**2**	**2**	**1**
CO2:	**3**	**3**				**2**			**3**	**2**	**2**	**2**
CO3:	**3**	**3**			**1**	**2**			**3**	**2**	**2**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme :	**B. Tech**	**Semester** :	**V**
Name of the Course:	**Engineering Economics**	**Course Code:**	**SOE-B-CSE505**
Credits :	**2**	**No of Hours :**	**2 Hrs. / Week**
Max Marks :	**50**		

Course Description

This course focuses on economic and cost analysis of engineering projects, along with insights on modern techniques and methods used on economic feasibility studies relating to design and implementation of engineering projects.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Relate the insights of economics with engineering
CO2	Develop decision making of future projects at present time
CO3	Understand the essence and effect of macroeconomic policies in their respective profession.

Syllabus:

Unit-I: Introduction

Introduction to Engineering Economy, Time value of money, Cash flow diagrams, Interest and Interest rate, discrete compounding and payment.

Unit-II: Equivalence Analysis

Principle of equivalence, Present worth, annual equivalent, future worth, internal rate of return, Methods of comparison of alternatives: Capitalized equivalent amount, capital recovery with return.

Unit-III: Asset life

Replacement analysis, Economic life of the asset, Depreciation and Depletion.

Unit-IV: Cost Analysis

Elements of cost, Break even analysis, Economic order quantity. Decision under risk and uncertainty.

Unit-V: Macroeconomic Policy

Fiscal Policy and decision making in India, Monetary policy, IS – LM Model, Inflation, Deflation and Stagflation.

Text Books:

- De Garmo, Sullivan, Canada, "Engineering Economy, Collier Macmillan.
- Blank, Tarquin, "Engineering Economy", McGraw-Hill.

Reference Books

- Dr. H L Ahuja, "Macroeconomics, Theory and Policy", S. Chand.

CO-PO & PSO Correlation

Course Name: Engineering Economics												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:		**2**				**2**		**2**	**1**	**1**	**1**	
CO2:		**2**				**2**		**1**	**2**	**2**		**1**
CO3:		**1**				**1**		**1**		**1**	**1**	**1**

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**V**
Name of the Course	:	**Internet of Things (IoT) Lab**	**Course Code:**		**SOE-B-CSE506 (1)**
Credits	:	**2**	**No of Hours**	:	**4 Hrs. / Week**
Max Marks	:	**75**			

Course Descriptions:

This course will describe the market around the Internet of Things (IoT), the technology used to build these kinds of devices, how they communicate, how they store data, and the kinds of distributed systems needed to support them. Divided into four modules, we will learn by doing. We will start with simple examples and integrate the techniques we learn into a class project in which we design and build an actual IoT system. The client will run in an emulated ARM environment, communicating using common IoT protocols with a cloud enabled backend system.

Course Objectives:

- Understand the IoT using Arduino programming.
- Explain the interfacing of data, I/O devices with Arduino UNO.
- Describe the digital protection schemes in power system relays.

Course Outcomes:

CO Number	Course Outcome
CO1	Understand the importance of internet of things in present scenario
CO2	Describe the interfacing of IoT with arduino.
CO3	Design of direct and alternating type of electrical instruments using Arduino.
CO4	Analyze the protection schemes of induction motor against over current and under voltage.

The following concepts will be covered in the lab:

Design a Digital DC Voltmeter and Ammeter to measure the voltage and current in DC electrical circuits using Arduino and display the values in LCD display, design a Digital AC Voltmeter and Ammeter to measure the voltage and current in AC electrical circuits using Arduino and display the values in LCD display, Digital frequency meter to measure the frequency in any AC electrical circuit using Arduino and display the values in LCD display, Measure the power and energy in electrical circuit using Arduino and display the values in LCD display, Measure the phase shift and power factor in an electrical circuit for different loads using Arduino and display the value in LCD display, Design an over current relay for distribution system and displaying the tripping status of the relay in substation through IOT, Design a system to protect home appliances from over and under voltages using Arduino, Design a system for protecting the three phase induction motor from over voltages, over currents, temperature and displaying the status of the motor at

remote location using IOT, Design a traffic control system using IOT.

Additional Experiments

Design a railway gate control using stepper motor using IOT, Control the speed and direction of a DC motor using Arduino and display the status of the motor at the remote location using IOT.

Reference Books:

- Mark torvalds, "Arduino Programming: Step-by-step guide to mastering arduino hardware and software (Arduino, Arduino projects, Arduinouno, Arduino starter kit, Arduino ide, Arduinoyun, Arduino mega, Arduinonano) Kindle", 2nd Edition, 2001
- Michael J Pont, "Embedded C", 2nd Edition, Pearson Education, 2008.

CO-PO & PSO Correlation

Course Name: Internet of Things (IoT) Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1	1	1	2					1	2	2	
CO2:	2	2	2	3					2	2	2	
CO3:	1		2						1		3	
CO4:	1									1	2	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course	**:**	**Block Chain Lab**	**Course Code:**		**SOE-B-CSE506 (2)**
Credits	**:**	**2**	**No of Hours :**		**4 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description:

This course is a dive into blockchain technology to understand the history and basics as well as explain its various components and commercially available implementations. The objective is to educate the reader about the technology details so they can develop A perspective about its application to specific Advertising Technology use cases, an understanding of the technology choices available and understanding of business and operational implications of implementing a blockchain solution.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Describe the basic concepts and technology used for blockchain.
CO2	Describe the primitives of the distributed computing and cryptography related to blockchain.
CO3	Illustrate the concepts of Bitcoin and their usage.
CO4	Implement Ethereum block chain contract.
CO5	Apply security features in blockchain technologies.
CO6	Use smart contract in real world applications.

The following concepts will be covered in the lab:

- Install and configure Block chain Development tools.
- Develop enterprise-grade smart contract-based DApps using solidity on Ethereum.
- Design and develop enterprise blockchain solutions using Hyperledger Fabric and Composer.
- Demonstrate the uses of Hyperledger Indy, Aries, and Ursa to solve digital identity in a distributed environment.
- Design and deploy private blockchain for industrial use cases.
- Develop, Debug, Deploy and Run sample applications on Corda R3.

Reference Books

- Imran Bashir, “Mastering Blockchain - Distributed ledgers, decentralization and smart contracts”, Packt Publishing Ltd, Second Edition, ISBN 978-1- 78712-544-5, 2017
- Kenny Vaneetvelde, “Ethereum Projects for Beginners: Build Blockchain-based Cryptocurrencies, Smart Contracts, and DApps”, 2018
- Andreas M. Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”, 1st Edition, O'Reilly Media, 2014

- Jamiel Sheikh, Mastering Corda Blockchain for Java Developers,O'Reilly Media, 2020

CO-PO & PSO Correlation

Course Name: Blockchain Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**2**							**1**	**2**	**1**	1
CO2:	**1**	**2**							**1**	**2**		2
CO3:	**1**	**2**							**1**	**2**		
CO4:	**1**	**2**				**1**			**1**	**2**	2	
CO5:	**1**	**3**	**2**							**2**	1	2
CO6:	**1**	**2**	**2**			**2**				**3**	2	2

Programme :	**B. Tech**	**Semester :**	**V**
Name of the Course:	**Data Warehousing & Business Intelligence Lab**	**Course Code:**	**SOE-B-CSE506 (3)**
		No of Hours :	**4 Hrs. / Week**
Credits :	**2**		
Max Marks:	**75**		

Course Description

This course provides the student within depth knowledge of Data Warehousing principles, Data Warehouse techniques, and Business Intelligence systems. The course introduces the topics of Data Warehouse design, Extract-Transform-Load (ETL), Data Cubes, and Data Marts. Students will create Business Intelligence using Data Warehouses with several OLAP and analytical tools.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Design and implement OLTP, OLAP and Warehouse concepts
CO2	Design and develop Data Warehouse using Various Schemas & Dimensional modelling
CO3	Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data.
CO4	Report the usable data by using various reporting concepts, techniques/tools, and use charts, tables for reporting in BI
CO5	Use Analytics concepts like data mining, Exploratory and statistical techniques for predictive analysis in Business Intelligence.
CO6	Demonstrate application of concepts in BI

The following concepts will be covered in the lab:

- Building Data Warehouse and Explore WEKA
- Performing data preprocessing tasks and performing association rule mining on data sets
- Performing classification on data sets
- Performing clustering on data sets
- Performing Regression on data sets

Reference Books:

- W. H. Inmon, "Building the Data Warehouse", 3rd edition.
- Anahory, Murray, “Data warehousing in the real world”, Pearson Education/Addison Wesley.
- Margaret Dunham, “Data Mining: Introductory and Advanced Topics”, Published by Prentice Hall.

CO-PO & PSO Correlation

Course Name : Data Warehousing & Business Intelligence Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**2**	**2**						**1**	**2**		
CO2:	**1**		**2**						**1**			
CO3:	**1**		**2**						**1**			
CO4:		**2**	**1**						**2**			
CO5:		**2**	**1**						**2**			1
CO6:	**1**	**2**	**1**						**2**			1

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Android Development Lab**	**Course Code:**		**SOE-B-CSE506 (4)**
Credits	**:**	**2**	**No of Hours :**		**4 Hrs. / Week**
Max Marks	**:**	**75**			

Course Descriptions:

The laboratory augments the lecture course in android development by providing experience with android programming techniques. The laboratory introduces basic concepts and tools required for development of android applications.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Design simple android application.
CO2	Design simple android application with textboxes and buttons
CO3	Designing application using different layouts
CO4	Design android application with fragments
CO5	Designing application for storing data in firebase

The following concepts will be covered in the lab:

- Implementation of simple android application with hello world
- Implementation of android application to store details of employee using text boxes and buttons.
- Implementation of android application with linear, relative and grid layouts
- Implementation of android application to store details of employee using text boxes and buttons.
- Implementation of android application for marriage portal with firebase as backend database.

Reference Books:

- Michael Burton , “Android App Development for Dummies”, 3rd Edition, 2015.
- John Horton, “Android Programming for Beginners - Second Edition: Build in-depth, full-featured android 9 Pie apps starting from zero programming experience”, McGraw-Hill, 2nd Edition, 2018.
- Raju Gandhi , “Head First Git: A Learner's Guide to Understanding Git from the Inside Out”, 1st edition, 2022.

CO-PO & PSO Correlation

Course Name: Android Development Lab												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1	1	2	2		2	2		1	2	2	
CO2:	3	3	2	2		1			2	2	2	
CO3:			3					1			3	
CO4:	1				2			3			2	
CO5:	1		2		2			3			2	

Programme	:	**B. Tech**	**Semester :**	**V**
Name of the Course	:	**Software Engineering Lab**	**Course Code:**	**SOE-B-CSE507**
Credits	:	**1**	**No of Hours :**	**2 Hrs./Week**
Max Marks	:	**50**		

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Apply the techniques for estimation, design, testing and quality management of large software development projects.
CO2	Convert software requirements into system design for a given problem domain.
CO3	Use various software tools and methodologies throughout the software project.
CO4	Manage any software project.
CO5	Plan and execute manual and automated testing using testing tools.
CO6	Work with support and issue tracking systems.

The following concepts will be covered in the lab:

- Study of SRS document
- UML diagrams
- Use case diagram
- Writing test cases
- Sequence diagrams
- Testing strategies
- Case studies

Reference Books:

- Hans Van Vliet, “Software Engineering: Principles and Practices”–, 2008.
- Richard Fairley, “Software Engineering Concepts”, 2008.
- James F. Peters, “Software Engineering, an Engineering approach”, Witold Pedrycz, John Wiley.
- Kenneth S. Rubin, “Essential Scrum: A Practical Guide to the Most Popular Agile Process”, Addison-Wesley, 2012
- Emily Freeman, “DevOps for Dummies”, Wiley, 2019
- Joakim Verona, “Practical DevOps”, Packt Publishing, 2016

CO-PO & PSO Correlation

Course Name : Software Engineering Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1	2	2			1			1	2		
CO2:	1	2	2						1	2		
CO3:	1	2				1			1	2		
CO4:	1			2	2				1		2	
CO5:	1	2							1			1
CO6:		1	2							2	1	

Note: 1.: Low 2.: Moderate 3.: High

Programme :	**B. Tech (01UG020)**	**Semester :**	**V**
Name of the Course:	**Machine Learning Lab**	**Course Code:**	**SOE-CSE-508**
		No of Hours :	**2 Hrs. /Week**
Credits :	**1**		
Max Marks :	**50**		

Course Descriptions:

The laboratory augments the lecture course in Machine Learning (ML) by providing experience with different programming techniques. The laboratory introduces Commonly used ML algorithms for various application domains.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Explain machine learning techniques, its characteristics and its application areas
CO2	Select and apply appropriate algorithms and ML techniques to solve complex problems
CO3	Solve different classification and regression problems using various supervised learning algorithms
CO4	Apply clustering algorithms to real life datasets

The following concepts will be covered in the lab:

- Import and basic analysis of datasets available in public repositories
- Different types of data handling tools and techniques, introduction to useful python libraries
- Implementation of TSP using heuristic approach
- Implementation of Simulated Annealing Algorithm
- Implementation of Hill-climbing to solve 8- Puzzle Problem
- Implementation of Data classification using Naïve Bayes classifier
- Implementation of Data classification using K-Nearest Neighbor classifier
- Implementation of K-Means Clustering Algorithm
- Implementation of Hierarchical Clustering Algorithm
- Implementation of Linear Regression

Reference Books:

- S. Russel, P. Norvig, "Artificial Intelligence – A Modern Approach", 2nd Edition, Pearson Education
- Mark Fenner, "Machine Learning with Python for Everyone", Pearson

- David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.
- Saikat Dull, S. Chjandramouli," Machine Learning", Das, Pearson
- R. O. Duda, P. E. Hart, D.G. Stork, "Pattern Classification", John Wiley, 2001
- G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem-solving", 4th Edition, Pearson Education.
- J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

CO-PO & PSO Correlation

Course Name: Machine Learning Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**	**2**					**1**	**2**	**2**	
CO2:	**3**	**3**	**2**	**2**					**2**	**2**	**2**	
CO3:			**3**								**3**	
CO4:	**1**				**2**						**2**	

Note: 1.: Low 2.: Moderate 3.: High

Programme :	**B. Tech**	**Semester :**	**V**
Name of the Course:	**Algorithm Design Lab**	**Course Code:**	**SOE-B-CSE-509**
Credits :	**2**	**No of Hours :**	**2 Hrs. / Week**
Max Marks :	**75**		

Course Description:

The lab experiment in this course is designed to introduce the principle techniques and practices required to understand the given problem and design the algorithm for solving the problem. It includes the study of various algorithmic design aspects to design algorithm in an efficient manner.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Analyze and estimate the time and space complexities of the algorithm.
CO2	Identify the computational issues and apply suitable algorithms to solve it effectively.
CO3	Conceptualize and design efficient and effective algorithmic solutions for different real-world problems.
CO4	To learn use of divide and conquer techniques and their application to solve the problems.
CO5	To learn use of greedy and dynamic programming techniques and their application in the field of computer science to solve problems.

The following concepts will be covered in the lab:

- Provide algorithms and programs to implement the following searching procedures.
  - Linear search
  - Binary search

  Discuss the detailed analysis of the developed algorithm.

- Implementation of Sorting algorithm like Quick sort, Heap Sort, Merge sort etc. and computation of its time complexity. Run the program for varied values of n> 5000, and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator.
- Implementation of divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
- Implementation of ,0/1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.
- Implementation of Dijkstra's algorithm to find shortest paths from a given vertex in a weighted connected graph.

- Implementation of finding Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm.
- Implementation of Prim's algorithm to find Minimum Cost Spanning Tree of a given connected undirected graph.
- Implementation of All-Pairs Shortest Paths problem using Floyd's algorithm.
- Implementation of Travelling Sales Person problem using Dynamic programming.

- Implementation of finding all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.

Text Books:

- T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to Algorithms", 3rd Edition, PHI.
- P. H. Dave, H.B. Dave, "Design and Analysis of Algorithms", 2nd edition, Pearson Education.

Reference Text Books:

- M. T. Goodrich and R. Tomassia, "Algorithm Design: Foundations, Analysis and Internet examples", John Wiley and sons.
- S. Sridhar, "Design and Analysis of Algorithms", Oxford Univ. Press.
- Aho, Ullman and Hopcroft, "Design and Analysis of algorithms", Pearson Education.
- R. Neapolitan and K. Imipour, "Foundations of Algorithms", 4th edition, Jones and Bartlett Student edition.

CO-PO & PSO Correlation

Course Name: Analysis and Design of Algorithm Lab												
	Program Outcomes								**PSOs**			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1	1	2	2					1	2	2	
CO2:	2	2	2	2					2	2	2	
CO3:			1								3	
CO4:	1										2	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**V**
Name of the Course:		**Project/ Case Studies**	**Course Code:**		**SOE-B-CSE510**
Credits	**:**	**2**	**No of Hours :**		**2 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description:

The project work can be an investigative analysis of a technical problem in the relevant area, planning and/or design project, experimental project or computer application based project on any of the topics. Each project group will submit project synopsis by the end of eighth semester. Project evaluation committee consisting of three or four faculty members specialized in the various fields shall study the feasibility of each project work before giving consent.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	gain in-depth knowledge and use adequate methods in the major subject/field of study.
CO2	create, analyze and critically evaluate different technical/research solutions.
CO3	clearly present and discuss the conclusions as well as the knowledge and arguments that form the basis for these findings
CO4	identify the issues that must be addressed within the framework of the specific dissertation in order to take into consideration
CO5	apply principles of ethics and standards, skill of presentation and communication techniques.

Contents

Project work is of duration of one semesters and is expected to be completed in the eighth semester. Each student group consisting of not more than four members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project batches are expected to fix their topics, complete preliminary studies like literature survey, field measurements etc. in the seventh semester.

Student shall study the topic of project work and define problem statement. The student shall evolve design and/or do experimental study and/or fabricate engineered device to obtain solution to the identified problem. The student shall prepare a report and shall present a seminar on the basis of work done at the end of semester.

CO-PO/PSO Mapping

CO Number	Program Outcome								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	3	2	2	2	-	2	2	2	3	2	3	2
CO2	3	2	1	1	1	1	1	2	2	3	2	3
CO3	1	2	1	3	2	-	-	1	1	3		3
CO4	1	1	1	-	1	-	3	2	1	2	1	2
CO5	-	1	-	3	2	-	3	1	1	3	2	3

Note: 1: Low 2: Moderate 3: High

Programme	:	**B. Tech**	**Semester** :	**V**
Name of the Course	:	**Internship/Training/ Certification**	**Course Code:**	**SOE-B-CSE511**
			No of Hours :	**2 Hrs. / Week**
Credits	:	**2**		
Max Marks	:	**50**		

Course description:

As a part of the B. Tech CSE curriculum, Industrial Training and seminar is a Practical course, which the students of CSE should undergo in reputed Private / Public Sector / Government organization / companies as industrial training of minimum four weeks to be undergone by the student in the summer vacation of the V semester.

Course Outcomes (COs)

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

CO Number	Course Outcome
CO1	To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions
CO2	To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university.
CO3	To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society
CO4	To set the stage for future recruitment by potential employers.

Procedures:

- Call up the company first before sending out the application letters.
- Find out whether there is a vacancy for industrial trainees.
- If the company has vacancies, you have to ask for the person in charge. The person in charge may be from the HR department, training department, or any other departments of the company.
- Try to get the name of the person so that you can address the letter to the person in charge correctly in your application letter.
- Choose a company and Send the application letter received from your departmental training in-charge to the company directly.
- Wait for the company's response.
- If you don't get a response from the company within about 2 weeks or so, give them a call and enquire on your application status.
- It is your responsibility to contact and follow-up with the company of your choice.
- If you are not getting the company for training, immediately contact your training in-

charge.

Note:

- Presentation will take place the following week after you complete your training. The presentation is evaluation by your class in-charge and a panel.
- Report must be submitted during presentation. The report evaluation is done by your class in-charge.
- A Viva voce comprising comprehensive questions based on your presentation and training undergone will be put forth after your presentation.

Grading:

The training is graded based on:
Presentation: 25%
Student's reports: 30%
Viva voce: 25%
Student's Attendance: 20%

CO-PO/PSO Mapping

Course Outcome	Program Outcome								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	2	2	-	3	3	3	2	2	2	2	3	3
CO2	2	2	1	2	2	2	2	2	1	2	2	2
CO3	2	1	2	2	1	1	2	2	1	2	2	1
CO4	-	-	-	2	1	2	2	2	1	2	2	1

Programme	**:**	**B. Tech**	**Semester**	**:**	**5th Semester**
Name of the Course:		**Professional Development**	**Course Code:**		**SOE-B-CSE512**
Credits	**:**	**2**	**No of Hours:**		**2 Hrs. / Week**
Max Marks	**:**	**75**			

Course Descriptions:

Leadership, delegation, motivation, communication, and vision are key components that make up an effective and successful shipboard leader. As a leader, a large part of the responsibility is anticipating issues and implementing directives and standard operating practices. Managerial Skills course is designed to blend theoretical and practical skills necessary to be an effective shipboard leader. Students will learn tools and management techniques to manage workload and resources, assess situations and manage risk within a team environment. This course covers self-awareness, communication theory, listening and nonverbal, interpersonal problem-solving, stress and stress management, persuasion and influence, oral presentations, and meetings and interviews.

Course Outcomes

Students will be able to

CO Number	Course Outcome
CO 1	Distinguish between leadership and management, recognize their own leadership style.
CO 2	Identify and understand various approaches in leading others
CO 3	Employ key competencies of visioning, aligning, delegation, motivating and inspiring others
CO 4	Recognize the need for collective problem solving and apply appropriate techniques
CO 5	Understand time pressures and the need for time management; and apply core management skills and techniques to deliver results

Syllabus:

Unit-I: Management and Managerial Skills:

Management- Meaning, Nature and Concept of Management, Function of Management- Planning, Organizing, Staffing and Controlling, Importance of Management, Role of Managers in Organization, Managerial Skills.

Unit–II: Leadership and Decision-Making Skills:

Leadership, Qualities of a Good Leader, Leadership Styles, Concept of Decision Making- Importance of Decision making, Decision making Process, Decision making Techniques.

Unit–III: Problem-Solving Skills:

Problem-solving, Concept of Problem-solving, Process of Problem-Solving, Techniques for Problem-Solving, Challenges in Generating Creative Ideas.

Unit–IV: Team Building and Time Management:

Team building, Developing Teams and Team Work, Leading Team, Team Membership, Time Management, Steps and Techniques of Time Management, Importance of Time Management.

Unit-V: Empowerment and Delegation:

Empowering and Delegating: Meaning of Empowerment, Dimensions of Empowerment, how to Develop Empowerment, Inhibitors of Empowerment, Delegating Works.

Text Books:

- Arbinger Institute, "Leadership and Self-Deception", 2nd Edition, Berrett-Koehler Publishers; 2010, ISBN: 978-1576759776.
- E.H. McGrawth, "Basic Managerial skills for all", Prentice Hall India Pvt Ltd, 2006.
- Atul John Rego, "How to develop a pleasing personality, Better yourself bools", Mumbai, 2006.

Reference Books:

- Dr. Ujjawal Patni, Dr. Pratap Deshmukh, "The Powerful Personality", Fusion Books, 2006.
- Bennis, Warren, "On Becoming a Leader", Rev. ed. Cambridge, Mass.: Perseus, 2003.
- Bennis, Warren, Joan Goldsmith, "Learning to Lead: A Workbook on Becoming a Leader" 3rd edition, Cambridge, Mass.: Perseus, 2003.
- Bellman, Geoffrey M., "Getting Things Done When You Are Not in Charge", Berrett-Koehler Publishers, 2001.
- Jeff Gold, Richard Thorpe, Alan Mumford, "Gower handbook of leadership and management development".

CO-PO & PSO Correlation

Course Name: Professional Development												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:		**2**		**3**		**1**	**2**					**1**
CO2:		**1**		**2**		**1**	**1**					
CO3:				**3**		**2**	**2**					**1**
CO4:				**1**		**1**	**1**					

Note: 1: Low 2.: Moderate 3: High

Computer Science and Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering)

Academic Semester VI

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P) /2 (L+T+P)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-CSE601	CSE	Computer Networks	2	1	0	20	15	40	75	3
2	SOE-B-CSE602	CSE	Big Data & Cloud Computing	2	1	0	20	15	40	75	3
3	SOE-B-CSE603	CSE	Indian Financial System	2	0	0	15	10	25	50	2
4	SOE-B-CSE604	CSE	Professional Elective-II	2	1	0	20	15	40	75	3
5	SOE-B-CSE605	SoM	Professional Elective-III	2	1	0	20	15	40	75	3
6	SOE-B-CSE606	CSE	Computer Networks Lab	0	0	2	0	30	20	50	1
7	SOE-B-CSE607	CSE	Big Data & Cloud Computing Lab	0	0	4	0	50	25	75	2
8	SOE-B-CSE608	CSE	Elective Lab II	0	0	2	0	30	20	50	1
9	SOE-B-CSE609	CSE	Elective Lab III	0	0	2	0	30	20	50	1
10	SOE-B-CSE610	CSE	MOOCS/SWAYAM/Certification/Liberal ArtS	2	0	0	0	30	20	50	2
11	SOE-B-CSE611	CSE	Project/ Case Studies	0	0	4	0	30	20	50	2
12	SOE-B-CSE612	Humanities	Professional Development	0	0	4	0	50	25	75	2
TOTAL				**12**	**4**	**18**	**95**	**320**	**335**	**750**	**25**

* End Semester Examination
** Progress Review Examination

Professional Elective-II			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE604 (1)	CSE	Compiler Design
2	SOE-B-CSE604 (2)	CSE	Deep Learning
3	SOE-B-CSE604 (3)	CSE	Cryptography and Information Security
4	SOE-B-CSE604 (4)	CSE	Industrial Internet of Things

Professional Elective-III			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE605 (1)	CSE	Dev ops and CI/CD
2	SOE-B-CSE605 (2)	CSE	Enterprise DApps and Blockchain Technologies
3	SOE-B-CSE605 (3)	CSE	Digital Image Processing
4	SOE-B-CSE605 (4)	CSE	Ethical Hacking

Elective Lab-II			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE608 (1)	CSE	Compiler Design Lab
2	SOE-B-CSE608 (2)	CSE	Deep Learning Lab
3	SOE-B-CSE608 (3)	CSE	Cryptography and Information Security Lab
4	SOE-B-CSE608 (4)	CSE	IIoT Lab

Professional Elective-III			
S. No.	Subject Code	Board of Study	SUBJECT
1	SOE-B-CSE609 (1)	CSE	Dev ops and CI/ CD Lab
2	SOE-B-CSE609 (2)	CSE	Enterprise DApps and Blockchain Technologies Lab
3	SOE-B-CSE609 (3)	CSE	Digital Image Processing Lab
4	SOE-B-CSE609 (4)	CSE	Ethical Hacking Lab

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**Computer Networks**	**Course Code:**		**SOE-B-CSE601**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

This course offers lectures, tutorials, case studies, laboratory, and online interaction to provide a foundation in software engineering concepts. It includes representing information with the traditional and modern approaches in software engineering including knowledge of CASE tools. This course further explains concepts of software development process, agile, scrum and DevOps development process, software project management, software requirement and design engineering, development, quality assurance, automated testing, operational support and software maintenance.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Develop fundamental communication systems with customize requirement(s).
CO2	Design computer network as per the specifications given.
CO3	Acquire analytical ability to identify the problems area in the hardware planning of computer network with possible trouble shooting technique.
CO4	Diagnose the possible Bugs in the software application and to provide the possible trouble shoot.
CO5	Understand the basic concept to Project planning, Network planning, design, selection of hardware components and its configuration.

Syllabus:

Unit-I:

Evolution of Computer Networking-Types of Networks- networks Topologies-Protocols & Standards-Network Devices-The OSI reference model- TCP/IP Reference Model. Physical Layer: transmission media- Analog Transmission- Digital transmission, line coding scheme, switching methods (circuit switching, Packet switching), TDM.

Unit-II:

Data Link Layer – Error detection and correction, Flow control Protocols Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols, CSMA, CSMA/CD, Overview of IEEE standards

Unit-III:

Introduction to Network Layer – Services - Circuit Switching Vs Packet Switching-Packet Switched Networks-Types of Routing-routing algorithms- congestion control Algorithms-

Network Protocols-IP- IPV4, IPV6, Subnets, Gateways- Congestion Avoidance in Network Layer.

Unit-IV:

Transport Layer: Transport Layer - Design issues, connection management, Flow control, TCP window management, congestion control-slow start algorithm. TCP vs UDP Application Layer-Web and HTTP-Electronic mail-DNS, WWW.

Unit-V:

Servers: Stateful and stateless, Proxy servers, Security: Cryptography, HTTP vs HTTPS, Wireless Security, Attacks, IPsec, TLS, Case Study: Wireshark, TCP Dump, Snort Troubleshooting and the Future of Networking, Everything as a service, Cloud storage.

Text Books:

- Andrew S Tananbaum, "Computer Networks", 4th Edition, Pearson Publication
- William Stallings, "Computer Networking with Internet Protocols and Technology", Pearson's.
- Prakash C Gupta,"Data Communications and Computer Networks" 2nd Edition, PHI

Reference Books:

- Duglas E Comer, "Internetworking with TCP/IP, Principles Protocols and Architecture" 5th Edition Vol1, PHI.
- Behrouz a Forouzen, "TCP/IP Protocol Suit" 4th Edition, Tata McGraw Hills.
- Larry L Peters, Bruce S Davie, "Computer Network - a Systems Approach", 5th Edition, Morgan Kaufmabb Elsevier.
- Dimitri Betsekas Robert Gallager, "Data Networks", 2nd Edition, PHI.

CO-PO & PSO Correlation

Course Name: Computer Networks												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**1**				**3**						
CO2:	**2**	**1**				**1**			**2**	**2**		**1**
CO3:	**1**		**1**			**2**	**2**	**2**	**1**	**2**		
CO4:	**1**	**2**	**1**				**3**	**3**	**1**	**1**		**2**
CO5:	**1**	**1**				**1**				**2**	**1**	

Note: 1: Low 2.: Moderate 3: High

Programme	**: B. Tech**	**Semester**	**: VI**
Name of the Course:	**Big Data & Cloud Computing**	**Course Code:**	**SOE-B-CSE602**
Credits	**: 3**	**No of Hours**	**: 3 Hrs. / Week**
Max Marks	**: 75**		

Course Description

This course will discuss fundamental concepts and tools in computer network and communications, with emphasis on algorithm development and analysis. The course will cover study on recommended reference models and its implications. Contains of the courses as included to give a closer insight of the working behavior with verification models. The course is so designed to give foundation to the students to take up specialized courses as per the demand of the profession.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Differentiate different computing techniques
CO2	Identify the appropriate cloud services for a given application
CO3	Compare various cloud computing providers/ Software.
CO4	Analyze big data using Map Reduce

Syllabus:

Unit-I Introduction of Computing:

New Computing Paradigms & Services: Cloud computing, Edge computing, Grid computing, Utility computing, Cloud Computing Architectural Framework, Cloud Deployment Models, Virtualization in Cloud Computing, Parallelization in Cloud Computing, Security for Cloud Computing, Cloud Economics.

Unit-II Service Models:

Cloud Service Models: SaaS, IaaS, PaaS, Service Oriented Architecture, Elastic Computing, On Demand Computing, Cloud Architecture, and Introduction to virtualization. Types of Virtualizations, Grid technology, Browser as a platform, Web 2.0, Automatic systems, cloud Computing Operating System.

Unit-III

Introduction to Big Data, Challenges, 5 V's, Ecosystem; Google's Solution Vs Hadoop, Hadoop: Ecosystem, Architecture, Cluster.

Unit-IV

Introduction to Map Reduce, Information retrieval through Map Reduce, Hadoop File

System, GFS, Page Ranking using Map Reduce.

Unit-V

Case studies- Apache Spark, Machine Learning, VMware.

Text Books:

- Rajkumar Buyya, "Cloud Computing Principles and Paradigms", Wiley.
- Kai Hwang, "Distributed and Cloud Computing", Mk Publication
- Viktor Mayer-Schonberger, Kenneth Cukier, "Big Data"

Reference Books:

- George Reese, "Cloud Application Architectures", O'Reillly Publications, 2009
- Tim Mather, Subra Kumaraswamy, "Cloud Security and Privacy", O'Reilly, 2009

CO-PO & PSO Correlation

Course Name: Big Data & Cloud Computing												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**								**3**			
CO2:		**3**	**1**		**1**						**3**	**1**
CO3:		**3**			**1**					**1**	**2**	
CO4:	**1**	**3**			**1**					**1**	**2**	

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**Indian Financial System**	**Course Code:**		**SOE-B-CSE603**
Credits	**:**	**2**	**No of Hours :**		**2 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description

This course gives an introduction of the Indian Financial System to the students. It covers the capital markets and commonly used financial services.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Recall and relate Financial System, Financial Market instrument, underwriting of shares, Mutual Fund, Leasing, Credit Rating, and Hire Purchase.
CO2	Express and relate various instrument of Financial Market, Mutual Fund and distinguish between hire purchase and leasing.
CO3	Predict and apply purchasing and dealing in stock market.
CO4	Design and develop to act as a Venture Capitalist and assemble fund through Angel Investors.

Syllabus:

Unit-I:

Introducing various components of the Indian financial system: financial markets, financial institutions, financial services. Classification of the Indian financial market, characteristics and functions of the financial market, introducing the money market and capital market.

Unit-II:

Introduction to primary market, functions of primary market, Underwriting, methods of floating new issue, Principal steps of a public issue, Issue pricing, Case on IPO, what is a stock exchange? recognition of stock exchanges, listing of stocks, registration of brokers, online trading system, demutualization of stock exchanges. stock market trading, requirements for a retail investor to trade in stock market.

Unit-III:

Credit Rating, Importance of credit rating, factors affecting rating, instruments for rating, credit rating agencies and ratings, emerging avenues of rating services, Leasing, origin and development, classification, difference between Operating and Financial Lease, advantages & disadvantages of leasing, cases on leasing.

Unit-IV:

Mutual Fund, History, classification, structural arrangement, Net Asset Value, Advantages of investing in mutual funds, Venture Capital, features, scope of venture capital, methods of venture financing in India, venture capital players in India, case on venture capitalism. Angel Investing.

Text Books:

- Bhole and Mahakud, "Financial Institutions and Markets", McGraw Hill Publications.

Reference Books:

- Jeff Madura, "Financial Institutions and Markets", Cengage Publications.

CO-PO & PSO Correlation

Course Name: Indian Financial System												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:						1	1	1			1	1
CO2:		1				1	1				1	1
CO3:		2				1	1				1	1
CO4:			1			1	1				1	1

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B.Tech.**	**Semester**	**:**	**VI**
Name of the Course:		**Compiler Design**	**Course Code:**		**SOE-B-CSE604(1)**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

The aim of this course is to learn how to design and implement a compiler and also to study the underlying theories. The main emphasis is for the imperative languages. This study explains the principles, techniques and tools required in developing compilers in a systematic way; To gain an understanding on different theoretical and systems concepts from computer science coming together in building a compiler.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Design and implement of a prototype compiler.
CO2	Define a grammar for a language and validation.
CO3	Generate Three address code of a grammar.
CO4	Learn about storage allocation.
CO5	Apply various optimization techniques to produce efficient code.

Syllabus:

Unit-I:

Introduction: Introduction to Compiler, Single and Multi-Pass Compilers, Translators, Phases of Compilers, Compiler writing tools, Bootstrapping, Back patching. Finite Automata and Lexical Analysis: Role of Lexical Analyzer, Specification of tokens, Recognition of tokens, Regular expression, Finite automata from regular expression to finite automata, transition diagrams, Implementation of lexical analyzer, Tool for lexical analyzer – LEX, Error reporting.

Unit-II:

Syntax Analysis and Parsing Techniques: Context free grammars, Bottom-up-parsing and top down parsing, Top down parsing: elimination of left recursion, recursive descent parsing, Predictive parsing; Bottom Up Parsing: Operator precedence parsing, LR parsers, Construction of SLR, canonical LR and LALR parsing tables, Construction of SLR parse tables for ambiguous grammar, the parser generator – YACC, error recovery in top down and bottom up parsing.

Unit-III

Syntax Directed Translation & Intermediate code generation: Synthesized and inherited attributes, dependency graph, Construction of syntax trees, bottom up and top down evaluation of attributes, S-attributed and L-attributed definitions. Postfix notation; Three address code, quadruples, triples and indirect triples, Translation of assignment statements, control flow, Boolean expressions and Procedure Calls.

Unit-IV:

Runtime Environment: Storage organization, activation tree, activation record, allocation strategies, Parameter passing, symbol table, dynamic storage allocation.

Unit-V:

Code Optimization & Code Generation: Basic blocks and flow graphs, Optimization of basic blocks, Loop optimization, Global data flow analysis, Loop invariant computations. Issues in the design of Code generator, register allocation, the target machine and a simple code generator.

Text Books:

- Alfred V.Aho, Ravi Sethi, J. D. Ullman, "Compiler-Principles, Techniques and Tools", Addison Wesley.
- Alfred V.Aho, J.D.Ullman, "Principles of Compiler Design", Narosa Publication.

Reference Books:

- A.C. Holub, "Compiler Design in C", Prentice Hall of India.
- A.Barret William, R.M.Bates, "Compiler Construction (Theory and Practice)", Galgotia Publication
- Kakde, "Compiler Design", Galgotia Publication

CO-PO & PSO Correlation

Course Name: Compiler Design												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**3**	**2**	**1**			**1**			**2**	**2**	**1**	
CO2:		**2**	**2**			**1**			**2**	**1**	**2**	**1**
CO3:	**2**					**1**			**2**		**2**	**1**
CO4:	**1**	**2**				**1**			**2**	**2**	**1**	**1**
CO5:	**2**	**2**				**2**			**2**		**2**	**1**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**Deep Learning**	**Course Code:**		**SOE-B-CSE604(2)**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

The course will provide foundational knowledge of deep learning algorithms and get practical experience in building neural networks. It does not require an extensive math background to understand neural network. In understandable steps, this course builds from a one node neural network to a multiple feature, multiple output neural networks. All the steps are explained using working code to solve problems. After an understanding of how neural networks work and the parameters that control deep learning systems, Keras is introduced and used to simplify the building of deep learning neural networks. A convolutional deep learning neural network is built using Keras to show how deep learning is used in specialized neural networks.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the fundamentals of deep learning.
CO2	Know the main techniques in deep learning and the main research in this field.
CO3	Design and implement deep neural network systems.
CO4	Identify new application requirements in the field of computer vision.

Syllabus:

Unit-I: Course overview

What is deep learning? DL successes, Artificial intelligence, Machine learning, Learning representations from data, review of basic math's, Gradient descent.

Unit-II: Introduction to neural networks

Feed-forward networks; MLP, sigmoid units; Learning in neural networks, What's a derivative, the gradient, learning via gradient descent, Stochastic gradient descent, Chaining derivatives: The Backpropagation algorithm, bias-variance tradeoff, regularization; Activation Functions; linear, softmax, Sigmoid, tanh, RELU. 8

Unit-III: System setup for Deep Learning

Introduction to Keras, Theano, Tensor flow, and CNTK, GPU training, regularization, RLUs, dropout, batch normalization, Deep Learning methodologies, Data representations for neural networks: Scalars (0D tensors), 1D, 2D, 3D and higher dimensional tensors, Manipulating tensors in Numpy, The notion of data batches, Real-world examples of data

tensors, Vector data, Time series data or sequence data, Image data, Video data

Fundamentals of Machine Learning: Overview of Supervised learning, Unsupervised learning, Self-supervised learning, Reinforcement learning, evaluating machine-learning models, Training, validation, and test sets, Data pre-processing, feature engineering, and feature learning, Data pre-processing for neural networks, Overfitting and underfitting, Reducing the network's size, adding weight regularization, Adding dropout

Unit-IV: Deep learning for computer vision

Convolutional neural networks; The convolution operation, the max-pooling operation, Training a convnet from scratch on a small dataset, relevance of deep learning for small-data problems, Downloading the data, Building your network, Data pre-processing, Using data augmentation, Using a pretrained convent, Feature extraction, Fine-tuning, Visualizing what convnets learn, Visualizing intermediate activations, Visualizing convnet filters, Visualizing heatmaps of class activation.

Unit-V: Deep learning for text and sequences

Working with text data, One-hot encoding of words and characters, using word embedding, Recurrent Neural Networks, recurrent layer in Keras, Long-Short Term Memory (LSTM) and Gated Recurrent Units (GRU), LSTM example in Keras.

Text Books:

- Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press (2017).
- Francois Chollet, "Deep Learning with Python", 2018

Reference Books:

- AurÈlien GÈron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 2017
- Antonio Gulli, Amita Kapoor, "TensorFlow 1.x Deep Learning Cookbook", Packt publishing, 2017
- Nikhil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly Media, 2017
- Josh Patterson and Adam Gibson, "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017

CO-PO & PSO Correlation

Course Name: Deep learning												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**								**3**			**2**
CO2:	**2**					**2**			**2**			**2**
CO3:		**2**	**1**					**1**		**2**		
CO4:	**1**	**2**	**1**			**1**		**3**	**1**	**2**	**2**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme	**: B. Tech**	**Semester**	**: VI**
Name of the Course:	**Cryptography and Information Security**	**Course Code:**	**SOE-B-CSE604(3)**
		No of Hours :	**3 Hrs. / Week**
Credits	**: 3**		
Max Marks	**: 75**		

Course Description

This course will provide detailed exposure on basic security attacks, encryption algorithms, authentication techniques, web and wireless security. In addition, firewall configuration, mobile and cloud security will also be introduced.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand basic cryptographic algorithms, message, file and web authentication along with their security issues.
CO2	Identify information system requirements for both of them such as client and server.
CO3	Understand the current legal issues towards information security.
CO4	Understand about digital signatures, web security, importance of password and its management, etc.

Syllabus:

Unit-I:

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks. The Data Encryption Standard (DES), The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles.

Unit-II:

Symmetric Ciphers: Basic Concepts in Number Theory and Finite Fields: Groups, Rings, and Fields, Modular Arithmetic, the Euclidian algorithm, Finite Fields of the Form GF(p), Polynomial Arithmetic, Finite Fields of the Form GF(2n). Advanced Encryption Standard: The Origins AES, Evaluation criteria for AES, the AES Cipher. Stream cipher: Stream ciphers and RC4. Confidentiality using symmetric encryption: Placement of encryption function, traffic confidentiality, key distribution.

Unit-III:

Asymmetric (Public Key) Ciphers: Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms. Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems. Key Management-Other Public-Key Cryptosystems: Key management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography. Hash functions, Security of Hash functions and MAC, SHA, HMAC, CMAC. Digital Signatures and Authentication protocols: Digital signature, Authentication protocols, Digital signature standards.

Unit-IV:

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) Wireless Network Security:

Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security.

Unit-V:

Network Security applications: Authentication applications: Kerberos, X.509 Authentication services, Public key infrastructure. Electronic mail security: PGP, S/MIME. Overview of IP Security. Web Security: Web security considerations, SSL and TLS, Secure electronic transaction. System Security: Intruders, Intrusion detection, password management, viruses and related threats, virus counter measures, Firewall design principles, and trusted systems. E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, Combining security associations, Internet Key Exchange.

Text Books:

- William Stallings, "Cryptography and Network Security - Principles and Practice", 6th Edition, Pearson Education
- Atul Kahate, "Cryptography and Network Security", 3rd Edition, Mc Graw Hill

Reference Books:

- C K Shyamala, N Harini, Dr T R Padmanabhan, "Cryptography and Network Security", 1st Edition, Wiley India
- Forouzan Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Mc Graw Hill
- Mark Stamp, "Information Security, Principles, and Practice", Wiley India.
- WM. Arthur Conklin, Greg White, "Principles of Computer Security", TMH.
- Neal Krawetz, "Introduction to Network Security", CENGAGE Learning.
- Bernard Menezes, "Network Security and Cryptography", CENGAGE Learning.

CO-PO & PSO Correlation

Course Name: Cryptography and Information Security												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**3**	**2**	**1**						**2**			
CO2:	**2**	**2**										**1**
CO3:						**2**	**2**		**1**			
CO4:	**2**	**2**										

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**6th Semester**
Name of the Course:		Industrial Internet of Things	**Course Code:**		**SOE-B-CSE604(4)**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are the different drivers necessary for the transformation. Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems. IIoT links the automation system with enterprise, planning and product lifecycle.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Describe Industrial Internet of Things and Cyber Physical manufacturing demonstrate Cyber Physical and Cyber Manufacturing systems
CO2	Describe Architectural design patterns for industrial Internet of Things 20
CO3	Analyse AI and data Analytics for Industrial Internet of Things 20
CO4	Evaluation of Workforce and Human Machine Interaction and Application of
CO5	Understand Industrial Internet of Things

Syllabus:

Unit-I: Understanding Industrial Internet of Things (IIoT)

Industrial Internet of Things and Cyber Manufacturing Systems, Application map for Industrial Cyber Physical Systems, Cyber Physical Electronics production.

Unit-II: Modeling of CPS and CMS:

Modeling of Cyber Physical Engineering and manufacturing, Model based engineering of supervisory controllers for cyber physical systems, formal verification of system, components, Evaluation model for assessments of cyber physical production systems.

Unit-III: Architectural Design Patterns for CMS and IIoT:

CPS-based manufacturing and Industries 4.0., Integration of Knowledge base data base and machine vision, Interoperability in Smart Automation, Enhancing Resiliency in Production Facilities through CPS. Communication and Networking of IIoT.

Unit-IV: Artificial Intelligence and Data Analytics for manufacturing:

Application of CPS in Machine tools, Digital production, Cyber Physical system Intelligence, Introduction to big data and machine learning and condition Monitoring.

Unit-V: Evaluation of Workforce and Human Machine Interaction:

Worker and CPS, Strategies to support user intervention. Introduction to Advance manufacturing and Innovation Ecosystems.

Unit-VI: Application of IIoT:

Smart Metering, e-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Plant Automation, Real life examples of IIOT in Manufacturing Sector.

Text Books:

- Sabina Jeschke, Christian Brecher Houbing Song, Danda B. Rawat, "Industrial Internet of Things Cyber Manufacturing Systems", Springer
- Hakima Chaouchi, "The Internet of Things Connecting Objects to the Web" ISBN : 978-1- 84821-140-7, Willy Publications
- Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", ISBN: 978-1-119-99435-0, 2nd Edition, Willy Publications
- Jonathan Holdowsky, Monika Mahto, Michael E. Raynor, Mark Cotteleer, "Inside the Internet of Things (IoT)", Deloitte University Press

Reference Books:

- Ovidiu, Peter, "Internet of Things- From Research and Innovation to Market Deployment", River Publishers Series
- Phil Wainewright - Kevin Ashton, "Five thoughts from the Father of the Internet of Things".
- RedLion, "How Protocol Conversion Addresses IIoT Challenges", White Paper
- Dr. Guillaume Girardin, Antoine Bonnabel, Dr. Eric Mounier, 'Technologies Sensors for the Internet of Things Businesses & Market Trends 2014 -2024", Yole Development Copyrights ,2014

CO-PO & PSO Correlation

Course Name: Industrial Internet of Things												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**2**				**1**		**1**	**2**	**2**	**2**	**1**
CO2:	**1**	**1**	**2**			**1**			**1**	**2**	**2**	**1**
CO3:	**2**	**2**	**2**			**1**			**3**	**2**	**2**	**2**
CO4:	**1**		**1**			**1**				**1**	**1**	
CO5:	**1**		**1**							**1**		

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**Dev ops and CI/CD**	**Course Code:**		**SOE-B-CSE605(1)**
Credits	**:**	**3**	**No of Hours :**		**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description

This course offers lectures, tutorials, case studies, laboratory, and online interaction to develop a foundational understanding of Development and Operations (DevOps) and Continuous Integration and Continuous Delivery (CI/CD) in software engineering concepts. It covers the modern approaches, practices, and tools being used in DevOps. This course further explains concepts of CI/CD Pipeline, Git, Jenkins, Application Containerization using Docker and Kubernetes and DevOps Azure Platform including Azure Boards, Pipelines, Repos, Artifacts, Monitor and DevTest Labs. This course also covers DevSecOps including Postman and SonarQube for API testing and static code analysis respectively.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Explain the need for modern software engineering practices such as DevOps and CI/CD.
CO2	Use Git, GitFlow, Jenkins, and Azure Pipelines to create CI/CD Pipelines for a given scenario.
CO3	Explain the importance of application Containerization using Docker and Kubernetes.
CO4	Identify and discuss uses of various Azure DevOps Tools.
CO5	Explain the importance of DevSecOps and related concepts.

Syllabus:

Unit-I: Introduction to DevOps and CI/CD

Introduction to DevOps: Definition, Benefits and culture, DevOps and the application lifecycle, DevOps practices: Continuous integration and continuous delivery (CI/CD), Version Control, Agile software development, Infrastructure as code, Configuration management, Continuous Monitoring, and Logging, Communication and Collaboration Current and Future scope of DevOps.

Unit-II: DevOps CI/CD Pipeline

Managing Your Source Code with Git, Understanding the Git process and GitFlow pattern, Code isolation, Branching strategy with GitFlow, Using package manager for CI/CD, Using Jenkins, Using Azure Pipelines, Using GitLab CI

Unit-III: Containerized Applications with Docker and Kubernetes

Introduction to Docker, Installation, and configuration of Docker, Creating a Dockerfile, Building and running a container on a local machine, Building a Docker image, Instantiating a new container of an image, testing a container locally, working with Docker Hub. Kubernetes architecture, Installation, and configuration of Kubernetes, Kubernetes application deployment examples.

Unit-IV: DevOps Azure Platform

Introduction to Azure DevOps, Azure Boards, Azure Pipelines, Azure Repos, Azure Artifacts, Azure Monitor, DevTest Labs, and Azure Test Plans

Unit-V: DevSecOps

Introducing DevSecOps, InfoSec and DevOps Cultures, Methodologies for Continuous Security, Code Security, Container Security, Testing APIs with Postman, Static Code Analysis with SonarQube, DevSecOps Case Studies

Text Books:

- Mikael Krief, "Learning DevOps", Packt Publishing, Oct. 2019.
- Ashish Raj, "Demystifying Azure DevOps Services", BPB, March 2021.
- Jose Manuel Ortega Candel, "DevOps and Containers Security", BPB, March 2020.

Reference Books:

- Sjoukje Zaal, Stefano Demiliani, Amit Malik, "Azure DevOps Explained", Packt Publishing, Dec 2020.
- Donna Knapp, "DevOps Key Concepts", Addison-Wesley Professional, Jan 2022.
- Gaurav Agarwal, “Modern DevOps Practices”, Packt Publishing, September 2021.

CO-PO & PSO Correlation

Course Name: Dev ops and CI/CD												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1								3		1	2
CO2:	2								3		1	2
CO3:	2	3	3						3	3	3	2
CO4:	2								3		1	2
CO5:		3	3	1	1				3	1	1	2

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**En. DApps and Blockchain Technologies**	**Course Code:**		**SOE-B-CSE605(2)**
			No of Hours :		**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description

This advanced-level course provides a broad overview of the essential concepts of Enterprise Blockchain platforms and distributed application (Dapp) development technologies by initially exploring enterprise Ethereum and advanced features of solidity followed by the Hyperledger platform to lay the foundation necessary for developing distributed applications (DApps) for industrial use-cases. Students will learn about the Enterprise-grade Blockchain platforms such as Hyperledger Fabric, Besu, Indy, Aries, and Ursa along with consensus and smart contract-based enterprise application development using Corda R3 for regulated industries. This course also covers enterprise blockchain network configuration using Hyperledger Composer and digital identity aware private Blockchain solutions for enterprises.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Introduce and define Blockchain, explain Blockchain types, Platforms, Components and Its Applications.
CO2	Understand and explain about the various cryptography used in Blockchain along with Bitcoin Platform.
CO3	Discuss the innovation of the Smart Contract, Ethereum Blockchain, review its protocol, and explore the payment model for code execution in solidity.
CO4	Discuss the concepts used in various Consensus Protocols and Blockchain Security Threats.
CO5	Understand the need of Enterprise Blockchain Platforms, its features and should be able to propose Blockchain based solution for a given Use Cases.

Syllabus:

Unit-I: Solidity and Enterprise DApps

Introduction to Blockchain and Distributed Applications (DApps), Introduction to Solidity Programming, Solidity Common Patterns, Mathematical and Cryptographic Functions ERC Token Standard, Case Study based Industrial Enterprise Use Cases and Dapp.

Unit-II: Hyperledger: Enterprise-grade blockchain

Introduction to Hyperledger, Hyperledger Tools, Hyperledger Libraries, Introduction to Hyperledger Fabric, Hyperledger Fabric Functionalities, Hyperledger Fabric Model, Blockchain network, Identity, Mapping MSPs to Organizations, Local and Channel MSPs, MSP Levels, and Structure, Types of Peer, Private data and Ledger, Working with Chaincode, Introduction to Hyperledger Composer, Blockchain State Storage, Connection Profiles and Assets, Participants, Identities, Business Network Cards and Transactions, Queries, Events, Access Control and Historian Registries, working model of Hyperledger Composer, Case Study based Enterprise Use Cases.

Unit-III: Enterprise Private Blockchain

Enterprises, Privacy and Trade Secrets, Introduction to Hyperledger Besu, Creating Private Network, Exploring Private Networks and Privacy, Private Transactions, Case Study based Industrial Enterprise Use Cases.

Unit-IV: Distributed Identity for Enterprise Blockchain

Introduction to Identity, distributed Identity: issues and challenges, The Verifiable Credentials (VC) Model, Self-Sovereign Identity (SSI), Decentralized Identifiers (DIDs), Trust Over IP (ToIP), Zero-Knowledge Proof (ZKP) and Selective Disclosure, Hyperledger Indy, Aries and Ursa for Digital Identity, Case Study based Industrial Enterprise Use Cases.

Unit-V: Corda R3: Blockchain for regulated industries

Introduction to Regulated Framework, Pros, and Cons of Regulations, Introduction to Corda R3, Key Concepts: Corda networks and Nodes, Corda as a network of interconnected graphs, Nodes, States, Bilateral ledger, Transactions, Contracts, Commands, Timestamps, Attachments, Flows, Consensus, Notary services, Oracles, CorDapps, Corda networks and Node services, Corda Advance Concepts, Case Study based Industrial Enterprise Use Cases.

Text Books:

- Kenny Vaneetvelde, “Ethereum Projects for Beginners: Build Blockchain-based Cryptocurrencies, Smart Contracts, and DApps”, 2018
- Ashwani Kumar, “Hyperledger Fabric In-Depth Learn, Build and Deploy Blockchain Applications Using Hyperledger Fabric”, BPB PUBN, 2020
- Debajani Mohanty, “R3 Corda for Architects and Developers With Case Studies in Finance, Insurance, Healthcare, Travel, Telecom, and Agriculture”, Apress, 2019

Reference Books:

- Andreas M. Antonopoulos, Gavin Wood Ph.D., "Mastering Ethereum: Building Smart Contracts and DApps", O'Reilly Media, 2018
- Jamiel Sheikh, "Mastering Corda Blockchain for Java Developers", O'Reilly Media, 2020
- Debjani Mohanty, "Blockchain from Concept to Execution: BitCoin, Ethereum, Quorum, Ripple, R3 Corda, Hyperledger Fabric/SawTooth/Indy, MultiChain, IOTA, CoCo", BPB Publications, 2018

CO-PO & PSO Correlation

Course Name: En. DApps and Blockchain Technologies												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1	2	2						3		1	2
CO2:	2	1	1						3		1	2
CO3:	2	3	3						3	3	3	2
CO4:	2								3		1	2
CO5:		3	3	1	1				3	1	1	2

Note: 1: Low 2.: Moderate 3: High

Programme :	**B. Tech**	**Semester :**	**VI**
Name of the Course:	**Digital Image Processing**	**Course Code:**	**SOE-B-CSE605(3)**
Credits :	**3**	**No of Hours :**	**3 Hrs. / Week**
Max Marks :	**75**		

Course Description

The course will cover techniques and tools for digital image processing, and finally also introduce image analysis techniques in the form of image segmentation. The course is primarily meant to develop on-hand experience in applying these tools to process these images. Hence the programming assignments form a key component of this course.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	learn concept, process, and practice of the digital image processing and how methodologies are applied to enhance quality of the images.
CO2	Learn image processing in spatial and transform domain.
CO3	Learn image restoration and segmentation.
CO4	Learn image compression using various techniques.

Syllabus:

Unit-I: Digital Image Fundamentals:

Light, brightness adaption and discrimination, Human visual system, Image as a 2D data, Image representation gray scale and Colour images, Image sampling and quantization

Unit-II: Image enhancement and filtering in spatial domain:

Intensity transformation functions: Contrast stretching, Thresholding, Image negative, Log ransformation, Power-low transformation, Intensity level slicing and Bit-plane slicing. Image histogram, Histogram equalisation process. Fundamentals of spatial filtering, Correlation and convolution, Spatial filtering mask for low pass filtering (smoothing) and high pass filtering (sharpening).

Unit-III: Image filtering in the frequency domain:

Preliminary Concepts, Extension to functions of two variables, Image Smoothing, Image Sharpening, Homomorphic filtering, 2D- DFT, 2D FFT, 2D- DCT, Fundamentals of 2D-wavelet transform, Image pyramids, sub-band coding.

Unit-IV: Image restoration:

Reasons for image degradation, Model of image degradation/restoration process, Noise

probability density functions, Image restoration using spatial filtering (Mean filters, Order statistic filters and adaptive filters), Inverse Filtering, MMSE (Wiener) Filtering.

Unit-V: Image Compression and Segmentation

Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard, Wavelet based image compression. Edge based segmentation, Region based segmentation, Region split and merge techniques, Region growing pixel aggregation, optimal thresholding.

Text Books:

- Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.

Reference Books:

- Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education
- Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011
- S Sridhar, "Digital Image Processing", Oxford University Press.

CO-PO & PSO Correlation

Course Name: Digital Image Processing												
	Program Outcomes								PSOs			
Course	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2	2	3			2		1				
CO2:	2	2	3			2		1				
CO3:	3	3	3			2		3				
CO4:	3	3	3			1		3				

Programme	**: B. Tech**	**Semester**	**: VI**
Name of the Course:	**Ethical Hacking**	**Course Code:**	**SOE-B-CSE605(4)**
Credits	**: 3**	**No of Hours :**	**3 Hrs. / Week**
Max Marks	**: 75**		

Course Description

Ethical hacking subject has been introduced since it has become very important in present-day context. It has capability to prepare individuals and organization both to adopt safe and optimal use/practice of their IT infrastructure. Starting from the basic topics like phases of attacks, Metasploit, vulnerability analysis, etc., hands-on demonstrations will help students to gain insight and confidence in the field of cyber security

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Find motivation behind cyber-attack.
CO2	Plan a vulnerability assessment and penetration test for a network. Report on the strengths and vulnerabilities of the tested network.
CO3	Find methods to safeguard individual and organization against cyber-attacks.
CO4	Sniff network traffic and extract required information out of it. Execute a penetration test using standard hacking tools in an ethical manner.
CO5	Identify legal and ethical issues related to vulnerability and penetration testing.

Syllabus:

Unit-I:

Ethical hacking process and overview, TCP/IP Concepts Review, network and computer Attacks and its motives, Maintaining Anonymity, Hacking Methodology, Information Gathering, Active and Passive Sniffing, Physical security vulnerabilities and countermeasures. Internal and External testing. Preparation of Ethical Hacking and Penetration Test Reports and Documents

Unit-II:

Network enumeration and Foot printing- DNS query, Whois query, OS finger printing, Banner grabbing Programming for security professionals- Web application vulnerabilities, Buffer overflow attack, Social Engineering attacks and countermeasures. Password attacks, Privilege Escalation and Executing Applications, Network Infrastructure Vulnerabilities, IP spoofing, DNS spoofing, Wireless Hacking: Wireless footprint, Wireless

scanning and enumeration, Gaining access (hacking 802.11), WEP, WPA, WPA2.

Unit-III:

DoS attacks. Web server and application vulnerabilities, SQL injection attacks, Vulnerability Analysis and Reverse Engineering, Buffer overflow attacks. Client-side browser exploits, Exploiting Windows Access Control Model for Local Elevation Privilege. Exploiting vulnerabilities in Mobile Application

Unit-IV:

Introduction to Metasploit: Metasploit framework, Metasploit Console, Payloads, Metrpreter, Introduction to Armitage, Installing and using Kali Linux Distribution, Introduction to penetration testing tools in Kali Linux. Case Studies of recent vulnerabilities and attacks.

Unit-V:

Surveillance, desktop and server OS Vulnerabilities, Database attacks, hacking wireless networks, cryptography, network protection systems, Trojan and backdoor applications, legal resources, virtualization, Malware analysis, and reverse engineering.

Text Books:

- Michael T. Simpson, Kent Backman,James Corley, “Ethical Hacking and Network Defense”.
- Baloch, R., “Ethical Hacking and Penetration Testing Guide”, CRC Press, 2015
- Beaver, K., “Hacking for Dummies”, 3rd edition, John Wiley & sons., 2013
- Council, Ec., “Computer Forensics: Investigating Network Intrusions and Cybercrime, Cengage Learning”, 2nd Edition, 2010

Reference Books:

- McClure S., Scambray J., Kurtz G, “Hacking Exposed”, 6th Edition, Tata McGraw-Hill Education, 2009
- Davidoff, S., Ham, J., “Network Forensics Tracking Hackers through Cyberspace”, Prentice Hall, 2012
- Michael G. Solomon, K Rudolph, Ed Tittel, Broom N., Barrett D., “Computer, Forensics Jump Start”, Willey Publishing, Inc, 2011

CO-PO & PSO Correlation

Course Name: Ethical Hacking												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1			2	2	3	3		1		1	3
CO2:	2	3	2			1	3	3	3	1	2	2
CO3:	3	2	3	1			1	1	1		1	1
CO4:	2	3	1			1	3	1	3	1	2	3
CO5:	1						3	1			1	1

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**VI**
Name of the Course	:	**Computer Networks Lab**	**Course Code:**		**SOE-B-CSE606**
Credits	:	**1**	**No of Hours :**		**2 Hrs. / Week**
Max Marks	:	**50**			

Course Descriptions:

This lab is designed to Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work.

Course Outcomes:

At the end of the course, students should be able to:

CO Number	Course Outcome
CO1	The students will be able to develop fundamental communication systems with customize requirement(s).
CO2	The students will be able to design computer network as per the specifications given.
CO3	The students will acquire analytical ability to identify the problems area in the hardware planning of computer network with possible trouble shooting technique..
CO4	The students will be able to diagnose the possible Bugs in the software application and to provide the possible trouble shoot.
CO5	Project planning Network planning, design, selection of hardware components and its configuration.

The following concepts will be covered in the lab:

Part-I: Application Development:

- Experiment on ECHO Program as per TCP specifications.
- Part-I: Develop an echo program with Client and Iterative Server using TCP.
- Part-II: Develop and echo program with Client and Concurrent Server using TCP.
- Experiment on ECHO Program as per UDP specifications.
- Development of ECHO program with client and concurrent server using UDP.
- Experiment on Chat Application Development.
- Develop a chatting program following client – server model
- Systems Information Retrieval Program
- Develop a program to retrieve date as well as time using TCP and UDP.
- Experiment on Stream Socket and Datagram Socket.
- Part-I: Develop an Echo client and Server program using UNIX domain stream socket.

- Part-II: Develop an Echo Client and server program using UNIX domain Datagram Socket.
- File Transfer Application: Develop a program to implement file transfer using TCP from Client to Server in JAVA.

Part-II: Network Simulation (As per CISCO Specifications)

- To configure a Cisco Switch on network configuration using Packet Tracer and demonstrate packet communication.
- To connect and configure a Cisco router on small LAN and demonstrate packet transfer.
- Study of Address Resolution Protocol (ARP) functions on CISCO environment.
- To configure CISCO network for STATIC Routing on a computer network having three systems.
- To establish a Wireless network and demonstrate packet transfer on all possible junctions.

Part-III: Case Study

The students would take up a study project to understand a real network environment. It is recommended to take up the existing networks around the campus. The identified areas are OPJU computer network or the networks of the organizations/ industries all around the university campus.

Reference Books:

- Duglas E Comer, "Internetworking with TCP/IP, Principles Protocols and Architecture" 5th Edition Vol1, PHI.
- Behrouz A Forouzen,"TCP/IP Protocol Suit", 4th Edition, Tata MGraw Hills.
- Larry L Petersnand Bruce S Davie, "Computer Network - a Systems Approach", 5th Edition, Morgan Kaufmabb Elsevier
- Dimitri Betsekas Robert Gallager, "Data Networks", 2nd Edition, PHI

CO-PO & PSO Correlation

Course Name: Computer Network Lab												
	Program Outcomes								**PSOs**			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**2**	**2**						**1**		**2**	
CO2:	**2**									**2**		**1**
CO3:	**2**	**3**	**2**								**1**	**2**
CO4:		**2**										**1**
CO5:	**1**	**1**										

Note: 1.: Low 2.: Moderate 3.: High

Programme :	**B. Tech**	**Semester :**	**VI**
Name of the Course:	**Big Data and Cloud Computing Lab**	**Course Code:**	**SOE-B-CSE607**
		No of Hours :	**2 Hrs. / Week**
Credits :	**2**		
Max Marks :	**75**		

Course Description

This course will discuss fundamental concepts and tools in computer network and communications, with emphasis on algorithm development and analysis. The course will cover study on recommended reference models and its implications. Contains of the courses as included to give a closer insight of the working behavior with verification models. The course is so designed to give foundation to the students to take up specialized courses as per the demand of the profession.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Acquire Fundamental concept of Cloud
CO2	Development and practices of cloud application tools
CO3	Implementation of Big Data Analytics through Hadoop.

The following concepts will be covered in the lab:

- Big Data analysis using Map Reduce, PIG, HIVE, Spark, or as recommended by the department time to time.
- Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top
- of windows7 or 8.
- Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
- Install Google App Engine. Create hello world app and other simple web applications using python/java.
- Use GAE launcher to launch the web applications.
- Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
- Find a procedure to transfer the files from one virtual machine to another virtual machine.
- Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
- Install Hadoop single node cluster and run simple applications like wordcount.

CO-PO & PSO Correlation

Course Name : Big Data and Cloud Computing Lab												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1	3							1	2		
CO2:	1	3							1	2		
CO3:	1	3							1	2		

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**Compiler Design Lab**	**Course Code:**		**SOE-B-CSE608(1)**
Credits	**:**	**1**	**No of Hours :**		**1 Hrs. / Week**
Max Marks:	**:**	**50**			

Course Descriptions:
This course is intended to provide an Understanding of the language translation peculiarities.

Course Outcomes:
After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the practical approaches of how a compiler works
CO2	Understand and analyze the role of syntax and semantics of
CO3	Apply the techniques and algorithms used in Compiler Construction in

The following concepts will be covered in the lab:

- Implementation of Scan and Count the number of characters, words, and lines in a file.
- Implementation of NFAs that recognize identifiers, constants, and operators of the mini language.
- Implementation of DFAs that recognize identifiers, constants, and operators of the mini language.
- Design a Lexical analyzer for the above language. The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
- Implement the lexical analyzer using JLex, flex, flex or lex or other lexical analyzer generating tools.
- Design Predictive parser for the given language
- Design LALR bottom up parser for the above language.
- Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
- Demonstrate to generate machine code from the abstract syntax tree generated by the parser. The following instruction set may be considered as target code.

Reference Text Books:

- LOUDEN, “Compiler Construction”, Thomson
- Cooper, Linda, “Engineering a compiler”, Elsevier
- Dick Grune, Henry E.Bal, Cariel TH Jacobs, “ Modern Compiler Design”, Wiley Dreatech, springer

CO-PO & PSO Correlation

Course Name: Compiler Design Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**1**	**2**	**2**		**2**	**2**		**1**	**2**	**2**	
CO2:	**2**	**2**	**2**	**2**		**1**			**2**	**2**	**2**	
CO3:			**1**					**1**			**3**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	:	**B. Tech**	**Semester**	:	**VI**
Name of the Course	:	**Deep Learning Lab**	**Course Code:**		**SOE-B-CSE608(2)**
Credits	:	**1**	**No of Hours :**		**1 Hrs. / Week**
Max Marks	:	**50**			

Course Description:

The course will provide foundational knowledge of deep learning algorithms and get practical experience in building neural networks. It does not require an extensive math background to understand neural network. In understandable steps, this course builds from a one node neural network to a multiple feature, multiple output neural networks. All the steps are explained using working code to solve problems. After an understanding of how neural networks work and the parameters that control deep learning systems, Keras is introduced and used to simplify the building of deep learning neural networks. A convolutional deep learning neural network is built using Keras to show how deep learning is used in specialized neural networks.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Create a deep neural network.
CO2	Design layers and various parameters of deep network.
CO3	Analyze different deep learning models and parameters.
CO4	Discriminative Learning models of a deep neural network.
CO5	Implement a deep learning application to solve real-world problem.

The following concepts will be covered in the lab:

- Tensorflow, keras
- Convolutional neural network (CNN)
- Recurrent neural network (RNN):
- Long short-term memory network (LSTM):

Reference Books:

- AurÈlien GÈron, “Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems”, O’Reilly, 2017
- Antonio Gulli, Amita Kapoor, “TensorFlow 1.x Deep Learning Cookbook”, O’Reilly, 2017
- Nikhil Buduma, Nicholas Locascio, “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms”, O’Reilly, 2017
- Josh Patterson, Adam Gibson, “Deep Learning: A Practitioner's Approach”, O’Reilly, 2017

CO-PO&PSO Correlation

Course Name : Deep Learning Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**3**							**2**			
CO2:		**1**				**2**			**2**	**1**	**1**	
CO3:		**3**	**3**		**3**			**2**	**2**	**2**	**2**	
CO4:	**2**	**3**	**3**					**3**	**2**	**2**	**2**	**3**
CO5:	**3**	**3**	**3**			**2**			**1**		**2**	**3**

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**6th Semester**
Name of the Course	:	**Cryptography and Network Security Lab**	**Course Code:**		**SOE-B-CSE608(3)**
			No of Hours :		**1 Hrs. / Week**
Credits	:	**1**			
Max Marks	:	**50**			

Course Description:

The lab experiment in this course is designed to survey the cryptographic tools and techniques. It includes the study of encryption techniques, public key encryption/decryption, key exchange techniques, etc. The focus of this course is also towards providing understanding of system security issues, such as viruses, malwares, ransomwares, intrusion, and firewalls.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand cryptography basics, algorithms and mathematical background for cryptography.
CO2	Analyze the important cryptographic algorithms.
CO3	Apply the Digital signature for secure data transmission
CO4	Utilize the different open source tools for network security and analysis
CO5	Demonstrate intrusion detection system using network security tool.

List of Experiments

- Perform encryption, decryption using the following substitution techniques
  - Ceaser cipher
  - Playfair cipher
  - Hill Cipher
  - Vigenere cipher
- Perform encryption and decryption using following transposition techniques.
  - Rail fence
  - Row & Column Transformation
- Apply DES algorithm for practical applications
- Apply AES algorithm for practical applications.
- Implement RSA Algorithm using HTML and JavaScript
- Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
- Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.
- Install jcrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric Crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and Management
- Discuss the Signature Scheme - Digital Signature Standard

- Perform wireless audit on an access point or a router and decrypt WEP and WPA. (Net Stumbler)

Reference Books:

- prakash. C Guptha, "Cryptography and Network security".
- Bruce Schneier, "Secrets and Lies: Digital Security in a Networked World", Wiley
- Ajay Raj Parashar, "Cryptography and Network Security".

CO-PO & PSO Correlation

Course Name: Cryptography and Network Security Lab												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2					3	2	2		1	2	2
CO2:	2	2	3			1	2	2	1	2	1	2
CO3:	2	2	2				1	1	2	1	1	2
CO4:	2	3				1	2	1	1	2	2	2
CO5:	2						2	1	1	2	2	2

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**Industrial IOT Lab**	**Course Code:**		**SOE-B-CSE608(4)**
Credits	**:**	**1**	**No of Hours**	**:**	**1 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description:

Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are the different drivers necessary for the transformation. Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems. IIoT links the automation system with enterprise, planning and product lifecycle.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Describe Industrial Internet of Things and Cyber Physical manufacturing demonstrate Cyber Physical and Cyber Manufacturing systems
CO2	Describe Architectural design patterns for industrial Internet of Things 2.0
CO3	Analyse AI and data Analytics for Industrial Internet of Things 2.0
CO4	Evaluation of Workforce and Human Machine Interaction and Application of
CO5	Understand Industrial Internet of Things

The following concepts will be covered in the lab:

- Setting up of Raspberry Pi and connect to a network
- Familiarization with GPIO pins and control hardware through GPIO pins.
- Speed Control of motors using PWM with python programming.
- Use sensors to measure temperature, humidity, light and distance.
- Web based hardware control.
- Connect IOT devices through cloud using IoT protocol such as MQTT.
- Controlling IoT devices using Arduino.
- Create Wireless network of sensors using Zigbee

CO-PO & PSO Correlation

Course Name : Industrial IoT Lab												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2	3				2			2	2	1	1
CO2:	1	3				1			2	2	1	1
CO3:	1	3							1	2		
CO4:	1	3				1			1	2	1	
CO5:	1	3				1			1	2	1	

Note: 1.: Low 2.: Moderate 3.: High

Programme :	**B. Tech**	**Semester :**	**VI**
Name of the Course:	**Dev ops and CI/ CD Lab**	**Course Code:**	**SOE-B-CSE609(1)**
Credits :	**1**	**No of Hours :**	**1 Hrs. / Week**

Course Descriptions:

This course offers a foundational understanding of Development and Operations (DevOps) and Continuous Integration and Continuous Delivery (CI/CD) in software engineering concepts. It covers the modern approaches, practices, and tools being used in DevOps. This course further explains concepts of CI/CD Pipeline, Git, Jenkins, Application Containerization using Docker and Kubernetes and DevOps Azure Platform including Azure Boards, Pipelines, Repos, Artifacts, Monitor and DevTest Labs. This course also covers DevSecOps including Postman and SonarQube for API testing and static code analysis respectively.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Explain the need for modern software engineering practices such as DevOps and CI/CD.
CO2	Use Git, GitFlow, Jenkins, and Azure Pipelines to create CI/CD Pipelines for a given scenario.
CO3	Explain the importance of application Containerization using Docker and Kubernetes.
CO4	Identify and discuss uses of various Azure DevOps Tools.

The following concepts will be covered in the lab:

DevOps CI/CD Pipeline

Managing Your Source Code with Git, Understanding the Git process and GitFlow pattern, Code isolation, Branching strategy with GitFlow, Using package manager for CI/CD, Using Jenkins, Using Azure Pipelines, Using GitLab CI.

Docker and Kubernetes

Installation, and configuration of Docker, Creating a Dockerfile, Building and running a container on a local machine, Building a Docker image, Instantiating a new container of an image, testing a container locally, working with Docker Hub. Kubernetes architecture, Installation, and configuration of Kubernetes, Kubernetes application deployment examples.

DevOps Azure Platform

Azure DevOps, Azure Boards, Azure Pipelines, Azure Repos, Azure Artifacts, Azure Monitor, DevTest Labs, and Azure Test Plans

DevSecOps

DevSecOps, InfoSec and DevOps Cultures, Code Security, Container Security, Testing APIs with Postman, Static Code Analysis with SonarQube.

Reference Books:

- Sjoukje Zaal, Stefano Demiliani, Amit Malik, "Azure DevOps Explained", Packt Publishing, Dec 2020.
- Donna Knapp, "DevOps Key Concepts", Addison-Wesley Professional, Jan 2022.
- Gaurav Agarwal, “Modern DevOps Practices”, Packt Publishing, September 2021.

CO-PO & PSO Correlation

Course Name: Dev ops and CI/CD Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**					**2**	**2**	**2**	**3**		**1**	**2**
CO2:	**2**					**2**	**2**	**2**	**3**		**1**	**2**
CO3:	**2**	**3**	**3**			**2**	**2**	**2**	**3**	**3**	**3**	**2**
CO4:	**2**					**2**	**3**	**3**	**3**		**1**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**VI**
Name of the Course	:	**Enterprise DApps and Blockchain Technology Lab**	**Course Code:**		**SOE-B-CSE609(2)**
			No of Hours :		**1 Hrs. / Week**
Credits	:	**1**			
Max Marks	:	**50**			

Course Descriptions:

All the enterprise blockchain on the market is specially equipped to meet with all organizational demands. In simple terms, these networks are made for enterprise blockchain solutions. So, if an enterprise wants to integrate a blockchain technology that can offer special features only for them, then those networks are called enterprise blockchain.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Install and configure Block chain Development tools
CO2	Develop enterprise-grade smart contract-based DApps using solidity on Ethereum
CO3	Design and develop enterprise blockchain solutions using Hyperledger Fabric and Composer.
CO4	Demonstrate the uses of Hyperledger Indy, Aries, and Ursa to solve digital identity in a distributed environment.
CO5	Design and deploy private blockchain for industrial use cases.
CO6	Develop, Debug, Deploy and Run sample applications on Corda R3.

The following concepts will be covered in the lab:

- Fundamentals of Blockchain Technology.
- Enterprise Projects in Non-financial and Federated Networks.
- Enterprise Blockchains: BAAS Vendors and Popular Platforms.
- Hyperledger Ecosystem.
- Decentralized Internet and Web 3.0

Reference Books:

- Kenny Vaneetvelde, “Ethereum Projects for Beginners: Build Blockchain-based Cryptocurrencies, Smart Contracts, and DApps”, 2018.
- Ashwani Kumar, “Hyperledger Fabric In-Depth Learn, Build and Deploy Blockchain Applications Using Hyperledger Fabric”, BPB PUBN, 2020.

- Andreas M. Antonopoulos, Gavin Wood Ph.D., "Mastering Ethereum: Building Smart Contracts and DApps", O'Reilly Media, 2018.
- Jamiel Sheikh, "Mastering Corda Blockchain for Java Developers", O'Reilly Media, 2020.

CO-PO & PSO Correlation

Course Name: Enterprise DApps and Blockchain Technology Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**2**							**1**	**2**		
CO2:	**1**	**2**							**1**	**2**		
CO3:	**1**	**2**				**1**			**1**	**2**		
CO4:	**1**	**2**							**1**	**2**	**1**	
CO5:	**1**	**2**				**1**			**1**	**2**		
CO6:	**1**	**2**							**1**	**2**	**1**	**1**

Note: 1: Low 2.: Moderate 3: High

Programme	:	**B. Tech**	**Semester**	:	**VI**
Name of the Course	:	**Digital Image Processing Lab**	**Course Code:**		**SOE-B-CSE609(3)**
			No of Hours :		**1 Hrs. / Week**
Credits	:	**1**			
Max Marks	:	**50**			

Course Descriptions:
This course is an introduction to image processing, image analysis techniques and concepts. Areas include: Imaging sensors and their principles; Image representation and storage, coding and compression techniques, lossy versus lossless; techniques for noise reduction.

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

CO Number	Course Outcome
CO1	Learn concepts, process and practice DIP methodologies
CO2	Learn image processing in spatial domain
CO3	Learn image restoration and segmentation
CO4	Learn image compression using various techniques

Following concepts will be covered in the lab

- Checking the basic relationships of Pixel i.e. connectivity based on following two methods:
    a. 4-Adjacency
    b. 8-Adjacency Mirror Image Generation, flipped Image Generation.
- Implement Low Pass Filters – Gaussian, Butterworth, Ideal.
- Implement High Pass Filters – Gaussian, Butterworth, Ideal.
- Perform Image Enhancement in Spatial Domain through Gray Level
- Transformation Function. Histogram Equalization
- Histogram Specification.
- Use of Second Derivate for Image Enhancement: The Laplacian.
- Use of First Derivate for Image Enhancement.
- Implementation of Morphological Operations, image processing, image segmentation and for Edge detection.

Software Requirements:

- Scientific computing tool.

Reference Books:

- John H Davies, "MSP430 Microcontrollers Basics", 1st edition, Newnes Publishers, 2008
- C P Ravikumar, "MSP430 Microcontrollers in Embedded Sys-tem Projects", 1st edition, Elite Publishing House, 2012.

CO-PO & PSO Correlation

Course Name: Digital Image processing Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**2**	**1**			**2**			**1**	**2**		
CO2:	**1**	**2**	**2**			**1**			**1**	**2**	**2**	
CO3:	**1**	**2**	**1**			**1**			**1**	**2**		
CO4:		2	1						1			

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**VI**
Name of the Course:		**Ethical Hacking Lab**	**Course Code:**		**SOE-B-CSE-609(4)**
Credits	**:**	**1**	**No of Hours :**		**1 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description:

The lab experiment in this course is designed to introduce the principle techniques and practices required to understand the core concepts of ethical hacking. It includes the study and demonstration of general cyber-attacks, penetration testing and vulnerability scanning approaches to understand the attack severity to safeguard the organization.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Learn aspects of security, importance of data gathering, foot printing and system hacking
CO2	To learn about various types of attacks, attackers and security threats and vulnerabilities present in the computer system.
CO3	Understand interpretation of intruders escalating privileges.
CO4	Describe Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Virus Creation.
CO5	To describe about cryptography, and basics of web application attacks.

Following concepts will be covered in the lab

- Document and demonstrate the procedure to setup a honey pot and monitor the honey pot on network.
- Create a social networking website login page using phishing techniques.
- Install rootkits and study variety of options.
- Use ping command to emulate the traceroute.
- demonstrate DoS attacks.
- Discover the maximum frame size for the network.
- Discuss various ICMP type and the code for echo request and echo reply packet.
- Study of Techniques uses for Web Based Password Capturing.
- Install jcrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric Crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and Management.
- Implement Passive scanning, active scanning, session hijacking, cookies extraction using Burp suit too

Reference Books:

- Jon Erickson, "Hacking: The Art of Exploitation", 2nd edition, No Starch Press
- Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing", Syngress

CO-PO & PSO Correlation

Course Name: Ethical Hacking Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1					3	2			1	1	
CO2:	2	2	2			1	2	2	1	2	1	
CO3:	2	2	3				1	1		1	1	
CO4:	2	3	1			1	2	1	1	2		
CO5:	1						2	1				

Note: 1.: Low 2.: Moderate 3.: High

Programme:	**B.Tech.**	**Semester :**	**6th Semester**
Name of the Course:	**MOOCS/ SWAYAM / Certification (Machine Learning)**	**Course code:**	**SOE-B-CSE610**
Credits :	**2**	**No of Hours**	**2 Hrs. / Week**
Max Marks:	**50**		

Course Description:

With the increased availability of data from varied sources there has been increasing attention paid to the various data driven disciplines such as analytics and machine learning. In this course we intend to introduce some of the basic concepts of machine learning from a mathematically well motivated perspective. We will cover the different learning paradigms and some of the more popular algorithms and architectures used in each of these paradigms.

COURSE OUTCOMES:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	To provide a broad survey of approaches and techniques in machine learning;
CO2	To develop the design and programming skills that will help you to build, intelligent systems.
CO3	To develop the basic skills necessary to pursue research in machine learning.

Syllabus:

Unit - I: Introduction

Introduction: Basic definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation.

Unit - II: Regression

Introduction, Types of regression (Linear, multiple, logistic), Models of Evaluation,

Overfit& Underfit.

Unit - III: Neural Networks and Genetic Algorithms

Neural Network Representation, Problems, Perceptrons, Multilayer Networks and Back Propagation Algorithms, Genetic Algorithms.

Unit - IV: Instant Based Learning

K-Nearest Neighbor Learning, Locally weighted Regression, Radial Bases Functions and Case Based Learning

Unit - V: Bayesian and Computational Learning

Bayes Theorem, Concept Learning, Maximum Likelihood, Minimum Description Length Principle Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Network, EM Algorithm, Probability Learning, Case Study & project development.

Text Books:

1. Tom M. Mitchell, "Machine Learning", McGraw,Hill edition, 1997.
2. Ethem Alpaydin, "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press 2004

Reference Books:

1. T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer Verlag, 2001
2. Christopher Bishop, "Pattern recognition and machine learning", Springer Verlag, 2006

CO-PO & PSO Correlation

Course Name: Machine Learning												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2	3	2						3	2	2	1
CO2:	3	3	2						3	2	2	2
CO3:	3	2	1		1				3	2	2	2

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**6th Semester**
Name of the Course:		**Project/ Case Studies**	**Course Code:**		**SOE-B-CSE611**
Credits	**:**	**2**	**No of Hours :**		**2 Hrs. / Week**
Max Marks	**:**	**50**			

Course Description:

The project work can be an investigative analysis of a technical problem in the relevant area, planning and/or design project, experimental project or computer application based project on any of the topics. Each project group will submit project synopsis by the end of sixth semester. Project evaluation committee consisting of three or four faculty members specialized in the various fields shall study the feasibility of each project work before giving consent.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	gain in-depth knowledge and use adequate methods in the major subject/field of study.
CO2	create, analyze and critically evaluate different technical/research solutions.
CO3	clearly present and discuss the conclusions as well as the knowledge and arguments that form the basis for these findings
CO4	identify the issues that must be addressed within the framework of the specific dissertation in order to take into consideration
CO5	apply principles of ethics and standards, skill of presentation and communication techniques.

Contents

Project work is of duration of one semesters and is expected to be completed in the eighth semester. Each student group consisting of not more than four members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project batches are expected to fix their topics, complete preliminary studies like literature survey, field measurements etc. in the seventh semester.

Student shall study the topic of project work and define problem statement. The student shall evolve design and/or do experimental study and/or fabricate engineered device to obtain solution to the identified problem. The student shall prepare a report and shall present a seminar on the basis of work done at the end of semester.

CO-PO & PSO Correlation
Project / Case Studies

CO Number	Program Outcome								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	3	2	2	2	-	2	2	2	3	2	3	2
CO2	3	2	1	1	1	1	1	2	2	3	2	3
CO3	1	2	1	3	2	-	-	1	1	3		3
CO4	1	1	1	-	1	-	3	2	1	2	1	2
CO5	-	1	-	3	2	-	3	1	1	3	2	3

Note: 1: Low 2: Moderate 3: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**6th Semester**
Name of the Course:		**Professional Development**	**Course Code:**		**SOE-B-CSE612**
Credits	**:**	**2**	**No of Hours:**		**2 Hrs. / Week**
Max Marks	**:**	**75**			

Course Descriptions:

Employability is a course for engineering students, designed to develop the knowledge and skills necessary to prepare for the career development. Knowledge of the factors involved in these roles is vital for preparing students to make informed and competent decisions regarding career and family life. This course focuses on the development of the transferable skills students need in job and life situation tasks. These skills include: basic academic skills, thinking skills, personal qualities, use of resources, interpersonal skills and using information.

Course Outcomes

Students will be able to

CO Number	Course Outcome
CO 1	Explore their values and career choices through individual skill assessments
CO 2	Make realistic employment choices and to identify the steps necessary to achieve a goal
CO 3	Develop and practice self management skills for the work site, explore and practice basic communication skills.
CO 4	Learn skills for discussing and resolving problems on the work site

Syllabus:

Unit - I Career Exploration:

a. Career Clusters.

b. Interest inventory-Career Cruising.

c. Career Cruising – My Portfolio.

Unit - II Finding a Job:

a. Job Sources.

b. Networking and Personal Contacts.

c. Entrepreneurship.

Unit - III Job Search Skills:

a. Resume Writing.

b. Letter of Application.

c. Job applications

d. Interviews

e. Professional Dress.

Unit - IV Employer/Employee Relationships:

a. Communication skills

b. Transferable work skills.

c. Positive work skills.

d. Conflict resolution.

e. Workplace legal issues.

f. Work ethic.

Unit - V Small Business:

a. Small business types

b. Entrepreneurship

c. Business plan

Text Books:

i. Hariharan S., S. N.Sundararajan, S.P.Shanmugapriya, "Soft Skills", Mjp Publishers.
ii. Alex, "Soft Skills: Know Yourself and Know the World".
iii. Beverly Jaeger, "Making Work Work for the Highly Sensitive Person", McGraw-Hill Education.
iv. Dipali Biswas, "Enhancing Soft Skills", 1st Edition, Shroff
v. M. S. Rao, "Soft Skills – Enhancing Employability: Connecting Campus with Corporate", I K International Publishing House Pvt. Ltd.
vi. Shalini Verma, "Enhancing Employability @ Soft Skills", 1st edition, Pearson Education

Reference Books:

i. A J Balasubramanian, Dr J Sadakkadulla, "Get your First Job: A companion for getting your first job – A Guide to Employability Skills and Career Planning", Amazon Asia-Pacific Holdings Private Limited.
ii. Beverly Amer, "Soft Skills at Work: Technology for Career Success", Course Technology Inc.
iii. Sally J. Vonada and JoAnn Brunner, "BEST: Basic Employability Skills Training: Volume 1", CreateSpace Independent Publishing Platform.
iv. Kim Watty and Beverley Jackling, "Personal Transferable Skills in Accounting Education RPD", 1st Edition, Routledge
v. Atul John Rego, "How to develop a pleasing personality", Better yourself bools, Mumbai, 2006.

CO-PO & PSO Correlation

Course Name: Professional Development												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:		**2**		**3**		**1**	**2**					**1**
CO2:		**1**		**2**		**1**	**1**					
CO3:				**3**		**2**	**2**					**1**
CO4:				**1**		**1**	**1**					

Computer Science and Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering) Prog. Code- 01UG020

Academic Semester VII & VIII

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+P+T)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-CSE-19-F01	CSE	Long term Industrial Internship	_	_	40		300	200	500	20
2	SOE-B-CSE-19-F02	CSE	Major Project	_	_	24		200	100	300	12
3	SOE-B-CSE-19-F03(1-3)	CSE	Elective IV	3	0	0	20	15	40	75	3
4	SOE-B-CSE-19-F04(1-3)	CSE	Elective V	3	0	0	20	15	40	75	3
5	SOE-B-CSE-19-F05(1-3)	CSE	Elective VI	3	0	0	20	15	40	75	3
6	SOE-B-CSE-19-F06(1-2)	CSE	Elective lab IV	0	0	2	0	25	0	25	1
7	SOE-B-CSE-19-F07(1-2)	CSE	Elective lab V	0	0	2	0	25	0	25	1
			Total	**9**	**0**	**68**	**60**	**595**	**420**	**1075**	**43**

* End Semester Examination
** Progress Review Examination

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+P+T)
				L	T	P	PRE** Mid Sem	PRE** TA	ESE*	Total Marks	
	Academic Semester VII										
1	SOE-B-CSE-19-F01	CSE	Long term Industrial Internship	_	_	40		300	200	500	20
	Academic Semester VIII										
1	SOE-B-CSE-19-F02	CSE	Major Project	_	_	24		200	100	300	12
2	SOE-B-CSE-19-F03(1-3)	CSE	Elective IV	3	0	0	20	15	40	75	3
3	SOE-B-CSE-19-F04(1-3)	CSE	Elective V	3	0	0	20	15	40	75	3
4	SOE-B-CSE-19-F05(1-3)	CSE	Elective VI	3	0	0	20	15	40	75	3
5	SOE-B-CSE-19-F06(1-2)	CSE	Elective lab V	0	0	2	0	25	0	25	1
6	SOE-B-CSE-19-F07(1-2)	CSE	Elective lab VI	0	0	2	0	25	0	25	1
			Total	**9**	**0**	**68**	**60**	**595**	**420**	**1075**	**43**

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+P+T)
				L	T	P	PRE** Mid Sem	PRE** TA	ESE*	Total Marks	
	Academic Semester VII										
1	SOE-B-CSE-19-F03(1-3)	CSE	Elective IV	3	0	0	20	15	40	75	3
2	SOE-B-CSE-19-F04(1-3)	CSE	Elective V	3	0	0	20	15	40	75	3
3	SOE-B-CSE-19-F05(1-3)	CSE	Elective VI	3	0	0	20	15	40	75	3
4	SOE-B-CSE-19-F06(1-2)	CSE	Elective lab V	0	0	2	0	25	0	25	1
5	SOE-B-CSE-19-F07(1-2)	CSE	Elective lab VI	0	0	2	0	25	0	25	1
	Academic Semester VIII										
1	SOE-B-CSE-19-F01	CSE	Long term Industrial Internship	_	_	40		300	200	500	20
2	SOE-B-CSE-19-F02	CSE	Major Project	_	_	24		200	100	300	12
			Total	**9**	**0**	**68**	**60**	**595**	**420**	**1075**	**43**

OR

Elective IV	
SOE-B-CSE-19-F03(1)	Human computer Interaction
SOE-B-CSE-19-F03(2)	Distributed System
SOE-B-CSE-19-F03(3)	Software Project Management

Elective V	
SOE-B-CSE-19-F04(1)	Soft Computing
SOE-B-CSE-19-F04(2)	Cyber Forensics and Malware
SOE-B-CSE-19-F04(3)	Semantic web and Social Network

Elective VI	
SOE-B-CSE-19-F05(1)	Signal Processing and data Analytics
SOE-B-CSE-19-F05(2)	Mobile Application Development
SOE-B-CSE-19-F05(3)	Natural Language Processing

Elective lab V	
SOE-B-CSE-19-F06(1)	Soft Computing Lab
SOE-B-CSE-19-F06(2)	Cyber Forensics Lab

Elective lab VI	
SOE-B-CSE-19-F07(1)	Natural Language Processing Lab
SOE-B-CSE-19-F07(2)	Signal Processing and data Analytics Lab

Programme	:	**B. Tech**	**Semester**	:	**Final Year**
Name of the Course	:	**Long term Industrial Internship**	**Course Code:**		**SOE-B-CSE-19-F01**
			No of Hours	:	**20 Hrs. / Week**
Credits	:	**20**			
Max Marks	:	**500**			

Course description:

As a part of the B. Tech curriculum, Industrial Training and seminar is a Practical course, which the students of CSE should undergo in reputed Private / Public Sector / Government organization / companies as industrial training of minimum four weeks to be undergone by the student in the summer vacation.

Course Outcomes (COs)

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

CO Number	Course Outcome
CO1	To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions
CO2	To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university.
CO3	To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society
CO4	To set the stage for future recruitment by potential employers.

Procedures:

- Call up the company first before sending out the application letters.
- Find out whether there is a vacancy for industrial trainees.
- If the company has vacancies, you have to ask for the person in charge. The person in charge may be from the HR department, training department, or any other departments of the company.
- Try to get the name of the person so that you can address the letter to the person in charge correctly in your application letter.
- Choose a company and send the application letter received from your departmental training in-charge to the company directly.
- Wait for the company's response.
- If you don't get a response from the company within about 2 weeks or so, give them a call and enquire on your application status.
- It is your responsibility to contact and follow-up with the company of your choice.
- If you are not getting the company for training, immediately contact your training in-charge.

Note:

- Presentation will take place the following week after you complete your training. The presentation is evaluation by your class in-charge and a panel.
- Report must be submitted during presentation. The report evaluation is done by your class in-charge.
- A Viva voce comprising comprehensive questions based on your presentation and training undergone will be put forth after your presentation.

Grading:

- The training is graded based on:
- Presentation: 25%
- Student's reports: 30%
- Viva voce: 25%
- Student's Attendance: 20%

Task:

- Discuss with your company supervisor about any project or assignment/tasks.
- Try to understand the systems in your workplace - Organization, administrative or practical
- Record all the work done or knowledge gained
- Maintain logbook
- Email to lecturer softcopy every week

CO-PO/PSO Mapping

Course Name: Long term Industrial Internship												
Course Outcome	Program Outcome								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	2	2	-	3	3	3	2	2	2	2	2	2
CO2	2	2	1	2	2	2	2	2	1	2	2	1
CO3	2	1	2	2	1	1	2	2	1	2	2	1
CO4	-	-	-	2	1	2	2	2	1	2	2	1

Programme	**:**	**B. Tech.**	**Semester**	**:**	**Final Year**
Name of the Course:		**Major Project**	**Course Code:**		**SOE-B-CSE-19-F02**
Credits	**:**	**12**	**No of Hours**	**:**	**12 Hrs. / Week**
Max Marks	**:**	**300**			

Course Description:

The project work can be an investigative analysis of a technical problem in the relevant area, planning and/or design project, experimental project or computer application based project on any of the topics. Each project group will submit project synopsis by the end of eighth semester. Project evaluation committee consisting of three or four faculty members specialized in the various fields shall study the feasibility of each project work before giving consent.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	gain in-depth knowledge and use adequate methods in the major subject/field of study.
CO2	create, analyze and critically evaluate different technical/research solutions
CO3	clearly present and discuss the conclusions as well as the knowledge and arguments that form the basis for these findings
CO4	identify the issues that must be addressed within the framework of the specific dissertation in order to take into consideration
CO5	apply principles of ethics and standards, skill of presentation and communication techniques.

Contents

Project work is of duration of one semester and is expected to be completed in the eighth semester. Each student group consisting of not more than four members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project batches are expected to fix their topics, complete preliminary studies like literature survey, field measurements etc. in the seventh semester.

Student shall study the topic of project work and define problem statement. The student shall evolve design and/or do experimental study and/or fabricate engineered device to obtain solution to the identified problem. The student shall prepare a report and shall present a seminar on the basis of work done at the end of semester.

CO-PO/PSO Mapping

Course Name: Major Project												
CO Number	**Program Outcome**								**PSO**			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	3	2	2	2	-	2	2	2	3	2	1	1
CO2	3	2	1	1	1	1	1	2	2	3	3	2
CO3	1	2	1	3	2	-	-	1	1	3	-	1
CO4	1	1	1	-	1	-	3	2	1	2	3	2
CO5	-	1	-	3	2	-	3	1	1	3	1	1

Note: 1: Low 2: Moderate 3: High

Programme	**:**	**B. Tech(01UG020)**	**Semester**	**:**	**Final Year**
Name of the Course:		**Human Computer Interaction**	**Course Code:**		**SOE-B-CSE-19-F03(1)**
			No of Hours :		**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

This course will discuss fundamental concepts and tools in designing an interactive system. This includes designing of menus, commands, natural languages, quality of service, User Documentation and Online Help. Document searching and visualization is also an integral part of this course.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Explain the capabilities of both humans and computers from the viewpoint of human information processing.
CO2	Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
CO3	Apply an interactive design process and universal design principles to designing HCI systems.
CO4	Describe and use HCI design principles, standards and guidelines.
CO5	Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.

Syllabus:

Unit-I: Introduction to HCI

Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories.

Unit-II: Interaction with the Application:

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization,
Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through
Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays.

Unit-III: Command and Natural Languages:

Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

Unit-IV: Quality of Service

Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Non-anthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

Unit-V: User Documentation and Online Help

Introduction, Online Vs Paper Documentation, reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process. Information Search: Introduction, searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization.

Text Books

- Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, "Designing the User Interface, Strategies for Effective Human Computer Interaction", 5th Edition, Pearson
- Wilbert O Galitz, "The Essential guide to user interface design", 2nd Edition, , Wiley DreamaTech

Reference Books

- Dan R.Olsan, "Human Computer Interaction", Cengage ,2010
- Ben Shneidermann, "Designing the user interface", 4th Edition, PEA.
- Soren Lauesen, "User Interface Design", PEA
- Prece, Rogers, Sharps, "Interaction Design", Wiley

CO-PO&PSO Correlation

Course Name: Human Computer Interaction												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:		**2**	**2**			**1**			**2**		**1**	**2**
CO2:		**1**	**2**			**1**			**1**		**1**	**2**
CO3:		**2**	**2**			**1**			**1**		**1**	**2**
CO4:		**1**	**2**			**1**			**2**		**1**	**2**
CO5:		**2**	**2**			**1**			**2**		**1**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech (01UG020)**	**Semester**	**:**	**Final Year**
Name of the Course:		**Distributed System**	**Course Code:**		**SOE-B-CSE-19-F03(2)**
Credits	**:**	**3**	**No of Hours**	**:**	**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description:

The study of basic techniques in the design and development of Distributed Systems and understanding solutions of the fundamental problems in distributed systems like mutual exclusion, deadlock detection, termination detection, leader election, fault tolerance, etc.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Identify models of distributed system.
CO2	analyze the current popular distributed systems such as peer-to-peer (P2P) systems.
CO3	Analyze algorithms for coordination, communication, security and synchronization in distributed systems.
CO4	Classify distributed shared memory models.

Syllabus:

Unit-I: Introduction

Various Paradigms in Distributed Applications, Remote Procedure Call, Remote Object Invocation, Message-Oriented Communication, Unicasting, Multicasting and Broadcasting, Group Communication.

Unit-II: Issues in Distributed Operating System

Threads in Distributed Systems, Clock Synchronization, Causal Ordering, Global States, Election Algorithms, Distributed Mutual Exclusion, Distributed Transactions, Distributed Deadlock, Agreement Protocols.

Unit-III: Distributed Shared Memory

Data-Centric Consistency Models, Client-Centric Consistency Models, Ivy, Munin, Distributed Scheduling, Distributed File Systems, Sun NFS.

Unit-IV: Introduction to Fault Tolerance

Distributed Commit Protocols, Byzantine Fault Tolerance, Impossibilities in Fault Tolerance.

Unit-V: Case Studies:

Distributed Object-Based System, CORBA, COM+, Distributed Coordination-Based

System, JINI.

Text Books:

- George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design Ⅲ", 5th Edition, Pearson Education, 2012
- Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007

Reference Books:

- Hagit Attiya, Jennifer Welch, "Distributed Computing: Fundamentals, Simulations and Advanced Topics", Wiley Edition 2004
- Mukesh Singhal, Niranjan Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill Series in Computer Science, 1994
- A.S.Tanenbaum, M.Van Steen, "Distributed Systems", Pearson Education, 2004
- Kshemkalyani, Ajay D, Mukesh Singhal. "Distributed computing: principles, algorithms, and systems", Cambridge University Press, 2011

CO-PO & PSO Correlation

Course Name: Distributed System												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**					**2**			**2**	**1**	**1**	
CO2:	**2**	**2**	**1**	**2**		**1**			**2**	**1**	**1**	
CO3:	**2**	**3**		**3**	**2**	**1**			**2**	**2**		**2**
CO4:	**2**		**2**							**2**		

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech (01UG020)**	**Semester**	**:**	**Final Year**
Name of the Course:		**Software project management**	**Course Code:**		**SOE-B-CSE-19-F03(3)**
			No of Hours	**:**	**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

This course offers lectures, tutorials, case studies, laboratory, and online interaction to provide a foundation in software engineering concepts. It includes representing information with the traditional and modern approaches in software engineering including knowledge of CASE tools. This course further explains concepts of software development process, agile, scrum and DevOps development process, software project management, software requirement and design engineering, development, quality assurance, automated testing, operational support, and software maintenance.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand various software process models such as waterfall, Spiral and evolutionary models
CO2	Demonstrate effective teamwork and strong working knowledge of ethics and professional responsibility for managing the software projects. .
CO3	Demonstrate effective project execution, quality control and risk management techniques that result in successful projects.
CO4	Conduct project planning activities that accurately forecast project costs, timelines and quality.
CO5	Conduct standard tests and measurements for validation of projects; to conduct, analyze, and interpret results; and to apply results to improve processes.

Syllabus:

Unit-I: Introduction Software Engineering

Software Engineering definition; S/W characteristics, applications, Life Cycle Models – Waterfall (classical and iterative), Spiral Model with quadrants and its scope, Prototyping, RAD Models

Comparison of above models and their applications

Unit-II: Requirements Analysis and Specifications

Requirements Engineering-Crucial steps; types of requirements, Requirements documentation – Nature of SRS, characteristics of a good SRS, Use case approach with

guidelines, Problems on Use Case diagram, DFD (Level 0, 1, 2 and 3)

Unit-III: Software Project Planning
Size Estimation – LOC and Function Count, Albrecht FPA, Cost estimation– Static, Single variable and Multivariable Models (SEL, Watson Felix model), The Constructive Cost model: basic, intermediate model, Cost-benefit evaluation techniques (Net Profit, Payback period, ROI, NPV computation).

Unit-IV: Software Metrics
Understanding metrics: definition, process metrics, product and project metrics, areas of applications, Product metrics – Metrics for source code; metrics for testing (Halstead metrics); Metrics for maintenance.

Unit-V: Project Quality and Risk Management
Understanding Software Quality attributes, McCall Model. ISO 9126 and CMM Model Software Risk Management: Types of Risks involved Phases of Risk Management.

Textbooks:

- Software Engineering, New Age International Third Edition, Aggarwal, K. K. & Singh, Yogesh
- Software Project Management, Tata Mcgraw Hill, New Delhi, Fifth Edition, Bob Hughes and Mike Cotterell

Reference Books:

- Fundamentals of Software Engineering by Rajib Mall
- Software Engineering by Ian Sommerville, Pearson Education, New Delhi
- Software Engineering Principles and Practices, OXFORD, New Delhi by Deepak Jain
- Software Project Management – A Concise Study by S.A. Kelkar.

CO-PO & PSO Correlation

Course Name: Software project management												
	Program Outcomes								**PSOs**			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**3**	**1**							**2**	**1**	**1**
CO2:	**1**	**2**							**1**		**1**	
CO3:	**2**	**2**							**1**		**1**	**1**
CO4:	**1**	**2**	**1**						**1**	**1**	**1**	**1**
CO5:										**2**	**2**	**2**

Note: 1: Low 2.: Moderate 3: High

Programme	**:**	**B. Tech (01UG020)**	**Semester**	**:**	**Final Year**
Name of the Course:		**Soft Computing**	**Course Code:**		**SOE-B-CSE-19-F04(1)**
Credits	**:**	**3**	**No of Hours**	**:**	**3 Hrs. / Week**
Max Marks	**:**	**75**			

Course Description:

This course covers the theory and applications of neural networks, fuzzy logic, evolutionary strategies and genetic algorithms in developing intelligent systems with examples and practical applications.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO2	Demonstrate proficiency in applying scientific method to models of machine learning and to build intelligent systems through soft computing techniques.
CO3	Recognize the feasibility of applying a soft computing methodology for a particular problem.
CO4	Develop intelligent machines to provide solutions to real world problems, which are not modeled or too difficult to model mathematically.
CO5	Exploit the tolerance for Approximation, Uncertainty, Imprecision, and Partial Truth in order to achieve close resemblance with human like decision making.

Syllabus:

Unit-I:

Overview & Search Techniques: Introduction to AI, Problem Solving, State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction. Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

Unit-II:

Knowledge Representation (KR): Introduction to KR, Knowledge agent, Predicate logic, WFF, Inference rule & theorem proving forward chaining, backward chaining, resolution; Propositional knowledge, Boolean circuit agents. Rule Based Systems, Forward

reasoning: Conflict resolution, backward reasoning: Use of Back tracking, Structured KR: Semantic Net - slots, inheritance, Frames- exceptions and defaults attached predicates, Conceptual Dependency formalism and other knowledge representations.

Unit-III:

Neural Networks Neuron, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory. Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient; back propagation algorithm, factors affecting backpropagation training, applications.

Unit-IV:

Fuzzy Logic Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

Unit-V:

Genetic Algorithm Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators: Crossover, Mutation, Generational Cycle, GA optimization problem, applications.

Text Books:

- Elaine Rich, Kevin Knight, “Artificial Intelligence”, Tata MeGraw Hill.
- Dan W.Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Prentice Hall of India
- S N Sivanandam, S N Deepa, “Principles of Soft Computing”, Wiley India, 2007.
- Fakhreddine 0 Karray, Clarence D Silva, “Soft Computing and Intelligent System Design”, Pearson Edition, 2004.

Reference Books:

- Nils J.Nilsson, “Principles of Artificial Intelligence”, Narosa Publishing house
- Clocksin & C.S. Melish, “Programming in PROLOG”, Narosa Publishing house
- M. Sasikumar, S.Ramani, et. al., “Rule based Expert Systems-A practical Introduction”, Narosa Publishing House
- Siman Haykin, “Neural Netowrks”, Prentice Hall of India
- Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Wiley India

CO-PO & PSO Correlation

Course Name: Soft Computing												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**1**	**2**				**1**			**1**	**2**		
CO2:	**1**	**2**				**1**			**1**	**2**		
CO3:	**1**	**2**				**1**			**1**		**1**	
CO4:	**1**		**1**			**1**			**1**		**1**	
CO5:	**1**	**2**				**1**			**1**		**1**	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech(01UG020)**	**Semester**	**:**	**Final Year**
Name of the Course:		**Cyber Forensics and Malware**	**Course Code:**		**SOE-B-CSE-19-F04(2)**
			No of Hours	**:**	**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

This course is designed to introduce the principles and practices generally required to investigate the cyber-crimes. It includes the study of various data acquisition process and tools, evidence analysis procedures and methodologies, taxonomy of digital forensics tools, analysis of network, file signature, malware analysis, malware classification, volatile memory forensics, mobile devices and cloud forensics which are the state-of-the-art requirement in the present and upcoming digital world followed by digital forensics examiner.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the scope of digital forensic investigation and severity of crime scene.
CO2	Acquire forensic image of suspected digital device under investigation.
CO3	Examine the evidence using open source and freeware tools.
CO4	Apply different computer forensic tools for conducting malware analysis and reverse engineering.
CO5	Perform investigation practices using different operating systems on different class of malwares.

Syllabus:

Unit-I: Basics of Digital Forensics

Fundamentals of Computer forensics investigation, computer forensics versus other related disciplines, A brief History of computer Forensics, benefits of computer forensics, Modern day digital forensics, Introduction to IT Act 2000, Volatile and Non-Volatile Memory, challenges in digital forensics, Strategies for forensics investigations, importance of event reconstruction.

Unit-II: Memory Analysis

Memory organization concept, Data storage concepts, Disk partition, Data Acquisition and Authentication Process, Non-volatile memory analysis: overview of various File systems (FAT/NTFS/EXT/UFS etc.), data recovery concepts, file search and recovery, file carving approach, Volatile memory analysis: dumping RAM image, RAM analysis,

Volatility framework.

Unit-III: Network Forensics

Introduction to WireShark, Introduction to TCPDump, investigating netrowk traffic, investigating network intrusions, study and analysis of benchmark network traffic dumps, analysis of cyber-attacks, understanding attack signature and behavior, router forensics.

Unit-IV: Malware Analysis

Introduction to malware, Basic Static and Dynamic Analysis, Overview of Windows file format, PEView.exe, Patching Binaries, Disassembly (objdump, IDA Pro), Introduction to IDA, Introduction to Reverse Engineering, Extended Reverse Engineering using GDB and IDA, Advanced Dynamic Analysis – debugging tools and concepts, Malware Behavior – malicious activities and techniques, Analyzing Windows programs – WinAPI, Handles, Networking , COM, Data Encoding, Malware Countermeasures, Covert Launching and Execution

Unit-V: Forensic Tools and Case Studies

Evaluating Computer Forensics Tool Needs, Introduction to Kali Linux, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools, Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools, Command-Line Forensics Tools, Other GUI Forensics Tools, Overview of Computer Forensics Hardware Tools, Forensic Workstations, Use Case of Write-Blocker Case Study: IoT device forensics, Drone Forensics, Smart TV Forensics, Gaming Console Forensics etc.

Text Books:

- Brian Carrier, "File System Forensic Analysis", Pearson Education.
- Michael Sikorski, Andrew Honig, "Practical Malware Analysis", No Starch Press,2012
- Eoghan Casey, "Handbook of Digital Forensics and Investigation", 1st edition, Academic Press.
- Jamie Butler, Greg Hoglund, "Rootkits: Subverting the Windows Kernel", Addison-Wesley, 2005
- Dang, Gazet, Bachaalany, "Practical Reverse Engineering", Wiley,2014

Reference Books:

- Mangesh M. Ghonge, Sabyasachi Pramanik, Ramchandra Mangrulkar, Dac-Nhuong Le, "Cyber Security and Digital Forensics: Challenges and Future Trends", Wiley-Scrivener
- Greg Gogolin, "Digital Forensics Explained", 2nd Edition, RC Press/Taylor & Francis Group
- Chuck Easttom, "Digital Forensics, Investigation, and Response", 4th Edition, Jones & Bartlett Learning

- Darren R. Hayes, "A Practical Guide to Digital Forensics Investigations", 2nd Edition, Pearson IT Certification

CO-PO & PSO Correlation

Course Name: Cyber Forensics and Malware												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**3**	**2**	**2**			**2**	**3**		**3**	**1**	**1**	**1**
CO2:		**2**	**1**			**1**			**1**	**2**	**2**	**1**
CO3:	**3**	**2**				**2**	**1**		**2**	**3**	**1**	**1**
CO4:	**3**	**2**	**1**			**2**	**1**		**2**	**3**	**1**	**1**
CO5:	**3**	**2**	**2**			**2**	**2**		**3**	**2**	**2**	**2**

Note: 1.: Low 2.: Moderate 3.: High

Programme :	**B. Tech(01UG020)**	**Semester** :	**Final Year**
Name of the Course:	**Semantic Web and Social Networks**	**Course Code:**	**SOE-B-CSE-19-F04(3)**
		No of Hours :	**3 Hrs. / Week**
Credits :	**3**		
Max Marks :	**75**		

Course Description:

The Course explains the analysis of the social Web and the design of a new class of applications that combine human intelligence with machine processing. It will help in describe how the Semantic Web provides the key in aggregating information across heterogeneous sources and understand the benefits of Semantic Web by incorporating user-generated metadata and other clues left behind by users.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand Intelligent web application and logic to develop a semantic web
CO2	Understand and knowledge representation for the semantic web.
CO3	create ontology
CO4	Understand the basics of Semantic Web and Social Network.
CO5	Evaluate Web- based social network and Ontology.

Syllabus:

Unit-I: Web Intelligence

Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

Unit-II: Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema.

Unit-III: Ontology Engineering

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Unit-IV: Semantic Web Applications, Services and Technology

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

Unit-V: Social Network Analysis and semantic web

What is social Networks analysis, Development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

Text Books:

- Godel and Turing, "Thinking on the Web - Berners Lee", Wiley inters science, 2008.
- Peter Mika, "Social Networks and the Semantic Web", Springer, 2007.

Reference Books:

- J.Davies, R. Studer, P. Warren, "Semantic Web Technologies, Trends and Research in Ontology Based Systems", John Wiley & Sons.
- Liyang Lu, "Semantic Web and Semantic Web Services", Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
- Heiner Stuckenschmidt; Frank Van Harmelen, "Information Sharing on the semantic Web", Springer Publications.
- T.Segaran, C.Evans, J.Taylor, "Programming the Semantic Web", O'Reilly, SPD.

CO-PO & PSO Correlation

Course Name: Semantic Web and Social Networks												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2		2			1			2		1	2
CO2:	1		3			1			1		1	2
CO3:	1		3			1			1		1	2
CO4:	1		3			1			2		1	2
CO5:	1		1			1			2		1	2

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**Final Year**
Name of the Course:		**Signal Processing and Data Analytics**	**Course Code:**		**SOE-B-CSE-19-F05(1)**
			No of Hours :		**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

The course will provide foundational knowledge of digital signal processing and data analytics and get practical experience in building projects in analyzing signals. It does not require an extensive math background to signals and data analytics. It introduces basic concepts of signal processing and data analytics.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Learn concept, process, and practice of the digital signal processing and data analytics.
CO2	Learn digital signal processing to analyze signals.
CO3	Learn data analytics techniques to deep understand of signals
CO4	Learn techniques to detect and classify digital signals.

Syllabus:

Unit-I: Introduction to Signal Processing

Signals, systems and signal processing, classification of signals, elements of digital signal processing system, concept of frequency in continuous and discrete time signals, Periodic Sampling, Frequency domain representation of sampling, Reconstructions of band limited signals from its samples

Unit-II: Introduction to Fourier Domain

Representation of Periodic sequences: The discrete Fourier Series and its Properties Fourier Transform of Periodic Signals, Sampling the Fourier Transform, The Discrete-Fourier Transform, Properties of DFT, Linear Convolution using DFT.

Unit-III: Introduction to data analytics

Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

Unit-IV: Data analytics techniques

Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs – averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – interquartile range – variability for qualitative and ranked data

Unit-V: Data analytics tools to analyze data

Normal distributions – z scores – normal curve problems – finding proportions – finding scores – more about z scores – correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient – regression – regression line – least squares regression line – standard error of estimate – interpretation of r2 – multiple regression equations – regression toward the mean

Text Books:

- David Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", Manning Publications, 2016
- S. K. Mitra, "Digital Signal Processing: A Computer-Based Approach", 3rd edition, McGraw-Hill, 2006

Reference Books:

- Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.
- Li Tan , Jean Jiang, "Digital Signal Processing fundamentals and Applications", 2nd edition, Academic Press, 2013

CO-PO & PSO Correlation

Course Name: Signal Processing and Data Analytics												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2		2			1			2		1	2
CO2:	1		3			1			1		1	2
CO3:	1		3			1			1		1	2
CO4:	1		3			1			2		1	2

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech.**	**Semester**	**:**	**Final Year**
Name of the Course:		**Mobile Application Development**	**Course Code:**		**SOE-B-CSE-19-F05(2)**
			No of Hours	**:**	**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

This course is concerned with the development of applications on mobile and wireless computing platforms. Android will be used as a basis for teaching programming techniques and design patterns related to the development of standalone applications and mobile portals to enterprise and m-commerce systems. Emphasis is placed on the processes, tools and frameworks required to develop applications for current and emerging mobile computing devices. Students will work at all stages of the software development life-cycle from inception through to implementation and testing.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Identify various concepts of mobile programming that make it unique from programming for other platforms.
CO2	Critique mobile applications on their design pros and cons
CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
CO4	Program mobile applications for the Android operating system that use basic and advanced phone features.
CO5	Deploy applications to the Android marketplace for distribution.

Syllabus:

Unit-I: Introduction to Android:

Android Platform, Android SDK, Eclipse Installation, Android Installation, Building Android application, Understanding Anatomy of Android Application, Android Manifest file.

Unit-II: Android Application Design Essentials:

Anatomy of an Android applications, Terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

Unit-III: Android User Interface Design Essentials:

User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Unit-IV: Testing and Publishing:
Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Unit-V: Common Android APIs:
Using Android Data and Storage APIs, managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Text Books:

- T1. Lauren Darcey, Shane Conder, "Android Wireless Application Development", 2nd edition, Pearson Education, 2011

Reference Books:

- Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
- Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
- Barry Burd, "Android Application Development All in one for Dummies", Edition: I

CO-PO & PSO Correlation

Course Name: Mobile Application Development												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	1		1	2		2	2		1	2	1	
CO2:	2	1	2	2		1			1	2	2	
CO3:			1		1			1			2	
CO4:	1	2						3			2	1
CO5:				1		2	2	1		2		1

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech (01UG020)**	**Semester**	**:**	**Final Year**
Name of the Course:		**Natural Language Processing**	**Course Code:**		**SOE-B-CSE-19-F05(3)**
			No of Hours	**:**	**3 Hrs. / Week**
Credits	**:**	**3**			
Max Marks	**:**	**75**			

Course Description:

The course will provide foundational knowledge of natural language processing. In the course, basic concepts of language designing, grammars, syntax and semantics and designing of NLP systems will be covered.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Tag a given text with basic Language features
CO2	Design an innovative application using NLP components
CO3	Implement a rule-based system to tackle morphology/syntax of a language
CO4	Design a tag set to be used for statistical processing for real-time applications
CO5	Compare and contrast the use of different statistical approaches for different types of NLP applications.

Syllabus:

Unit-I: Introduction

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

Unit-II: Word level analysis

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

Unit-III: Syntactic Analysis

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

Unit-IV: Semantics and pragmatics

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

Unit-V: Discourse analysis and lexical resources

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

Text Books:

- Daniel Jurafsky, James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech", Pearson Publication, 2014.
- Steven Bird, Ewan Klein, Edward Loper, "Natural Language Processing with Python‖", 1st Edition, O_Reilly Media, 2009

Reference Books:

- Breck Baldwin, "Language Processing with Java and LingPipe Cookbook", Atlantic Publisher, 2015
- Richard M Reese, "Natural Language Processing with Java‖", O_Reilly Media, 2015
- Nitin Indurkhya, Fred J. Damerau, "Handbook of Natural Language Processing", 2nd Edition, Chapman and Hall/CRC Press, 2010.
- Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval‖", Oxford University Press, 2008

CO-PO & PSO Correlation

Course Name: Natural Language Processing												
	Program Outcomes								PSOs			
Course Outcomes	1	2	3	4	5	6	7	8	1	2	3	4
CO1:	2	2							1	2	1	
CO2:	2			1	1					1	1	
CO3:	2	2								2		
CO4:	2	1							1	1	1	
CO5:	1	2		1	1				1	2	1	

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**Final Year**
Name of the Course:		**Soft Computing Lab**	**Course Code:**		**SOE-B-CSE-19-F06(1)**
Credits	**:**	**1**	**No of Hours**	**:**	**1 Hrs. / Week**
Max Marks	**:**	**25**			

Course Descriptions:

This course will cover fundamental concepts used in Soft computing. The concepts of Fuzzy logic (FL) will be covered first, followed by Artificial Neural Networks (ANNs) and optimization techniques using Genetic Algorithm (GA). Applications of Soft Computing techniques to solve a number of real life problems will be covered to have hands on practices. In summary, this course will provide exposure to theory as well as practical systems and software used in soft computing.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Explore methods that implements neural network techniques.
CO2	Practice the fuzzy set relations using different operations.
CO3	Design Regression techniques for a set of data points.
CO4	Capture an appropriate classification model for analytical tasks.

The following concepts will be covered in the lab:

- Introduction to Soft Computing
  a. Concept of computing systems.
  b. "Soft" computing versus "Hard" computing
  c. Characteristics of Soft computing
  d. Some applications of Soft computing techniques
  e. Solving single-objective optimization problems using Gas
- Program to implement logic gates.
- Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform max-min composition on any two fuzzy relations.
- Implement svm classification by fuzzy concepts.
- Implementation of Genetic Application
- Implementation of Perceptron Learning Algorithm
- Implementation of Unsupervised Learning Algorithm
- Write a program to implement artificial neural network without back propagation.
- Implement travelling sales person problem (tsp) using genetic algorithms.
- Implement crisp partitions for real-life iris dataset

- Implement linear regression and multi-regression for a set of data points
- Perceptron net for an AND function with bipolar inputs and targets.
- Program for Pattern storage of 10 digits with Discrete Hopfield Network

Reference Books:

- G. A. Vijayalakshami, "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran", PHI.
- E. Goldberg, "Genetic Algorithms: Search and Optimization".
- Chin Teng Lin, "Neuro-Fuzzy Systems", C. S. George Lee, PHI.
- Joe choong, "Build_Neural_Network_With_MS_Excel_sample".

CO-PO & PSO Correlation

Course Name: Soft Computing Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	1	1	2	2					1	2	2	
CO2:	3	3	2	2					2	2	2	
CO3:			3								3	
CO4:	1										2	

Note: 1.: Low 2.: Moderate 3.: High

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Programme	**:**	**B. Tech**	**Semester**	**:**	**Final Year**
Name of the Course:		**Cyber Forensics Lab**	**Course Code:**		**SOE-B-CSE-19-F06(2)**
Credits	**:**	**1**	**No of Hours**	**:**	**1 Hrs. / Week**
Max Marks	**:**	**25**			

Course Description:

This course is designed to introduce the principles and practices generally required to investigate the cyber-crimes. It includes the study and practical's related to data acquisition process and tools, evidence analysis procedures and methodologies, taxonomy of digital forensics tools, analysis of network, file signature, malware analysis, malware classification, volatile memory forensics, mobile devices and cloud forensics which are the state-of-the-art requirement in the present and upcoming digital world followed by digital forensics examiner.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Understand the scope of digital forensic investigation and severity of crime scene.
CO2	Acquire forensic image of suspected digital device under investigation.
CO3	Examine the evidence using open source and freeware tools.
CO4	Apply different computer forensic tools for conducting malware analysis and reverse engineering.
CO5	Perform investigation practices using different operating systems on different class of malwares.

The following concepts will be covered in the lab:

- Discuss the process of installing malware hunter toolset: Wireshark. Provide the scope of the installed tool.
- Discuss the process of installing malware hunter toolset: PeStudio. Provide the scope of the installed tool.
- Discuss the process of installing malware hunter toolset: RegShot. Provide the scope of the installed tool.
- Discuss the process of installing malware hunter toolset: Hexinator. Provide the scope of the installed tool.
- Discuss the process of installing FTK Imager tool for creating and analyzing forensic image. Provide the scope of the installed tool.
- Discuss the process of installing Autopsy tool for creating and analyzing forensic image. Provide the scope of the installed tool.
- Demonstrate the procedure to make the forensic image of the hard drive or USB using FTK Imager tool.

- Set up a safe virtual environment to analyze malware like sandbox.
- Quickly extract network signatures and host-based indicators.
- Discuss the use of Use key analysis tools like IDA Pro, OllyDbg, and WinDbg.
- Develop a methodology for unpacking malware and get practical experience with five of the most popular Packers
- Analyze special cases of malware with shellcode, C++, and 64-bit code
- Install Reanimator in your Windows machine and scan the system for Malware and prepare one report for the same.

Reference Books:

- Mangesh M. Ghonge, Sabyasachi Pramanik, Ramchandra Mangrulkar, Dac-Nhuong Le, "Cyber Security and Digital Forensics: Challenges and Future Trends", Wiley-Scrivener.
- Greg Gogolin, "Digital Forensics Explained", 2nd Edition, CRC Press/Taylor & Francis Group
- Chuck Easttom, "Digital Forensics, Investigation, and Response", 4th Edition, Jones & Bartlett Learning
- Darren R. Hayes, "A Practical Guide to Digital Forensics Investigations", 2nd Edition, Pearson IT Certification

CO-PO & PSO Correlation

Course Name: Cyber Forensics Lab												
	Program Outcomes								PSOs			
Course Outcomes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**3**	**2**	**2**			**2**	**3**		**3**	**1**	**1**	**1**
CO2:		**2**	**1**			**1**			**1**	**2**	**2**	**1**
CO3:	**3**	**2**				**2**	**1**		**2**	**3**	**1**	**1**
CO4:	**3**	**2**	**1**			**2**	**1**		**2**	**3**	**1**	**1**
CO5:	**3**	**2**	**2**			**2**	**2**		**3**	**2**	**2**	**2**

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**Final Year**
Name of the Course:		**N L P Lab**	**Course Code:**		**SOE-B-CSE-19-F07(1)**
Credits	**:**	**1**	**No of Hours**	**:**	**1 Hrs. / Week**
Max Marks	**:**	**25**			

Course Descriptions:

The laboratory augments the lecture course in Artificial Intelligence (AI) by providing experience with AI programming techniques. The laboratory introduces Common Lisp, reviews the fundamentals of symbolic programming, and considers such issues in AI programming such as pattern matching, search, problem solving, and reasoning tasks.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	Creation of Bag of Words for text classification.
CO2	Implementing text Pre-processing techniques
CO3	Designing tools to remove stop words in dictionary
CO4	Creating training and testing data set for text classification
CO5	Designing machine learning based sentiment analysis.

The following concepts will be covered in the lab:

- Creation of Bag of Words for text classification.
- Implementing text Preprocessing techniques
- Designing tools to remove stop words in dictionary
- Creating training and testing data set for text classification
- Designing machine learning based sentiment analysis.

Reference Books:

- Daniel Jurafsky, James H. Martin, “Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech”, Pearson Publication, 2014
- Steven Bird, Ewan Klein and Edward Loper, “Natural Language Processing with Python”, 1st Edition, O_Reilly Media, 2009
- Breck Baldwin, “Language Processing with Java and LingPipe Cookbook”, Atlantic Publisher, 2015
- Richard M Reese, “Natural Language Processing with Java”, O_Reilly Media, 2015.
- Nitin Indurkhya, Fred J. Damerau, “Handbook of Natural Language Processing”, 2nd Edition, Chapman and Hall/CRC Press, 2010
- Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008

CO-PO & PSO Correlation

Course Name: NLP Lab												
	Program Outcomes								PSOs			
Course	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**2**				**1**			**1**	**2**	**1**	**1**
CO2:	**2**			**1**	**1**		**2**			**1**	**2**	**1**
CO3:	**2**	**2**						**1**		**2**	**1**	
CO4:	**2**	**1**					**1**		**1**	**1**	**2**	**1**
CO5:	**1**	**2**		**1**	**1**	**2**			**1**	**2**		**1**

Note: 1.: Low 2.: Moderate 3.: High

Programme	**:**	**B. Tech**	**Semester**	**:**	**Final Year**
Name of the Course:		**Signal Processing and Data Analytics lab**	**Course Code:**		**SOE-B-CSE-19-F07(2)**
			No of Hours	**:**	**1 Hrs. / Week**
Credits	**:**	**1**			
Max Marks	**:**	**25**			

Course Descriptions:

The laboratory augments the lecture course in Signal Processing and Data Analytics by programming signal processing and classification techniques. The laboratory introduces programming concepts of signal analysis and signal classification.

Course Outcomes:

After Completion of the course Students will be able to:

CO Number	Course Outcome
CO1	2D signal analysis using Fourier transform
CO2	2D signal analysis using Fourier transform
CO3	Analysis of signals using machine learning techniques
CO4	Signal classification using machine learning techniques
CO5	2D signal classification using CNN

The following concepts will be covered in the lab:

- Forward and Inverse Fourier transform of 1-Dimensional Signal.
- Forward and Inverse Fourier transform of 2-Dimensional Signal.
- Analysis 1D and 2D signal spectrum using machine learning techniques.
- Classification of different signals using SVM classifer.
- Classification of 2D signal using CNN.

Reference Books:

- David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016
- S. K. Mitra, “Digital Signal Processing: A Computer-Based Approach”, 3rd edition, McGraw-Hill, 2006
- Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014.
- , Li Tan , Jean Jiang, “Digital Signal Processing fundamentals and Applications”, 2nd edition, Academic Press,2013

CO-PO & PSO Correlation

Course Name: Signal Processing and Data Analytics Lab												
	Program Outcomes								PSOs			
Course	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1:	**2**	**2**							**1**	**2**	**1**	**1**
CO2:	**2**			**1**						**1**	**2**	**1**
CO3:	**2**	**2**								**2**	**1**	
CO4:	**2**	**1**							**1**	**1**	**2**	**1**
CO5:	**1**	**2**		**1**					**1**	**2**		**1**

Note: 1.: Low 2.: Moderate 3.: High