## **FACULTY OF ENGINEERING**

## Scheme of Instructions & Detailed Syllabus of I Year

## For

## Four Year Degree Programme of

## **Bachelor of Engineering (B.E)**

in

# **Information Technology**

(With effect from the academic year 2021-22) (Approved by College Academic Council on 14th July, 2021)

Empower Women - Impact The World



Issued by Dean, Academics STANLEY COLLEGE OF ENGINEERING AND TECHNOLOGY FOR WOMEN (AUTONOMOUS) (Affiliated to Osmania University) (Accredited by NAAC with "A" Grade) Abids, Hyderabad - 500 001, Telangana.

## Vision of the Institute

Empowering girl students through professional education integrated with values and character to make an impact in the World.

## **Mission of the Institute**

- **M1:** Providing quality engineering education for girl students to make them competent and confident to succeed in professional practice and advanced learning.
- M2: Establish state-of-art-facilities and resources to facilitate world class education.
- M3: Integrating qualities like humanity, social values, ethics, leadership in order to encourage contribution to society.

## **Vision of the Department**

Empowering girl students with the contemporary knowledge in Information Technology, for their success in life

## **Mission of the Department**

- **M1**: Providing quality education and excellent environments for students to learn and practice various latest hardware, software and firmware platforms.
- M2: To establish industry oriented training integrated with opportunities for team work, leadership.
- M3: To groom students with values, ethics and social activities

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## **Program Educational Objectives**

- **PEO1**: Graduates shall have enhanced skills and contemporary knowledge to adapt new software and hardware technologies for professional excellence, employment and Research.
- **PEO 2:** Proficient in analyzing, developing and solving engineering problems to assist life-long learning and to develop team work.
- **PEO 3:** To inculcate self-confidence, acquire professional and ethical attitude, infuse leadership qualities, impart proficiency in soft-skills, and the ability to relate engineering with social issues.

## **Program Specific Outcomes**

- **PSO1:** Acquire skills to design, analyze and implement algorithms using high-level programming languages.
- **PSO2:** Contribute their engineering skills in information technology domains like operating systems, network design and web designing, database design and cloud computing.
- **PSO3:** An ability to design and implement knowledge based discovery and machine learning by using the various concepts of digital system design, neural networks, internet of things.

**BE-IT** (Full – Time)

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# **Scheme of Instructions**

Abbreviation	Meaning
HS	Humanities, Social Sciences and Management
BS	Basic Sciences including Mathematics, Physics and Chemistry
ES	Engineering Sciences including Workshop, Drawing, Basic Electrical / Electronics
PC	Professional Core Courses
PE	Professional Elective Courses
OE	Open Elective Courses
PW	Project Work
MC	Mandatory Courses - Compulsory, Non credit Course
AC	Audit Courses - Non credit Course, Awareness Course
PY	Philosophy
EG	English
MT	Mathematics
PH	Physics
СН	Chemistry
ME	Mechanical Engineering
EC	Electronics and Communication Engineering.
CE	Civil Engineering,
IT	Information Technology
CS	Computer Science Engineering
EE	Electrical and Electronics Engineering
СМ	Computer Engineering
AD	Artificial Intelligence and Data Science
L	Lecture - Each contact hour is a clock hour
Т	Tutorial
Р	Practical -The duration of the Practical class is two hours
G	Grade
D	Drawing
CIE	Continuous Internal Evaluation
SEE	Semester End Evaluation

## **INDUCTION PROGRAM**

- Students come with diverse thoughts, backgrounds and preparations. It is important to assist them adjust in the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Keeping the above thought in mind AICTE proposes a 3-week induction program for the UG students entering the institution before the commencement of normal classes which will start only after the induction program is over.
- Its purpose is to make the students feel comfortable in their new environment, set a healthy daily routine, create bonding in the batch as well as between faculty, develop awareness, sensitivity and understanding of the self, society at large, and nature.
- The following are the activities under the induction program in which the student should be fully and actively engaged throughout the entire duration of the program.

SMC 900 IT Induction Program (Mandatory)	<b>3</b> Weeks Duration
Induction program for students to be offered right at the start of the first year	<ul> <li>Physical Activity</li> <li>Creative Arts</li> <li>Universal Human Values</li> <li>Literary</li> <li>Proficiency Modules</li> <li>Lectures by Eminent People</li> <li>Visits to local Areas</li> <li>Familiarization to Dept Branch &amp; Innovations</li> </ul>

## **BE (INFORMATION TECHNOLOGY)**

## **SEMESTER - I**

S.	Course	Course Title		S	chem	ne of		Scher	ne of	Cre-
No.	Code			In	stru	ction	E	xami	nation	dits
			L	T	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
						Week			in Hours	
Theory Courses										
1	SBS101MT	Mathematics-I	3	1	-	4	40	60	3	4
2	SBS904CH	Chemistry	3	-	-	3	40	60	3	3
3	SES 101CS	Programming for								
		Problem Solving	3	-	-	3	40	60	3	3
4	SES901EC	Basic Electrical and								
		Electronics Circuits	3	-	-	3	40	60	3	3
5	SMC903CE	Environmental	2	0	-	2	40	60	3	0
		Science								
6	SAC902IT	Design Thinking	2	0	-	2	50	-	0	0
		Practical / La	bor	ato	ory (	Courses				
7	SBS913CH	Chemistry Lab			4	4	40	60	3	2
0		Encirconing Countries				-				_
8	SES9ISME	& Design	1		1	5	40	60	3	3
			1	-	-	5	40	00	5	5
9	SES911EC	Basic Electrical and								
		Electronics						6.0		
		Circuits Lab	-	-	4	4	40	60	3	2
10	SES111CS	Programming for								
		Problem Solving Lab	-	-	4	4	40	60	3	2
		Credits	17	01	16	34	410	540	-	22

## **SEMESTER - II**

S.	Course	Course Title		S	chem	ne of		Scher	ne of	Cre-
No.	Code			Instruction			E	xami	nation	dits
			L	T	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
		Theory		<u> </u> החי	reee	week			In Hours	
	GUGGGIEG		y C	l	1363	•	4.0	60	2	•
1	SHS901EG	English	2	-	-	2	40	60	3	2
2	SBS902PH	Applied Physics	3	-	-	3	40	60	3	3
3	SBS201MT	Mathematics-II	3	1	-	4	40	60	3	4
4	SPC201IT	Data Structures with C	3	-	-	3	40	60	3	3
5	SMC902PY	Essence of Indian								
		Traditional Knowledge	2	-	-	2	40	60	-	-
6	SMC901PO	Indian Constitution	2	-	-	2	40	60	-	-
		<b>Practical</b> / ]	La	boı	ator	y Course	es			
7	SHS911EG	English lab	-	-	2	2	40	60	3	1
8	SBS912PH	Applied Physics Lab			4	4	40	60	3	2
9	SES914ME	Workshop	-	-	6	6	40	60	3	3
10	SPC211IT	Data Structures with				~	10	60	2	1
		C Programming lab			2	2	40	60	3	1
11	SPW211IT	Field Work		he	stude	nts have	50			1
11	51 \\21111		t		nderø	o a Field	50			1
			W	vor	k of 2	2 week				
			d	ura	tion	after				
			Ι	[- S	eme	ster SEE				
			or during semester							
			b	rea	ks.					
		Total	15	01	14	30	450	600	24	20

## **SEMESTER - III**

S.	Course	Course Title		S	chem	e of	Scheme of			Cre-
No.	Code		Instruction			E	2 <b>xami</b>	nation	dits	
			L	Т	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
						Week			in Hours	
		Theory	y C	ou	rses			-		
1	SBS302MT	Probability and statistics	3	-	-	3	40	60	3	3
2	SPC301IT	OOPS using JAVA	3	-	-	3	40	60	3	3
3	SES302EC	Digital Electronics &								
		Logic Design	3	-	-	3	40	60	3	3
4	SPC301IT	Database Management								
		Systems	3	-	-	3	40	60	3	3
5	SPC302IT	Discrete Mathematics	3	-	-	3	40	60	3	3
6	SAC903EE	Electrical Technology	2	-	-	2	50	-	-	-
		Practical / Lal	or	ato	ory (	Courses				
6	SPC311IT	OOPS using JAVA Lab	-	-	3	3	40	60	3	1.5
7	SPC311IT	Database Management								
		Systems Lab	-	-	3	3	40	60	3	1.5
8	SHS912EG	Soft Skills Lab	1	-	2	3	40	60	3	2
		Total	18	-	8	26	370	480	24	20

## **SEMESTER - IV**

S.	Course	Course Title		S	chen	ne of		Scher	ne of	Cre-
No.	Code			In	stru	ction	E	xami	nation	dits
			L	T	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
						Week			in Hours	
		Theory	y C	ou	rses					
1	SES401EC	Techniques on Signals								
		and Systems	3	-	-	3	40	60	3	3
2	SPC401IT	Theory of Automata	3	-	-	3	40	60	3	3
3	SPC402IT	Operating Systems	3		-	3	40	60	3	3
4	SES402EC	Fundamentals of								
		Digital Image								
		Processing	3	-	-	3	40	60	3	3
5	SPC404IT	Computer Organization								
		and Microprocessor	3	-	-	3	40	60	3	3
		Practical / Lal	bor	ato	ory (	Courses				
6	SPC414IT	Python Lab	1		2	3	40	60	3	2
7	SPC412IT	Operating Systems Lab	-	-	3	3	40	60	3	1.5
8	SPC413IT	Microprocessor Lab	-	-	3	3	40	60	3	1.5
9	SPW511IT	Internship-1	Т	he	stud	ents have				
		-	to	o u	nderg	go a				
			Iı	nte	rnshi	p of				
			4	W	eek d	luration				
			after IV- Semester							
			SEE 50 -			1				
		Total	16	-	8	24	370	540	24	21

## **SEMESTER - V**

S.	Course	Course Title		S	chem	e of		Scher	ne of	Cre-
No.	Code		Instruction			E	xami	nation	dits	
			L	Т	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
						Week			in Hours	
		Theory	y C	ou	rses					
1	SHS501BM	Finance & Accounting	3	-	-	3	40	60	3	3
2	SPC501IT	Compiler Construction	3	1	-	4	40	60	3	4
3	SPC502IT	Data Communications								
		& Computer Networks	3	1	-	4	40	60	3	4
4	SPC503IT	Design and Analysis								
		of Algorithms	3	-	-	3	40	60	3	3
5	SPE1501IT	PE-1	3	-	-	3	40	60	3	3
		Practical / Lal	or	ato	ory (	Courses				
6	SPC511IT	Compiler Construction								
		Lab	-	-	2	2	40	60	3	1
7	SPC512IT	Web Application								
		Development Lab	1	-	3	4	40	60	3	2.5
8	SPC513 IT	Data Communications								
		& Computer Networks								
		Lab	-	-	3	3	40	60	3	1.5
		Total	16	2	8	26	320	480	24	22

## **SEMESTER - VI**

<b>S.</b>	Course	Course Title		S	chem	ne of	Scheme of			Cre-
No.	Code		Instruction			E	xami	nation	dits	
			L	T	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
						Week			in Hours	
	Theory Courses									
1	SPC601IT	Embedded Systems	3	-	-	3	40	60	3	3
2	SPC602IT	Software Engineering	3	-	-	3	40	60	3	3
3	SPC603IT	Artificial Intelligence								
		& Machine Learning	3	-	-	3	40	60	3	3
4	SPE-II	PE-II	3	-	-	3	40	60	3	3
5	SOE-I	OE-I	3	-	-	3	40	60	3	3
		Practical / Lal	bor	ato	ory (	Courses				
6	SPC611IT	Embedded Systems Lab	-	-	3	3	40	60	3	1.5
7	SPC612IT	Artificial Intelligence								
		& Machine Learning Lab	-	-	3	3	40	60	3	1.5
8	SPW613IT	Mini Project Lab								
		(Software Engineering)	-	-	4	4	40	60	3	2
9	SPW614IT	Technical Seminar	-	-	2	2	50	-	3	1
10	SPW611IT	Internship - 2 The students have to								
		undergo a Internship of	`4 v	wee	ek du	ration				
		after VI- Semester SEE 50 -				1				
		Total	15	-	12	27	420	480	24	22

## **SEMESTER - VII**

S.	Course	Course Title		S	chem	e of	Scheme of			Cre-
No.	Code		Instruction			E	xami	nation	dits	
			L	Т	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
						Week			in Hours	
		Theory	y C	ou	rses					
1	SPC701IT	Internet of Things	3	-	-	3	40	60	3	3
2	SPE-III	PE-3	3	-	-	3	40	60	3	3
3	SPE-IV	PE-4	3	-	-	3	40	60	3	3
4	SPE-V	PE-5	3	-	-	3	40	60	3	3
5	SOE-II	OE-2	3	-	-	3	40	60	3	3
		Practical / Lal	bor	ato	ory C	Courses				
6	SPC711IT	Internet of Things LAB	-	-	4	4	40	60	3	2
7	SPE-III711IT	PE-III LAB	-	-	2	2	40	60	3	1
8	SPE-IV712IT	PE-IV LAB	-	-	2	2	40	60	3	1
9	SPW711IT	Project Work -1	-	-	6	6	50	-	_	3
		Total	15	-	14	29	370	480	24	22

## **SEMESTER - VIII**

S.	Course	Course Title		S	chem	e of	Scheme of			Cre-
No.	Code			In	strue	ction	E	xami	nation	dits
			L	T	P/D	Contact	CIE	SEE	SEE	
						Hours/			Duration	
						Week			in Hours	
	Theory Courses									
1	SOE-III	Open Elective - III	3	-	-	3	40	60	3	3
		Practical / Lal	or	ato	ory (	Courses				
2	SPW811IT	Project Work- 2	-	-	4	8	40	120	-	8
		Total	3	-	4	11	80	180	3	11

### **Professional Electives**

=

<b>Professional Elective - I</b>	
SPE 521 IT	Network security & cryptography
SPE 522 IT	Computational Intelligence
SPE 523 IT	Advanced databases
SPE 524 IT	Wireless mobile communications
SPE 525 IT	Principles of Programming

<b>Professional Elective - II</b>	
SPE 621 IT	Information Security
SPE 623 IT	Natural Language Processing.
SPE 624 IT	Information retrieval systems
SPE 625 IT	Ad-hoc and Sensor Networks
SPE 626 IT	Parallel Algorithms

<b>Professional Elective - III</b>	
SPE 721 IT	Database Security
SPE 722 IT	Deep learning
SPE 723 IT	Data mining and Data ware housing
SPE 724 IT	Cloud computing
SPE 725 IT	PHP

<b>Professional Elective - IV</b>	
SPE 731 IT	IOT Security
SPE 732 IT	Big Data Analytics
SPE 733 IT	Data Science using R
SPE 734 IT	VLSI Design
SPE 735 IT	Agile Software Development

<b>Professional Elective - V</b>	
SPE 741 IT	Computer Forensics
SPE 742 IT	Semantic Web
SPE 743 IT	Data Science & Virtualization
SPE 744 IT	Block chain Technology
SPE 745 IT	Software Quality Assurance and Testing

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S.No	Mandatory Course and Code	Mandatory Course -Subject Name
1	MC 904	Induction Program
2	MC 905 CE	Environmental Science
3	MC 906 PO	Indian Constitution
4	MC 907 PY	Essence of Indian Traditional Knowledge

S.No	Audit Course and Code	Audit Course -Subject Name
1	S AC901IT	Design Thinking
2	S AC902EE	Electrical Technology

## **List of Open Electives**

## **Open Elective - I**

S.No.	<b>Course Code</b>	Course Name	Course Offered By the Department
			the Department
1.	SOE 901EE	Reliability Engineering	EEE
2.	SOE 901EC	Telecommunication Network	
		Management	ECE
3.	SOE 901CS	Open Source Technologies	CSE/CME/AIDS
4.	SOE 901 HS	Industrial Safety & Disaster	
		Management	H&S
5.	SOE 901 HS	Project and Proposal Writing	

## **Open Elective - II**

S.No.	Course Code	Course Name	Course Offered By the Department
1	SOE902EE	Introduction to Renewable	
		Energy Systems	EEE
2	SOE902EC	Medical Electronics	ECE
3	SOE 902CS	Quantum Computing	CSE / CME / AIDS
4	SOE902HS	Quantitative Analysis for	
		Business Decisions [OR]	H & S
5	SOE902LW	Intellectual Property Rights	

## **Open Elective - III**

S.No.	Course Code	Course Name	Course Offered By the Department
1	SOE 903EE	Energy Conservation and	
		Management	EEE
2	SOE 903EC	Consumer Electronics	ECE
3	SOE903CS	Basics Of 3-D Printing	CSE / CME / AIDS
4	SOE903 HS	Basics of Entrepreneurship	H & S
5	SOE903CE	Industrial Pollution Prevention and Control	

## List of open electives offered to other departments

S.No.	Course Code	Course Name	Course Offered By the Department
1	SOE901 IT	Database Management Systems	IT
2	SOE902IT	Software Engineering	IT
3	SOE903 IT	Python Programming	IT

# **First Year Syllabus**

# I Semester

## **MATHEMATICS - I**

Course Code	Course Title						<b>Core / Elective</b>
SBS101MT							
	(Diff	erential	Core				
		(					
Pre Requisite	L	Т	Credits				
-	3	1	-	-	40	60	4

### **Course Objectives**

- 1. To introduce the concepts of sequences, series, and their properties.
- 2. To introduce the concepts of functions of several variables and multiple integrals.
- 3. To study vector differential and integral calculus..

## **Course Outcomes**

- 1. Find the nature of series and sequences.
- 2. Apply this knowledge to solve the curriculum problems.
- 3. Evaluate Multiple Integrals.
- 4. Solve the engineering problems using Numerical methods.

### Unit - I

**Sequence and series :** Sequences - General properties of series, Series of positive terms, Comparison test, tests of convergence-D'Alembert's Ratio test, Cauchy's nth root test, Raabe's test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence, and Conditional convergence.

## Unit - II

**Calculus of one variable :** Rolle's theorem, Lagrange's, Cauchy's Mean value theorems, Taylor's series, Curvature, Radius of curvature, Circle of Curvature, Envelope of family of curves, Evolutes and Involutes.

### Unit - III

**Multivariable Calculus (Differentiation) :** Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions(Chain rule), Change of variables, Jacobian, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum of values of functions of two variables, Lagrange's method of undetermined multipliers.

## Unit - IV

**Vector Calculus :** Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem (without proofs) and their verification with respect to Cartesian, polar and parametric co-ordinates, applications.

## Unit - V

**Numerical Methods :** Solutions of Algebraic and transcendental equations-Bisection method, Regula falsi method, Newton Raphson method, Solutions of linear system of equations, Gauss- elimination method, Gauss-Seidel iteration method, Interpolation, Lagrange's Interpolation, Newton's Divided Difference interpolation, Newton's Forward and Back ward difference interpolations.

## **TEXT / REFERENCE / ADDITIONAL BOOKS :**

- 1. Dr. B.S.Grewal, Higher. Engineering Mathematics, Khanna Publications, 43 Edition, 2014.
- 2. B.V.Ramana, Higher Engineering Mathematics, 23'dreprint, 2015.
- 3. N. Bali, M. Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2010.
- 4. G.B. Thomas, Maurice Weir and Joel Hass, Thomas Calculus, Peterson, 12 Edition, 2010.
- 5. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley, 9 Edition, 2012.

## CHEMISTRY

Course Code	Course Title						<b>Core / Elective</b>
SBS904CH	(A	<b>Chemistry</b> (AL& DS_CME_CSE_IT Branches)					Core
	Cont	Contact Hours per Week         CIE         SEE					Credits
Pre Requisite	L	L T D P					
-	3	-	-	-	40	60	3

#### **Course Objectives**

- 1. Acquire the knowledge of the materials and properties to understand the role of chemistry in engineering & technology.
- 2. Acquaint the students with water quality and treatment methods. Impart knowledge of corrosion and its significance
- 3. Know the conversion of chemical energy into electrical energy and its applications. Explore the knowledge of batteries and improvement.
- 4. Familiarizes with green fuels and various types of fuels, their industrial uses and effects on environment and importance of green fuels.
- 5. Importance of nano & composite materials in innovative of technologies.

#### **Course Outcomes**

- 1. Realises the importance of water quality and usefulness of knowledge of corrosion. (Knowledge)
- 2. Understands electrochemical process and their applications (Application)
- 3. Become aware of polymer science and conducting polymers, which create the tailor made conducting polymers (Knowledge)
- 4. Classify chemical fuels and grade them through qualitative analysis. (Knowledge, Analysis)

Acquire knowledge of important materials (Knowledge)

#### **UNIT 1: Water Chemistry**

Hardness of water, types of hardness, units of hardness, Determination of temporary & permanent hardness by EDTA method, Numericals. Alkalinity of water - its determination. Water softening by ion exchange and reverse osmosis methods, Boiler troubles-scale and sludge formation, effects and prevention. Specification of potable water. Sterilization by chlorination.

### **Corrosion and its Control**

Causes and effects of corrosion, chemical(dry) corrosion, Electrochemical(wet) corrosion-Mechanisms. Types of electrochemical corrosion, Factors affecting the rate of corrosion – Corrosion control methods- cathodic protection: sacrificial anode method and impressed current method, Surface coatings : Types of metallic coatings- anodic and cathodic coatings. Methods of application of metallic coatings- Hot dipping, galvanizing, tinning.

## UNIT 2: Electrochemistry and Battery Chemistry

**Electrochemistry:** Electrochemical cells, Electrolytic and Galvanic cells-notation, cell reaction and cell potentials. Types of electrodes, Calomel Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode. Thermodynamics of emf of cells, Nernst equation and its derivation. Applications of Nernst equation to electrode potential and emf of cells. Numerical problems.

### **Battery Chemistry :**

Types of Batteries: Primary batteries: Zinc- Carbon Battery, SecodaryBatteries: Lead – acid battery, Ni-Cd battery, Lithium ion batteries, and their application,

Solar cells: Concept of Solar energy conversion, photovoltaic cells,

**Fuel cells**: Concept of fuel cells and their advantages,  $H_2 - O_2$  fuel cell and,  $CH_3OH - O_2$  fuel cell

## UNIT 3: Molecular Structure & Polymers

**Molecular Structure:** Linear Combination of atomic orbitals (LCAO), Molecular Orbital Theory, Molecular Orbital energy level diagrams of diatomic molecules- O<sub>2</sub> , N<sub>2</sub>, NO.

**Polymer Chemistry:** Fundamentals of Polymers, Nomenclature, types of Polymerization. Classification of polymers. Preparation, Properties and Applications of Plastics: PET and Bakelite, Elastomers: Buna-S and Silicone rubbers. Fibers: Kevlar

**Biodegradable Polymers:** Introduction preparation, properties and applications of polylactic acid

**Conducting Polymers :** Introduction, classification. Mechanism of conduction in polyacetylene. Applications of conducting polymers

### **UNIT 4 : Chemical Fuels**

Definition and classification of fuels, Requirements of good fuel,, Combustion : Ignition temperature of a fuel, calculation of air quantities by weight and volume required for the

combustion of the fuels. Calorific value - HCV,LCV. Theoretical calculation of calorific value by Dulong's formula - Numerical. Solid fuels: Coal and its chemical composition, Proximate analysis, Ultimate analysis and significance. Liquid fuels: Source - Fractional distillation of petroleum, important fractions, and their uses. Knocking, Fuel rating- Octane and Cetane numbers. Gaseous fuels-LPG, CNG composition and uses.

## **UNIT 5 : Engineering Materials**

BioDiesel: Sources, concept of trans esterification, Applications of Biodiesels.

Green Chemistry : Concept and principles of green chemistry, examples of clean technology

**NanoMaterials :** Introduction – Concept of Nonmaterials, types of Nanomaterials: Carbon nano tubes, Quantum dots, Nanowires, Nanocrystals.

**Composite Materials :** Introduction, Constituents of Composites, types and classification of composites, polymer matrix composite, metal matrix composite and ceramic matrix composites. Advantages and applications of composites.

### **Text Books :**

- 1. P.C.Jain and M.Jain, Engineering Chemistry, Dhanapathi Rai publishing
- 2. Text Book of Engineering Chemistry bu Shashi Chawla
- 3. Chemistry in Engineering and Technology by Kuriacose & Rajaram.
- 4. Engineering chemistry by B Shivashankar
- 5. Text Book of Engineering Chemistry by Dr. S.S. Dara, Dr. K. Mukkanti, S.CHAND

## **Reference Books :**

- 1. Principles of Physical Chemistry by Puri, Sharma and Pathania S.N. Chand & Co. NewDelhi (Latest edition).
- 2. Engineering Chemistry by O G Palanna, TMH, and New Delhi.
- 3. Engineering Chemistry by Prasanta Rath, Cengage Learning India Pvt. Ltd.
- 4. Engineering Chemistry (NPTEL web book), by B.L. Tembe, Kamaluddin and M.S. Krishna
- 5. Concise Inorganic Chemistry by J.D. Lee, Blackwell publications V Edition
- 6. Organic chemistry by T.W. Graham Solomons & Craig B.Fryhle, 7<sup>th</sup> Edition, Wiley Publications.
- 7. Engineering Physics by Prof. Battacharya, Oxford press
- 8. Engineering Physics by Gupta & Gupta

## **PROGRAMMING FOR PROBLEM SOLVING**

Course Code			<b>Core / Elective</b>				
SES101CS	P	rogrami	Core				
	Con	tact Hou	rs per Wo	eek	CIE	SEE	Credits
Pre Requisite	L	Т	D	Р			
-	3	-	-	-	40	60	3

## **Course Objectives**

### The course should enable the students to :

- 1. Learn adequate knowledge by problem solvingtechniques.
- 2. Understand programming skills using the fundamentals and basics of CLanguage.
- 3. Improve problem solving skills using arrays, strings, and functions.
- 4. Understand the dynamics of memory by pointers.
- 5. Study files creation process with access permissions.

## **Course Outcomes**

- 1. Describe the concept of computer system, analyze a given problem, develop an algorithm, fundamental programming constructs, identify data representation formats, and describe operators and their precedence, associativity.
- 2. Understand branching and loop statements.
- 3. Describe the concept of homogeneous derives data types, strings and functions.
- 4. Understand pointers and heterogeneous data types.
- 5. Describe the concept of file system.

## Unit-I INTRODUCTION

Introduction to Programming: Computer system, components of a computer system, computing environments, computer languages, creating and running programs, algorithms, flowcharts; Introduction to C language: Computer languages, History of C, basic structure of C programs, process of compiling and running a C program, C tokens, keywords, identifiers, constants, strings, special symbols, variables, data types; Operators and expressions.

## UNIT - II CONTROL STRUCTURES

Conditional Control structures: Decision statements; Simple if, if-else, else if ladder, Nested if and Case Statement-switch statement; Loop control statements: while, for and do while loops. jump statements, break, continue, goto statements

## UNIT - III ARRAYS AND FUNCTIONS

Arrays: Concepts, one dimensional arrays, declaration and initialization of one dimensional arrays, two dimensional arrays, initialization and accessing, multi-dimensional arrays; Strings: Arrays of characters, variable length character strings, inputting character strings, character library functions, string handling functions.Functions: Need for user defined functions, function declaration, function prototype, category offunctions, inter function communication, function calls, parameter passing mechanisms, recursion, passing arrays to functions, passing strings to functions, storage classes, preprocessor directive.

## UNIT - IV STRUCTURES, UNIONS AND POINTERS

Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, passing structures through pointers, self-referential structures, unions, bit fields, typedef, enumerations; Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, pointers and arrays, pointers as functions arguments, functions returning pointers. Dynamic memory allocation: Basic concepts, library functions.

## UNIT - V FILE HANDLING AND BASIC ALGORITHMS

Files : Streams, basic file operations, file types, file opening modes, input and output operations files, special functions for working with files, file positioning functions, command line arguments. Searching, basic sorting algorithms (bubble, insertion, selection), algorithm complexity through example programs (no formal definitions required).

## **Text Books :**

1. Byron Gottfried, "Programming with C", Schaum's Outlines Series, McGraw Hill Education, 3rd Edition, 2017.2. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education, 6th Edition, 2012.

## **Reference Books:**

- 1. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
- 2. Yashavant Kanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003.
- 3. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.
- 4. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
- 5. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.
- 6. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

## **BASICS ELECTRICAL & ELECTRONIC CIRCUITS**

Course Code			<b>Core / Elective</b>				
SES901EC	Ba	asics Ele	Core				
	Contact Hours per Week CIE SEE					Credits	
Pre Requisite	L	Т	D	Р			
-	3	-	-	-	40	60	3

## **Course Objectives :**

The objectives of this course is to impart knowledge

- 1. To understand DC circuits and theorems.
- 2. To understand AC circuits with R,L and C elements.
- 3. To understand the characteristics of diodes and applications.
- 4. To understand the design concepts of biasing of BJT and FET
- 5. To understand the design concepts of feedback amplifiers and oscillators

## **Course Outcomes :**

After completing this course, the student will be able to:

- 1. Study the DC circuits and theorems.
- 2. Study the AC circuits and RLC circuit analysis.
- 3. Study diode charecteristics and applications as rectifiers and Filters.
- 4. Study the characteristics of BJTand FET
- 5. Ability to analyse & design Feedback amplifiers and Oscillator circuits using OP-AMPs

### Unit - I

**DC Circuits :** Electrical circuit elements (R, Land C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

### Unit - II

**AC Circuits:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R,L,C, and RL, RC, RLC combinations(seriesonly). Three phase balanced circuits, voltage and current relations in star and delta connections.

### UNIT - III

PN Junction Diode: Characteristics, Half wave rectifier, Full wave rectifier, filters, ripple,

regulation, TIF and efficiency, Zener diode and Zener diode regulators, CRO block diagram and applications

## UNIT - IV

**Transistors :** BJT construction and working, modes of operation, configurations of BJT (CB, CE, CC), small signal h-parameter model of CE, CE amplifier analysis. Construction and working of JFET, V-I characteristics of JFET.

## UNIT - V

**Feedback concepts :** Types of negative feedback – modification of gain, bandwidth, input and output impedances.

**OPAMP :** Block diagram, specifications, Inverting & Non inverting amplifiers, Adder, Subtractor, Integrator, Differentiator, Comprator, RC Phase shift, Wein bridge and Crystal Oscillator (Qualitative Analysis only)

#### Suggested Reading :

- 1. Robert Boylestad L. and Louis Nashelsky, *Electronic Devices and Circuit Theory*, PHI, 2007
- 2. Helfrick D and David Cooper, *Modern Electronic Instrumentation and Measurements Techniques*, 1st edition, Prentice Hall of India, 2006.
- 3. Salivahanan, Suresh Kumar and Vallavaraj, *Electronic Devices and Circuits*, 2nd edition, Tata McGraw Hill, 2010.
- 4. Ramakanth A.Gayakwad, *Op-amps and linear integrated circuits*,4<sup>th</sup> edition, Pearson education, 2015.

## **ENVIRONMENTAL SCIENCE**

Course Code		<b>Core / Elective</b>								
SMC903CE		Environmental Science								
	Con	tact Hour	s per We	ek	CIE	SEE	Credits			
Pre Requisite	L	Т	D P							
-	2		-	-	40	60	0			

## **Course Objectives**

- 1. To create awareness and impart basic knowledge about the environment and its allied problems.
- 2. To know the functions of ecosystems.
- 3. To understand importance of biological diversity.
- 4. To study different pollutions and their impact on environment.
- 5. To know social and environment related issues, disasters and their preventive measures

## **Course Outcomes**

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

- 1. Explain the uses of natural resources and the problems and effects of their over exploitation
- 2. Define ecosystem and relate the various elements of its structure and their functions
- 3. Classify the different levels of biodiversity and infer its importance.
- 4. Explain the causes and effects of environmental pollution, and the environmental protection acts.
- 5. Describe the social issues and the relevant environmental ethics, and the disaster management principles.

## Unit - I

*The Multidisciplinary Nature of Environmental Studies* : Definition, scope and importance, need for public awareness.

*Natural Resources* : Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources – World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources – Use and over exploitation, deforestation & its effect on tribal people. Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification. Energy Resources –Growing energy needs, Renewable and Non-renewable energy resources.

#### Unit - II

*Ecosystems* : Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland, desert)

## Unit - III

**Biodiversity :** Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

### Unit - IV

*Environmental Pollution :* Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management. *Environment Protection Act*: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation

#### Unit - V

*Social Issues and the Environment* : Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

*Environmental Disaster Management*: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

*Field Work :* Visit to a local area to document environmental issues - agricultural area/ pond/lake/terrestrial ecosystem. Visit to a local polluted area - market/slum area/ Industrial area/traffic area.

### **TEXT / REFERENCE / ADDITIONAL BOOKS :**

- 1. De Anil Kumar, "*Environmental Chemistry*", New Age Publisher International Pvt Ltd, New Delhi , 2016
- 2. E.P. Odum, 'Fundamentals of Ecology', W.B. Sunders Co., USA., 1971
- 3. M.N. Rao and A.K. Datta, "*Waste Water Treatment*", Oxford and IBK Publications, New Delhi, 2009.
- 4. Benny Joseph, "Environmental Studies", Tata McGraw Hill, New Delhi, 2009
- 5. V.K. Sharma, "*Disaster Management*", National Centre for Disaster Management, IIPE, New Delhi, 1999

Course Code			<b>Core / Elective</b>				
SAC902IT			Core				
	(0	Common	Credits				
		Contac					
Pre Requisite	L T D P CIE SEE						
-	2	-	-	50 -		-	0

## **DESIGN THINKING**

### **Course Objective :**

The main objective of this course is to inculcate interdisciplinary engineering skills in students for taking real time engineering problem available in our society/industry and to come-up with the grass root innovation, can be helpful to all level of human beings.

### **Course Outcomes :**

After completion of this course, student will be able to

- 1. Understand the importance of Design Thinking.
- 2. Evaluate the quality of your information and your emotions; keep thinking straight.
- 3. Identify skills and personality traits of successful problem solving.
- 4. Apply standard problem-solving heuristics to aid in problem solving.
- 5. Apply problem-solving techniques to programming activities.
- 6. Formulate and successfully communicate the solutions to problems.

### Pre-requisite of course : Not Required.

### Module 1 : Design Thinking Skills

Understand the critical design thinking skills needed to either improve an existing product or design a new product.

### Module 2 : Identifying Customer Needs

Learn to identify customer needs and draft customer needs statements as your first step towards user innovations.

### **Module 3 : Product Specifications**

Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help to define those specifications.

## Module 4 : Applied Creativity

Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions.

## Module 5 : Prototyping

Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications.

#### Module 6 : Design for Services

Understand design of services, identify the potential for innovations within them, and learn how to apply product development frameworks to the service context

#### Module 7 : Product Architecture

Learn to use the modular and integral product architectures in determining the building blocks of a product

#### **Module 8 : Financial Analysis**

Learn to perform financial analysis of your project idea and decide if it is backed by a strong business rationale (Worth-It).

#### Module 9 : Design for Environment

Learn how to apply design for environment principles to a product life cycle.

#### **Module 10 : Product Development Processes**

Learn to select and implement a product development process (staged, spiral, and agile) that's aligned to your project needs.

#### **References :**

- 1. H. S. Fogler and S. E. LeBlanc, Strategies for Creative Problem Solving, 2nd edition, Pearson, Upper Saddle River, NJ, 2008.
- 2. A. Whimbey and J. Lochhead, Problem Solving & Comprehension, 6th edition, Lawrence Erlbaum, Mahwah, NJ, 1999.
- 3. M. Levine, Effective Problem Solving, 2nd edition, Prentice Hall, Upper Saddle River, NJ, 1994.

## **CHEMISTRY LAB**

<b>Course Code</b>		<b>Core / Elective</b>					
SBS913CH		Core					
Pre Requisite	Cont	act Hour	s per We	ek	CIE	SEE	Credits
	L	Т	D	Р			
_	-	-	-	4	40	60	2

## **Course Objective :**

- 1. Apply the theoretical knowledge to experiments and acquire skills to handon.
- 2. Impart fundamental knowledge in handling the equipment / glassware and chemicals in chemistry laboratory.
- 3. Apply various instrumental methods to correlation to theory and to improve understanding of theoretical concepts.
- 4. Estimate the water quality analysis.
- 5. Estimation of purity of materials.

## **Course Outcomes :**

- 1. Knowing of the hardness and alkalinity of sample water. (Analysis)
- 2. Measure the amount of a substance in a given solution by conductometry, potentiometry snd PH metry. (Application)
- 3. Analysis of physical properties like surface tension and viscosity. (Analysis)
- 4. Analysis of about rate of reactions and rate constant information. (Knowledge)
- 5. Importance of absorption of light by substance in analysis. (Knowledge, Analysis)

## WATER ANALYSIS

- 1. Determination of hardness of water by EDTA method.
- 2. Determination of Carbonate and Bicarbonate Alkalinity.

## CONDUCTANCE MEASUREMENTS

- 3. Determination of Cell constant
- 4. Estimation of Strong acid with strong base (HCl Vs NaOH)
- 5. Estimation of weak acid with strong base (CH3COOH Vs NaOH )

## POTENTIOMETRIC MEASUREMNETS

- 6. Estimation of HCl
- 7. Estimation of Ferrous ion

#### PH METRY

8. Determination of PH of solution using glass electrode

#### **KINETIC STUDIES**

9. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.

#### SYNTHESIS OF A DRUG MOLECULE

10. Synthesis of Aspirin

#### **DISTRIBUTION STUDIES :**

11. Determination of partition coefficient of acetic acid between Butanol and Water

#### **PHYSICAL CONSTANTS :**

- 12. Determination of Viscosity
- 13. Determination of Surface Tension

#### COLOROMETRY

14. Verification of Beer's Law and Estimation of the given potassium permanganate

#### **Suggested Reading :**

- 1, Senior Practical Physicla Chemistry, B.D.Khosla, A.Gjulati, V.C.Garg., (R.Chand and company, New Delhi 10<sup>th</sup> Edition)
- 2. An Introduction to Practical Chemistry, K.K.Sharma and D.S. Sharma (Viaks Publishing, New Delhi)
- 3. Experiments in Applied chemistry, Sunita Rattan, S. K Kataria & Soms
- 4. Quantitative Inorganic chemistry by Vogel

## **ENGINEERING GRAPHICS AND DESIGN**

Course Code		<b>Core / Elective</b>					
SES915ME	]	Core					
Pre Requisite	Co	ntact Hou	ırs per We	eek	CIE	SEE	Credits
	L	Т	D	Р			
-	1	-	4	-	40	60	3

## **Course Objectives**

To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

To prepare you to use the techniques, skills, modern engineering tools to use for Engineering practice.

## **Course Outcomes**

- 1. Introduction to engineering design and its place in society
- 2. Exposure to the visual aspects of engineering design
- 3. Exposure to engineering graphics standards
- 4. Exposure to solid modelling
- 5. Exposure to computer-aided geometric design
- 6. Exposure to creating working drawings
- 7. Exposure to engineering communication

No	Discription	Lecture	Drawing
1.	Principles of Engineering Graphics and their significance, usage of drawing Instruments.	1	2
2	<b>Conic Sections – I</b> Construction of ellipse, parabola and hyperbola given focus and eccentricity.	1	2
3	<b>Conic Sections – II</b> Construction of ellipse (given major and minor axis), parabola (given base and height), rectangular hyperbola.		2
4	Cycloids (cycloid & epicycloid)	1	2

	Scheme of Instructions & Detailed Syllabus	>	
5	Involutes (involute of triangle, square & circle)		2
6	Scales (plain & diagonal scales)	1	2 + 2
7	<b>Introduction to Auto CAD</b> Basic commands and simple drawings.	1	2 + 2
8	<b>Orthographic Projection</b> Projections of points situated in different quadrants.	1	2
9	<b>Projections of straight lines – I</b> Line parallel to both the reference planes, line perpendicular or inclined to one reference plane.	1	2
10	<b>Projections of straight lines – II</b> Line inclined to both the reference planes.	1	2
11	Projections of planes – I Perpendicular planes	1	2
12	<b>Projections of planes – II</b> Oblique planes	1	2
13	<b>Projections of solids – I</b> Polyhedra and solids of revolution, Projections of solids in simple position.	1	2
14	<b>Projection of solids – II</b> Projections of solids when the axes inclined to one or both the reference planes.	1	2
15	<b>Section of solids – I</b> When the sectional plane is parallel or perpendicular to one reference plane.	1	2
16	Section of solids – II When the sectional plane is inclined to one reference plane.	1	2
17	<b>Development of surfaces</b> – I Prisms and Cylinders	1	2
18	<b>Development of surfaces</b> – <b>II</b> Pyramids and Cones	1	2
19	<b>Intersection of surfaces – I</b> Intersection of cylinder and cylinder	1	2
20	<b>Intersection of surfaces – II</b> Intersection of cylinder and cone	1	2
21	<b>Isometric projection</b> – I planes and simple solids	1	2
22	<b>Isometric projection – II</b> combination of two or three solids	1	2
# **TEXT / REFERENCE / ADDITIONAL BOOKS :**

- T1 Elementary Engineering Drawing, ND Bhatt, Charotar publishers
- T2 Engineering Drawing KL Narayana & P Kannaya, Scitech publications
- **R1** Engineering Drawing and Graphic Technology, T.E French et al, Mc Graw Hill International
- **R2** Engineering Drawing Graphics & Auto cad, K Venugopal, New Age International
- **R3** Engineering Drawing with a primer on Auto cad, AN Siddiquec et al, Prentice hall of India Ltd

# **BASICS ELECTRICAL & ELECTRONIC CIRCUITS LAB**

Course Code			<b>Core / Elective</b>				
SES901EC	Basi	cs Electr	its Lab	Core			
	Con	tact Hou	rs per We	eek	CIE	SEE	Credits
Pre Requisite	L	Т	D	Р			
-	-	-	-	2	40	60	1

## **Course Objective :**

The objectives of this course is to impart knowledge.

- 1. To understand and solve network theorems
- 2. To understand the characteristics of diodes and transistor configurations
- 3. To understand the design of an amplifier circuit.
- 4. To understand the design concepts of oscillators
- 5. To study the applications of OP- AMP

# **Course Outcomes :**

After completing this course, the student will be able to:

- 1. Ability to solve and measure the network parameters
- 2. Ability to analyse characteristics of Diodes &BJTs.
- 3. Ability to design an amplifier circuits.
- 4. Ability to design the different oscillator circuits.
- 5. Ability to design OP-AMP applications.

# List of Experiments :

- 1. State and prove Superposition Theorem.
- 2. State and prove Thevenin Theorem.
- 3. CRO-Measurements such as amplitude frequency and phase using function generator..
- 4. Characteristics of Semiconductors diode (Ge,Si and Zener)
- 5. Full-wave rectifier with and without filters
- 6. Static Characteristics of BJT-Common Emitter
- 7. Transistor as Switch
- 8. Common Emitter Amplifier
- 9. RC-Phase Shift Oscillator
- 10. Operational Amplifier Applications
- 11. OP\_AMP zero crossing detector
- 12. Strain Gauge Measurement

# Suggested Reading :

- 1. Maheshwari and Anand, *Laboratory Experiments and PSPICE Simulations in Analog Electronics*, 1st edition, Prentice Hall of India, 2006.
- 2. David Bell A., *Laboratory Manual for Electronic Devices and Circuits*, Prentice Hall of India, 2001.

# PROGRAMMING FOR PROBLEM SOLVING LABORATORY

Course Code			<b>Core / Elective</b>				
SES111CS	Program	mming f	oratory	Core			
	Con	tact Hou	Credits				
Pre Requisite	L	T D P					
-	-	-	60	2			

## **Course Objectives :**

#### The course should enable the students to :

- I. Formulate problems and implement algorithms using C programming language.
- II. Develop programs using decision structures, loops and functions.
- III. Learn memory allocation techniques using pointers.
- IV. Use structured programming approach for solving of computing problems in real world.

## **Course Outcomes :**

- 1. Understand the concept of basics of C, data types and variables.
- 2. Understand the concept of operators, precedence of operators, conditional statements and looping statements.
- 3. Explore the concept of strings, functions, recursive functions and differences between call by value and call by reference.
- 4. Explore the concept of storage classes, preprocessor directives, pointes and files.
- 5. Understand the concept of file handling functions, searching and sorting methods and real time applications of C.

# LIST OF EXPERIMENTS

# Week-1 OPERATORS AND EVALUATION OF EXPRESSIONS

- a. Write a C program to check whether a number is even or odd using ternary operator.
- b. Write a C program to perform the addition of two numbers without using + operator.
- c. Write a C program to evaluate the arithmetic expression ((a + b / c \* d e) \* (f g)). Read the values a, b, c, d, e, f, g from the standard input device.
- d. Write a C program to find the sum of individual digits of a 3 digit number.
- e. Write a C program to read the values of x and y and print the results of the following expressions in one line:

i. (x + y) / (x - y) ii. (x + y)(x - y)

# Week-2 CONTROL STRUCTURES

- a. Write a C program to find the sum of individual digits of a positive integer.
- b. A Fibonacci sequence is defined as follows : The first and second terms in the sequence are 0 and 1.Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- c. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- d. A character is entered through keyboard. Write a C program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol using if-else and switch case. The following table shows the range of ASCII values for various characters.

Characters ASCII values

A – Z 65 – 90

a – z 97 – 122

 $0-9\;48-57$ 

Special symbols 0 - 47, 58 - 64, 91 - 96, 123 - 127

If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Write a C program to determine how much profit or loss incurred in percentage.

# Week-3 CONTROL STRUCTURES

- a. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use switch statement).
- b. Write a C program to calculate the following sum: sum = 1 x2/2! + x4/4! x6/6! + x8/8! x10/10!
- c. Write a C program to find the roots of a quadratic equation.
- d. Write a C program to check whether a given 3 digit number is Armstrong number or not.
- e. Write a C program to print the numbers in triangular form
  - 1
  - 12
  - 123
  - 1234

# Week-4 ARRAYS

- a. Write a C program to find the second largest integer in a list of integers.
- b. Write a C program to perform the following:
  - i. Addition of two matrices
  - ii. Multiplication of two matrices
- c. Write a C program to count and display positive, negative, odd and even numbers in an array.
- d. Write a C program to merge two sorted arrays into another array in a sorted order.
- e. Write a C program to find the frequency of a particular number in a list of integer.

# Week-5 STRINGS

- a. Write a C program that uses functions to perform the following operations:
  - i. To insert a sub string into a given main string from a given position.
  - ii. To delete n characters from a given position in a given string.
- b. Write a C program to determine if the given string is a palindrome or not.
- c. Write a C program to find a string within a sentence and replace it with another string.
- d. Write a C program that reads a line of text and counts all occurrence of a particular word.
- e. Write a C program that displays the position or index in the string S where the string T begins, or 1 if S doesn't contain T.

# Week-6 FUNCTIONS

- a. Write C programs that use both recursive and non-recursive functions
  - i. To find the factorial of a given integer.
  - ii. To find the greatest common divisor of two given integers.
- b. Write C programs that use both recursive and non-recursive functions
  - i. To print Fibonacci series.
  - ii. To solve towers of Hanoi problem.
- c. Write a C program to print the transpose of a given matrix using function.
- d. Write a C program that uses a function to reverse a given string.

# Week-7 POINTERS

- a. Write a C program to concatenate two strings using pointers.
- b. Write a C program to find the length of string using pointers.
- c. Write a C program to compare two strings using pointers.

- d. Write a C program to copy a string from source to destination using pointers.
- e. Write a C program to reverse a string using pointers.

# Week-8 STRUCTURES AND UNIONS

- a. Write a C program that uses functions to perform the following operations:
  - i. Reading a complex number
  - ii. Writing a complex number

iii.Addition and subtraction of two complex numbers

iv. Multiplication of two complex numbers. Note: represent complex number using a structure.

- b. Write a C program to compute the monthly pay of 100 employees using each employee's name, basic pay. The DA is computed as 52% of the basic pay. Gross-salary (basic pay + DA). Print the employees name and gross salary.
- c. Create a Book structure containing book\_id, title, author name and price. Write a C program to pass a structure as a function argument and print the book details.
- d. Create a union containing 6 strings: name, home\_address, hostel\_address, city, state and zip. Write a C program to display your present address.
- e. Write a C program to define a structure named DOB, which contains name, day, month and year. Using the concept of nested structures display your name and date of birth.

# Week-9 ADDITIONAL PROGRAMS

- a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+.....+xn . For example: if n is 3 and x is 5, then the program computes1+5+25+125. Print x, n, the sum. Perform error checking. For example, the formula does not make sense for negative exponents if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.
- b. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2?s complement of a binary number.
- c. Write a C program to convert a Roman numeral to its decimal equivalent. E.g. Roman number CD is equivalent to 400.

# Week-10 PREPROCESSOR DIRECTIVES

a. Define a macro with one parameter to compute the volume of a sphere. Write a C program using this macro to compute the volume for spheres of radius 5, 10 and 15 meters.

- b. Define a macro that receives an array and the number of elements in the array as arguments. Write a C program for using this macro to print the elements of the array.
- c. Write symbolic constants for the binary arithmetic operators +, -, \*, and /. Write a C program to illustrate the use of these symbolic constants.

# Week-11 FILES

- a. Write a C program to display the contents of a file.
- b. Write a C program to copy the contents of one file to another.
- c. Write a C program to reverse the first n characters in a file, where n is given by the user.
- d. Two files DATA1 and DATA2 contain sorted lists of integers. Write a C program to merge the contents of two files into a third file DATA i.e., the contents of the first file followed by those of the second are put in the third file.
- e. Write a C program to count the no. of characters present in the file.

# **Text Books :**

- 1. Byron Gottfried, "Programming with C", Schaum's Outlines Series, McGraw Hill Education, 3rd Edition, 2017.
- 2. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education, 6th Edition, 2012.

# **Reference Books :**

- 1. B. A. Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3rd Edition, 2014.
- 2. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
- 3. Yashavant Kanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003.
- 4. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.
- 5. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
- 6. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.
- 7. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

# Web References:

- 1. https://www.bfoit.org/itp/Programming.html
- 2. https://www.khanacademy.org/computing/computer-programming

- 3. https://www.edx.org/course/programming-basics-iitbombayx-cs101-1x-0
- 4. https://www.edx.org/course/introduction-computer-science-harvardx-cs50x

# E-Text Books :

- 1. http://www.freebookcentre.net/Language/Free-C-Programming-Books-Download.htm
- 2. http://www.imada.sdu.dk/~svalle/courses/dm14-2005/mirror/c/
- 3. http://www.enggnotebook.weebly.com/uploads/2/2/7/1/22718186/ge6151-notes.pdf

# II SEMESTER

# **ENGLISH**

Course Code			Course	Title			<b>Core / Elective</b>
SES901EG							
		(Co	Core				
	Con	tact Hou	Credits				
Pre Requisite	L	Т					
-	2	-	-	-	40	60	2

#### **Course Objectives :**

To enhance the English language abilities of Engineering students, especially in reading and writing, by

- 1. using authentic material for language learning and exposing them to a variety of contentrich texts
- 2. strengthening their grammar and vocabulary
- 3. improving their reading and comprehension skills
- 4. honing their existing writing skills
- 5. encouraging them to think creatively and critically.

# **Course Outcomes :**

On successful completion of the course, the student will be able to:

- 1. Demonstrate competence in language by using appropriate vocabulary and grammar (REMEMBER, APPLY)
- 2. Evaluate themselves for their decision making, critical thinking skills and motivate themselves to understand their goals and dreams through reading (ANALYZE, EVALUATE)
- 3. Improve their writing skills for competitive exams by learning the different types of writings (UNDERSTAND)
- 4. Learn to write effectively for the social media and for their career advancement (UNDERSTAND, APPLY)
- 5. Use inclusive language and demonstrate empathy and treat all people with respect, dignity, and impartiality. (UNDERSTAND, APPLY)

	Scheme of Instructions & Detailed Syllabus
UNIT	DETAILS
I	<ul> <li>Reading: On the Conduct of Life - William Hazlitt</li> <li>Vocabulary: Word formation - part I - Prefixes, Suffixes, Root words</li> <li>Grammar: Articles, Prepositions, Degrees of comparison</li> <li>Writing: Guided Writing (Expanding the outline / Writing from verbal cues), Paragraph writing</li> </ul>
II	Reading: If-by Rudyard Kipling Vocabulary: Word formation – part II Compounding, Blending, and Contractions Grammar: Transitions, Connectives, Tense Writing: Types of writing - I: Expository, Descriptive
III	Reading: Martin Luther King Jr., "I Have a dream" Vocabulary: Synonyms, Antonyms, One-word substitutes Grammar: Narration (Direct - Indirect speech) Writing: Types of writing - II: Persuasive, Narrative
IV	Reading: Road Not Taken – Robert Frost Vocabulary: Words often confused Grammar: Voice Writing: Argumentative Writing
V	Reading: Blog Vocabulary: Inclusive Language, Euphemisms Grammar: Common errors Writing: Writing for social media (Blog, Vlog, Instagram, Twitter)

#### **Suggested Reading**

- 1. Board of Editors. Language and Life: A Skills Approach. Orient Black Swan, 2018.
- 2. Sudharshana, NP and C Savitha. English for Engineers. Cambridge University Press, 2018.
- 3. Kumar, Sanjay and Pushp Lata. English Language and Communication Skills for Engineers. Oxford University Press, 2018.
- 4. Practical English Usage by Michael Swan, Oxford University Press 4<sup>th</sup> edition 2017

# **APPLIED PHYSICS**

Course Code			<b>Core / Elective</b>				
SBS902PH							
	(Co	ommon te	Core				
	Con	tact Hou	Credits				
Pre Requisite	L	Т					
-	3	-	-	-	40	60	3

#### **Course Objectives :**

- 1. Know the construction of lasers and optical fibers and apply their basic principles to various laser systems and optical fibers.
- 2. Understand the properties of dielectric, magnetic and superconducting materials.
- 3. Learn the difference between classical and quantum mechanics and identify the role of quantum mechanics.
- 4. Familiarize with classical and quantum electron theories and use band theory to classify solids. To explain various types of semiconductors and their applications.
- 5. Acquire knowledge of preparation of thin films and basic concepts of nano materials.

#### **Course Outcomes :**

- 1. Explain the lasing action in lasers, propagation of light in optical fibers and compile their applications in different fields.
- 2. Select the materials for various applications in different fields.
- 3. Apply and solve various engineering problems from concepts of dual nature of particles.
- 4. Classify solids based on their energy band structures. Identify semiconductors for engineering applications.
- 5. Show their understanding in current applications like solar cell and explain the importance of nano materials in our daily life.

#### Unit - I :

**Lasers :** Characteristics of Lasers, Basic concepts of transitions - absorption, spontaneous and stimulated emissions, Einstein's theory for matter and radiation interaction (A & B coefficients), Concepts of meta stable states, population inversion and pumping, Components of lasers, Types of lasers, Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.

**Fiber optics :** Optical fiber as a wave guide, Parts of an optical fibre, Basic principle – total internal reflection, Concept of Numerical Aperture (NA) and acceptance angle, Types of optical fibres – Step Index and Graded Index fibres, Fibre drawing process (Double crucible method), Applications of optical fibres.

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## Unit - II :

**Dielectric Materials :** Introduction, Polar and non-polar dielectrics, Types of dielectric polarizations - Expressions for electronic polarizability and ionic polarizability, Frequency and temperature dependence of dielectric polarizations, Ferro electricity - Barium Titanate - Applications of ferroelectrics, Determination of dielectric constant by Capacitance bridge method.

**Magnetic materials :** Introduction, Classification of magnetic materials - Dia, para, ferro, antiferro and ferri magnetic materials their properties and ferrites applications, Weiss molecular field theory of ferro magnetism, Domain theory, Hysteresis curve, Soft and hard magnetic materials and their applications.

## Unit - III :

**Superconductivity :** Introduction, General properties of superconductors, Meissner effect, Josephson effect, BCS theory (qualitative), Type I and Type II superconductors, Applications of superconductors.

**Introduction to Quantum Mechanics :** Introduction, de-Broglie's concept - wave nature of particles (Debroglie wavelength), properties of wave function and its physical significance, Time independent and Time dependent schrodinger wave equations, Particle in a 1D box.

#### Unit - IV :

**Band theory of solids :** Classical free electron theory and its limitations, Band theory - Kronig penny model (qualitative treatment), Energy bands in solids, Classification of materials as conductors, semiconductors and insulators.

**Semiconductors :** Introduction, Intrinsic and extrinsic semiconductors, carrier concentration and conductivity in intrinsic semiconductors, formation of P-N junction diode and its I-V characteristics, Photo cell, Thermistor, Hall effect and its applications.

#### Unit - V :

**Thin Films :** Distinction between bulk and thin films - Thin films preparation Techniques-Thermal evaporation methods & Electron beam evaporation method, Construction and working of solar cell - Applications.

**Nano Materials :** Introduction, Properties of materials at reduced size, Surface to volume ratio at nano scale, Classification of nano materials, Preparation of nano materials - Bottom up methods (sol-gel & CVD) and Top down method (ball milling), Basic ideas of carbon nanotubes, Applications of nano materials and their health hazards.

#### **Text Books :**

- 1. B. K. Pandey and S. Chaturvedi, Engineering physics, Cengage Publications.
- 2. D. K Bhatacharya and Poonam Tandon, Engineering Physics, First Edition, Oxford University Press. Online
- 3. M. Armugam Materials Science, Anuradha Publications.
- 4. G. Aruldhas, Quantum Mechanics, 2nd Edition, Eastern Economy Edition.
- 5. S.O.Pillai, Solid State Physics, 4th Edition, New Age International Publishers.
- 6. A. Goswami, Thin Film Fundamentals, New Age International Publishers.
- 7. Charles P Poole, Jr., Frank J. Owens, Introduction to NanoTechnology, Student Edition, Wiley-India.

#### **Recommended Books :**

- 1. A. J. Dekkar, Solid State Physics, Mac Millan India Ltd.
- 2. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition.
- 3. Feynman P Richard, The Feynman Lectures on Physics, 2nd Edition, Addison-Wesley.
- 4. K. L. Chopra, Thin film Phenomena, Mc Graw Hill, Newyork.
- 5. Nano materials and their Applications, Book series, Springer.

# **MATHEMATICS - II**

Course Code			Course	Title			<b>Core / Elective</b>
SBS201MT							
		(Differen					
		Ι	Core				
	Con	tact Hou	Credits				
Pre Requisite	L	Т					
-	3	1	-	-	40	60	4

#### **Course Objectives :**

- 1. To study matrix algebra and its use in solving system of linear equations and solving eigen value problems.
- 2. To provide the over view of ordinary differential equations.
- 3. To study special functions like Legendre, Beta and Gamma functions.
- 4. To learn Laplace transforms and its properties.

#### **Course Outcomes :**

- 1. Solve system of equations and eigen value problems.
- 2. Solve certain first order and higher order differential equations.
- 3. Solve basic problems of Beta, Gamma and Legendre's Function.
- 4. Apply Laplace transforms, solve ordinary differential equations by using it.

#### Unit - I

**Differential Equations of First Order :** Exact Differential Equations, Integrating Factors, Linear differential Equations, Bernoulli's Equation, Riccati's and Clairaut's differential equations, Orthogonal Trajectories of a Given Family of Curves, Applications of differential equations-L-C, L-R circuit.

#### Unit - II

**Differential Equations of Higher Order :** Solutions of second and higher order linear Homogenous Equations with Constant Coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of Variation of Parameters, solution of Euler-Cauchy Equation, Applications of differential equations-L-CR circuit.

#### Unit - III

**Special functions :** Gamma Function, Beta Function, Relation between Gamma and Beta Functions, Error Function, Power Series Method, Legendre's Differential Equations and Legendre's Polynomial Pn(x), Orthogonal property of Legendre's Polynomial Rodrigue's Formula (with proof).

#### Unit - IV

**Matrices :** Rank of a matrix, Echelon form, System of linear equations, Linear dependence, independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigenvectors, Properties of eigenvalues, Cayley - Hamiltontheorem, Quadraticforms, Reduction of quadratic form to canonical form by orthogonal trans formation, Nature of quadratic form.

#### Unit - V

**Laplace Transforms :** Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary differential Equations using Laplace Transforms.

# **TEXT / REFERENCE / ADDITIONAL BOOKS :**

- 1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 43dEdition, 2014.
- 2. B.V. Ramana, Higher Engineering Mathematics, 23reprint, 2015.
- 3. N. Bali, M. Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2010.
- 4. G.B. Thomas, Maurice Weir and Joel Hass, Thomas' Calculus, Peterson, 12 Edition, 2010

# DATA STRUCTURES USING C

Course Code			<b>Core / Elective</b>				
SES202IT		Da	Core				
	Con	tact Hou	rs per Wo	eek	CIE	SEE	Credits
Pre Requisite	L	Т	D	Р			
-	3	-	-	40	60	3	

#### **Course Objectives : The students will try to learn :**

- 1. To provide students with skills needed to understand and analyze performance tradeoffs of different algorithms / implementations and asymptotic analysis of their running time and memory usage.
- 2. To provide knowledge of basic abstract data types (ADT) and associated algorithms: stacks, queues, lists, tree, graphs, hashing and sorting, selection and searching.
- 3. The fundamentals of how to store, retrieve, and process data efficiently.
- 4. To provide practice by specifying and implementing these data structures and algorithms in C.
- 5. Understand essential for future programming and software engineering courses.

#### **Course Outcomes :**

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

- 1. Carryout the analysis of a range of algorithms in terms of algorithm analysis and express algorithm complex it using the O notation (Understand).
- 2. Make use of recursive algorithm design technique in appropriate contexts (Apply).
- 3. Represent standard ADTs by means of appropriate data structures (Understand).
- 4. Select appropriate sorting technique for given problem (Understand).
- 5. Select appropriate searching technique for given problem (Understand).
- 6. **Implement** standard searching and sorting algorithms; including binary search; merge sort and quick sort; and their complexities (**Apply**).
- 7. Design and **implement** linked lists, stacks and queues in C (**Apply**).
- 8. Explain the use of basic data structures such as arrays, stacks, queues and linked lists in program design (Understand).
- **9. Extend** their knowledge of data structures to more sophisticated data structures to solve problems involving balanced binary search trees, AVL Trees, B-trees and B+ trees, hashing, and basic graphs.

- 10. Design and implement tree structures in C (Apply).
- 11. Compare and contrast the benefits of dynamic and static data structures implementations and choose appropriate data structure for specified problem domain (Understand).
- 12. Quickly **determine and explain** how efficient an algorithm or data structure will be, apply appropriate data structures for solving computing problems with respect to performance (**Analyze**).

# UNIT - I

# INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING

**Basic Concepts :** Introduction to data structures, classification of data structures, operations on datastructures; Algorithm Specification, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega, and Theta notations. Introduction to Linear and Non Linear data structures, Searching techniques: Linear and Binary search; SortingTechniques: Bubble, Selection, Insertion, Quick and Heap Sort and comparison of sorting algorithms.

# UNIT - II

# LINEAR DATA STRUCTURES

**Stacks :** Stack ADT, definition and operations, Implementations of stacks using array, applications of stacks, Arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Arrays, applications of linear queue, circular queue and double endedqueue (dqueue).

# UNIT - III

# LINKED LISTS

**Linked lists :** Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation. Types of linked lists: Circular linked lists, doubly linked lists; Linked list representation and operations of Stack, linked list representation and operations of queue.

# UNIT - IV

# NON LINEAR DATA STRUCTURES

**Trees :** Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary tree variants, threaded binary trees, application of trees, Graphs: Basic concept, graph terminology, Graph Representations - Adjacency matrix, Adjacency

lists, graph implementation, Graphtraversals – BFS, DFS, Application of graphs, Minimum spanning trees – Prims and Kruskal algorithms.

## UNIT - V

# **BINARY TREES AND HASHING**

**Binary search trees :** Binary search trees, properties and operations; Balanced search trees: AVL trees; Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.

#### **Text Books :**

- 1. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education India
- 2. Reema Thareja, Data Structures Using C, Oxford, Second Edition, 2014

#### **Reference Books :**

- 1. S. Lipschutz, "Data Structures", Tata McGraw Hill Education, 1<sup>st</sup> Edition, 2008.
- 2. D. Samanta, "Classic Data Structures", PHI Learning, 2<sup>nd</sup> Edition, 2004.

# ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Course Code			<b>Core / Elective</b>				
SMC902PY	Ess	ence of I	vledge	Core			
	Con	tact Hou	rs per We	eek	CIE	SEE	Credits
Pre Requisite	L	Т	D	Р			
-	2	-	0				

#### **Course Objectives**

- 1. To get a knowledge in Indian Culture
- 2. To Know Indian Languages and Literature and the fine arts in India.
- 3. To explore the Science and Scientists of Medieval and Modern India

#### CourseOutcomes

- 1. Understand philosophy of Indian culture.
- 2. Distinguish the Indian languages and literature.
- 3. Learn the philosophy of ancient, medieval and modern India.
- 4. Acquire the information about the fine arts in India.
- 5. Know the contribution of scientists of different eras.

# UNIT – I

**Introduction to Culture:** Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

#### UNIT – II

**Indian Languages, Culture and Literature:** Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India.

Indian Languages and Literature-II: Northern Indian languages & literature

#### UNIT – III

**Religion and Philosophy**: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

## UNIT – IV

**Fine Arts in India (Art, Technology& Engineering):** Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India.

#### UNIT – V

**Education System in India**: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

#### **Suggested Reading :**

- 1. Kapil Kapoor, "Text and Interpretation: The India Tradition", D. K. Print world, 2005
- 2. Gopala Krishnan, "Science in Samskrit", Samskrita Bharti Publisher, New Delhi, 2017.
- 3. NCERT, "Position paper on Arts, Music, Dance and Theatre" NCERT, New Delhi, 2010.
- 4. S. Narain, "Examinations in Ancient India", Arya Book Depot, New Delhi, 1993
- 5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, New Delhi, 1989
- 6. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, New Delhi, 2005

# **INDIAN CONSTITUTION**

Course Code			<b>Core / Elective</b>				
SMC901PO		Ι	Core				
	Con	tact Hou	rs per We	eek	CIE	SEE	Credits
Pre Requisite	L	Т	D	Р			
-	2	-	0				

#### **Course Objectives :**

- 1. To create awareness among students about the Indian Constitution.
- 2. To acquaint the working conditions of union, state, local levels, their powers and functions.
- 3. To create consciousness in the students on democratic values and principles articulated in the constitution.
- 4. To expose the students on the relations between federal and provincial units.
- 5. To divulge the students about the statutory institutions.

#### **Course Outcomes :**

- 6. Know the background of the present constitution of India.
- 7. Understand the working of the union, state and local levels.
- 8. Gain consciousness on the fundamental rights and duties.
- 9. Be able to understand the functioning and distribution of financial resources between the centre and states.
- 10. Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived. Sections can be addressed to raise human dignity in a democratic way.

#### UNIT – I

**Evolution of the Indian Constitution**: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly:

Composition and Functions; Fundamental features of the Indian Constitution

#### UNIT – II

Union Government: Executive-President, Prime Minister, Council of Minister State Government: Executive: Governor, Chief Minister, Council of Minister Local Government: Panchayat Raj Institutions, Urban Government

# UNIT – III

Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties

# UNIT – IV

**Relation between Federal and Provincial units**: Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India.

# UNIT – V

**Statutory Institutions:** Elections-Election Commission of India, National Human Rights Commission, National Commission for Women

## **Suggested Reading :**

- 1. Durga Das Basu, "Introduction to the Constitution of India", Lexis Nexis Butterworths Wadhwa Nagpur, 2008.
- 2. Subhash Kashyap, "Our Parliament", National Book Trust, India, 2004.
- 3. Peu Ghosh, "Indian Government and Politics", Prentice Hall of India, New Delhi, 2012.

# **ENGLISH LAB**

Course Code			<b>Core / Elective</b>				
SHS911EG							
		(Cor	Core				
	Con	tact Hou	Credits				
Pre Requisite	L	Т	D	Р			
-	-	-	-	2	40	60	1

## **Course Objectives :**

To enhance the listening and speaking skills of students by

- 1. Giving them sufficient practice in listening with comprehension
- 2. Training them in the use of correct pronunciation, stress, and intonation
- 3. Sensitizing them to the use of verbal and non-verbal communication.
- 4. Encouraging them to learn the art of conversation to suit formal and informal situations.
- 5. Preparing them to make formal presentations and face mock interviews and facilitating them to speak without inhibitions in order to improve their speaking skills.

# **Course Outcomes :**

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

- 1. Improve pronunciation skills by learning the phonemic system, word stress, rhythm and intonation of English phonetics (UNDERSTAND, APPLY)
- 2. Communicate effectively and appropriately using appropriate verbal and non verbal communication by participating in a situational context like role plays (ANALYZE, CREATE)
- 3. Improve their listening comprehension skills and perform effectively in competitive exams (CREATE, APPLY)
- 4. Face mock interviews confidently and demonstrate their verbal and soft skills (APPLY, CREATE)
- 5. Improve participation skills and be able to explain and defend their opinions by participating in Group Discussions and Debates (UNDERSTAND, APPLY, CREATE)

#### SYLLABUS :

#### UNIT DETAILS

- I Icebreaking Activity Jam
  - Picture Perception
  - Listening For Comprehension (Competitive Exams Ielts, Toefl, Pte)
- **II** Phonetics (Vowels, Diphthongs And Consonant Sounds)
  - Stress And Intonation

#### **III Conversation Skills :**

- Introducing Oneself To Others
- Asking For And Giving Information
- Making Requests And Responding To Them Appropriately
- Giving Instructions And Responding To Them Appropriately
- Making Formal Announcements And Emceeing

#### **IV** Group Activity :

- Group Discussion
- Debate
- Role Play
- V Interview Skills
  - Formal Presentations

#### **Suggested Reading :**

- 1. Board of Editors. Language and Life: A Skills Approach. Orient Black Swan, 2018.
- 2. Balasubramanian, T. A Textbook of English Phonetics for Indian Students. Macmillan, 1981.
- 3. CIEFL. Exercises in Spoken English. Parts. I-III. Oxford University Press.
- 4. Pillai, Radhakrishna G. Spoken English For You Level II. 8th Edition. Emerald Publishers, 2014.
- 5. Sethi, J and PV Dhamija. A Course in Phonetics and Spoken English. 2nd Edition.
- 6. Prentice Hall India Learning Private Limited, 1999.

# **APPLIED PHYSICS LAB**

Course Code			<b>Core / Elective</b>				
SBS912PH		А					
	(Co	ommon te	Core				
	Con	tact Hou	Credits				
Pre Requisite	L	Т					
-	-	-	-	4	40	60	2

#### **Course Objectives :**

The objective of this course is to make the student

- 1. Apply the theoretical knowledge in doing practical experiments and acquire skills to handle instruments.
- 2. Understand the behavior of semiconductors and opto-electronic devices.
- 3. Analyze errors in experimental data.
- 4. Plot graphs between different physical parameters.

#### **Course Outcomes :**

After completion of the course, the student will be able to

- 1. Relate theoretical knowledge to practical concepts by conducting experiments and can take measurements independently.
- 2. Know the working of different devices like solar cell, photocell and thermistor.
- 3. Summarize the experimental findings appropriately in laboratory records.
- 4. Compute and compare experimental results, draw graphs, estimate and interpret results.

# LIST OF EXPERIMENTS

- 1. Determination of wavelength of laser using diffraction grating.
- 2. Determination of Numerical Aperture (NA) and Acceptance angle of an optical fiber and also to determine the power loss per meter of the cable.

- 3. To draw the I-V characteristics of P-N junction diode and to evaluate series resistance in forward and reverse bias conditions.
- 4. To draw the I-V characteristics of solar cell and to calculate fill factor.
- 5. To determine the constants A and B using Thermistor characteristics.
- 6. To find the value of energy gap of a given semiconductor.
- 7. To find the value of Plank's constant using photo cell.
- 8. To draw the curve between the magnetic field and Intensity of magnetization for a given specimen and to find out Coercivity and Retentivity of the specimen.
- 9. To determine the Phase transition temperature of the given dielectric.
- 10. Determination of carrier concentration, mobility and Hall co-efficient in a semiconductor using Hall Effect experiment.

Note: A minimum of eight experiments to be done in one semester.

# WORKSHOP

Course Code			Course '	Title			Core / Elective	
SES914ME		Core						
		(Com						
Pre Requisite	Con	tact Hour	s per Wee	ek	CIE	SEE	Credits	
	L	L T D P						
_	-	-	-	6	40	60	3	

#### **Course Objectives :**

- 1. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances
- 2. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- 3. To gain good basic working knowledge required for the production of various engineering products.
- 4. To study different hand operated power tools, uses and their demonstration.
- 5. Adopt safety practices while working with various tools.

# **Course Outcomes :**

- 1. Demonstrate and understanding of and comply with workshop safety regulations.
- 2. Identify and apply suitable tools to for different trades of engineering processes including drilling,material removing, measuring,chiseling..
- 3. Study practice on machine tools and their operations.
- 4. Undertake jobs connected with engineering workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
- 5. Apply basic electrical engineering knowledge for house wiring practice.

# LIST OF EXPERIMENTS :

# A. TRADE FOR EXERCISES :

- 1. CARPENTRY: Half-lap dove-tail joint, mortise and tension joint, bridle joint.
- 2. FITTING: Square fitting, half round fitting, V-fitting.
- **3. HOUSE WIRING**: Series wiring and parallel wiring by one way switch, two way switching for stair case light, tube light connections.
- 4. SHEET METAL WORKING : Rectangle tray and a cone.
- 5. **SMITHY**: Hook and round to square.
- 6. WELDING: lap joint, single V-butt joint, T-joint, L-joint, corner joint.

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7. **PLUMBING**: preparation of nipple and fitting to elbow, tee, union and coupling tap connection and shower connection.

## **B. TRADES FOR DEMONSTRAYION AND EXPOSURE:**

- 1. Machine (lathe and drilling)
- 2. Injection moulding.
- 3. Mould making and casting.
- 4. Basic electronicslab instruments.

# C. PRESENTATIONS AND VIDEOS LECTURES:

- 1. Manufacturing methods.
- 2. Rapid prototyping.
- 3. Glass cutting.
- 4. 3D printing.
- 5. CNC lathe.

Note: At least two exercises from each trade.

# **TEXT / REFERENCE / ADDITIONAL BOOKS :**

- 1. Venugopal,K,"Workshop Manual", Anuradha Publicstions,Kumbakonam,TN,2012.
- 2. K.C.John, "Mechanical Workshop" 2<sup>nd</sup>Edn., PHI, 2010.
- 3. HajraChoudary, "Elements of Workshop Technology" Vol.1, Asian Publishers, Edu., 1993.
- 4. G.S.Sawhney, "Mechanical Experiments and Workshop Practice", I.K. International Publishing house, New Delhi, 2009.

**D. IT WORKSHOP :** Computer hardware, identification of parts, disassembly, assembly of computer to working condition, operating systeminstallation.

# **Course Objectives :**

- 1. The Workshop is a training lab course to get training on PC Hardware, Internet & World Wide Web, and Productivity tools for documentation, Spreadsheet computations, and Presentation.
- 2. To introduce to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers, hardware and software level troubleshooting process.
- 3. To introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, newsgroups and discussion forums.

To introduce the usage of Productivity tools in crafting professional word documents, 4. excel spreadsheets and powerpoint presentations using open office tools and LaTeX.

#### **Course Outcomes :**

After completion of the course the student will be

- 1 Able to assemble and disassemble the hardware components of computer.
- 2 Able to install the Operating systems
- Able to learn the documentation and report writing using Productivity tools 3.
- Able to examine database concepts and explore the Microsoft Office Access environment. 4.
- Able to understand about internet and designing web pages 5.
- Able to learn the documentation using latex 6.

## **Experiment - 1**

#### **PC Hardware**

Identify the peripherals of a computer. (Processor, Memory chips, Mother board, Disk drives, and Controller card such as AGP board, Network cards, Sound card, as well as Parallel and Serial ports etc.,)

#### **Experiment - 2**

Disassembling and Assembling PC in working condition. Load the Operating Systems with partitions for Windows and Linux, configure for Network

#### **Experiment - 3**

Documentation Using MS-Word: Introduction to Office Automation, Creating & Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, and Bookmarks.

#### **Experiment - 4**

Presentation using MS-PowerPoint: Creating presentation slides and Enhancing Slides with features like Organizational charts, Excel Charts, Word Art, Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object

#### **Experiment - 5**

MS Excel: Introduction to MS-Excel, Creating & Editing Worksheet, Formatting and Essential Operations, Formulas and Functions- like sum, average, standard deviation, and charts.

#### **Experiment - 6**

#### **MS-Access**:

Access Basics, Design a Database, Build a Database, Work with Forms, Sort, Retrieve, Analyze Data, Work With Reports, Access with Other Applications, Manage an Access Database

(3 hours)

#### (3 hours)

(3 hours)

#### (3 hours)

#### (3 hours)

# (3 hours)

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#### Scheme of Instructions & Detailed Syllabus

## **Experiment - 7**

#### Internet

- a) Telnet/Secure Shell (Remote login to university computers)
- b) Electronic Mail (Communicating with email software)
- c) File Transfer Protocols (transferring files between networked computers)
- d) World Wide Web (Interface, Navigation, Search Tools)

#### Experiment - 8 HTML

- a) Publishing Web Pages (Using HTML editors to create personal web sites)
- b) Create the web-page (With title, text, frames, hyperlinks to some sites, pictures, lists, tables, fonts and colors) without using any web authoring tools.

#### **Experiment - 9**

**Documentation Using LaTeX. :** Introduction to Linux Commands, Introduction to LateX, Creating & Editing Document, Formatting Document

#### Experiment - 10

#### LaTeX.

Page Layout – Titles, Abstract Chapters, Sections, References, Equation references, citation. List making environments Table of contents, Generating new commands, Figure handling numbering, List of figures, List of tables, Generating index.

#### **Suggested Reading :**

- 1) Peter Norton, Introduction to Computers, McGraw Hill Publishers, 6th Edition, 2010
- Leslie Lamport, Latex: A Document Preparation System, Pearson Education India, 2<sup>nd</sup> Edition,1994.
- 3) Stefan Kottwitz, LaTeX Beginner's Guide, Shroff/Packt Publishers, 1st Edition, 2012.

#### (3 hours)

(3 hours)

#### (3 hours)

#### (3 hours)

# DATA STRUCTURES USING C LABORATORY

Course Code			<b>Core / Elective</b>				
SES212IT		Data	Core				
	Con	tact Hou	rs per Wo	eek	CIE	SEE	Credits
Pre Requisite	L	Т	D	Р			
-	-	-	-	2	40	60	1

#### **Course Objectives :**

- 1. Understand various data representation techniques in the real world.
- 2. Implement linear and non-linear data structures.
- 3. Analyze various algorithms based on their time and space complexity.
- 4. Develop real-time applications using suitable data structure.
- 5. Identify suitable data structure to solve various computing problems.

#### **Course Outcomes :**

- 1. Understand the concept of data structures, C Programming and apply algorithm for solving problems like Sorting, searching, insertion and deletion of data.
- 2. Understand linear data structures for processing of ordered or unordered data.
- 3. Explore various operations on dynamic data structures like single linked list, circular linked list and doubly linked list.
- 4. Explore the concept of non linear data structures such as trees and graphs.
- 5. Understand the binary search trees, hash function, and concepts of collision and its resolution methods.

#### LIST OF EXPERIMENTS

#### Week - 1 LINKED LISTS

Write a C program that uses functions to perform the following:

- a. Create a singly linked list of integers.
- b. Delete a given integer from the above linked list.
- c. Display the contents of the above list after deletion.
- d. Check whether two given lists are containing the same data.

#### Week - 2 LINKED LISTS

Write a C program that uses functions to perform the following:

- a. Create a double linked list of integers.
- b. Delete a given integer from the above double linked list.
- c. Display the contents of the above list after deletion.
- d. Find the largest element in a given doubly linked list.

#### Week - 3 STACK

- a) Write a C program to implement stack using linked list.
- b) Write a C program that uses stack operations to convert a given infix expression into its postfix equivalent, implement the stack using an array.
- c) Write a C program to reverse the elements of the stack using recursion.

#### Week - 4 QUEUE

Write C programs to implement a double ended queue ADT using

- a. Array
- b. Double linked list

#### Week - 5 BINARY SEARCH TREE

Write a C program that uses functions to perform the following:

- a. Create a binary search tree of characters.
- b. Traverse the above binary search tree recursively in post order.
- c. \*Count the number of nodes in the binary search tree.

#### Week - 6 BINARY SEARCH TREE

Write a C program that uses functions to perform the following:

- a. Create a binary search tree of integers
- b. Traverse the above binary search tree non recursively in inorder

#### Week - 7 SORTING

Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order.

- a. Insertion sort
- b. Merge sort

#### Week - 8 SORTING

Week - 8 Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order.

- a. Quick sort
- b. Selection sort

#### Week - 9 SORTING

Write a C program to perform the following operation:

- a. Insertion into a B-Tree.
- b. Heap Sort.

#### Week - 10 HASHING

Write a C program to implement all the functions of a dictionary (ADT) using hashing.

#### Week - 11 HASHING

- a) Write a C program for implementing Knuth-Morris-Pratt pattern matching algorithm.
- b) Write a C program to sort a given list of strings.

#### Week - 12 GRAPH TRAVERSAL

Write C programs for implementing the following graph traversal algorithms:

- a. Depth first traversal
- b. Breadth first traversal

#### **REFERENCE BOOKS :**

- 1. Gilberg and Forouzan, Data Structure- A Pseudo code approach with C, Thomson publication
- 2. Data structure in C, Tanenbaum, PHI publication / Pearson publication
- 3. Pai, Data Structures & Algorithms; Concepts, Techniques & Algorithms, Tata McGraw Hill.

# **Field Work**

<b>Course Code</b>			<b>Core / Elective</b>				
SPW211 IT			Core				
	Con	tact Hou	rs per Wo	eek	CIE	SEE	Credits
Pre Requisite	L	Т	D	Р			
-	-	-	-	-	50	-	1

The students have to undergo a Field work of 2-week duration after II Semester SEE or during semester breaks.
## **Program Outcomes**

- 1. Engineering knowledge : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. **Problem Analysis :** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **3. Design/development of solutions :** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems : Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern Tool Usage : Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The Engineer and Society : Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment & Sustainability : Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and Team work : Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.
- **10.** Communication : Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. **Project Management and Finance :** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
- 12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Strive for perfection in everything you do. Take the best that exists and make it better. When it does not exist, design it. - Sir Henry Royce, English Engineer

Have courage to think differently, courage to invent, to travel the unexplored path, courage to discover the impossible to conquer the problems and succeed.

- APJ Abdul Kalam



STANLEY COLLEGE OF ENGINEERING AND TECHNOLOGY FOR WOMEN (AUTONOMOUS)

(Affiliated to Osmania University) (Accredited by NAAC with "A" Grade) ABIDS, HYDERABAD - 500 001, Telangana.

# FACULTY OF ENGINEERING Scheme of Instructions & Detailed Syllabus of III & IV Semester

## For

# Four Year Degree Programme of

# **Bachelor of Engineering (B.E)**

in

## **INFORMATION TECHNOLOGY**

(With effect from the academic year 2022-23) (Approved by College Academic Council on -- -- ----)



Issued by

Dean, Academics, Stanley College of Engineering and Technology for Women (Autonomous)

(Affiliated to Osmania University) (Accredited by NAAC with "A" Grade) Abids, Hyderabad – 500 001, Telangana.

		IT: SEMES	ΓER- Ι	11						
S. No.	Course Code	Course Title	Sche of Insti n	eme ruct	io		Sch of Exa on	neme amina	iti	its
			L	т	P/ D	Cont act Hour	CI E	SEE	SEE Duration in	Cred
		Theory Co	urses							
1	SBS301MT	Probability and statistics	3	-	-	3	40	60	3	3
2	SPC301IT	OOPS using JAVA	3	-	-	3	40	60	3	3
3	SES302EC	Digital Electronics & Logic Design	3	-	-	3	40	60	3	3
4	SPC302IT	Database Management Systems	3	-	-	3	40	60	3	3
5	SPC303IT	Discrete Mathematics	3	-	-	3	40	60	3	3
6	SAC903EE	Electrical Technology	2	-	-	2	50	-	-	-
	Practical	/ Laboratory Courses								
6	SPC311IT	OOPS using JAVA Lab	-	-	3	3	40	60	3	1.5
7	SPC312IT	Database Management Systems Lab	-	-	3	3	40	60	3	1.5
8	SHS902EG	Soft Skills Lab	1	-	2	3	40	60	3	2
		Total	18	-	8	26	330	480		20

Course Code		Core /					
		Elective					
SBS301MT		Proba	bility a	nd Sta	tistics		
		(Comr	non to	CSE,C	CME,A	[&DS,IT)	Core
	Con	tact Ho	urs per	Week			
Prerequisite	L	Credits					
_	3	_	_	_	40	60	3

- 1. To provide knowledge of probability distributions
- 2. To provide knowledge in tests of significance, correlation and regression.
- 3. Understand the basic ideas of vector algebra, linear dependence& linear independence and linear Spanning

## **Course Outcomes**

- 1. Apply probability theory to solve practical problems.
- 2. Apply various probability distributions to solve practical problems, to estimate unknown parameters and apply tests of hypothesis.
- 3. Perform a regression analysis and to compute and interpret the coefficient of correlation , Chi-square test for goodness o`f fit and independent attributes
- 4. To determine the numerical solutions of Ordinary differential equations.
- 5. To determine if a set of vector space is a vector space, Subspace or a basis

## Unit I

Introduction of Probability: Conditional Probability, Theorem of total probability, Baye's theorem and its application, Random variables, types of random variables. Probability mass function and probability density function. Mathematical Expectations, moments, Skewness and Kurtosis.

## Unit II

Discrete and Continuous probability distributions: Binomial, Poisson, Uniform, Normal and exponential. Mean, Variance, Moment generating function.

## Unit III

Curve fitting by the method of least squares: Straight line, second degree polynomial and more general curves. Correlation, regression and Rank correlation, Multiple regression, F-test,t-test and Chi- square tests.

## Unit IV

Numerical Solutions of Differential Equations: Single step method, Taylor's, Euler's, R-K Method of 4<sup>th</sup> order, Predictor - Corrector method, Milne's Method, Adams - Bashforth Method.

## Unit V

Linear Algebra: Vector spaces, subspaces, Linearly Independent, Linearly dependent vectors, Linear span, Basis, Dimensions, Rank, Impact, Singular value decomposition, connection between eigen values and eigen vectors, SVD with low rank, Relation between SVD and regularised least square methods.

#### **TEXT BOOKS**:

- 1. R.K. Jain and S.R. K. Iyengar , "Advanced Engineering Mathematics", Narosa Publications
- 2. Dr. B. S. Grewal "Higher Engineering Mathematics", Khanna Publications
- 3. P. Siva Rama Krishna Das & C. Vijaya Kumar, "Engineering Mathematics", Pearson India Education Services Pvt. Ltd.

#### **REFERENCE BOOKS**:

- 1. N.P. Bali & M. Goyal, "A text Book of Engineering Mathematics", Laxmi Publications, 2010
- 2. S.C. Gupta & V.K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand Pub.

Course Code				Core/Elective					
SPC301IT			Core						
	(C	ommor	n to AI&	DS, CSI	E <b>&amp; IT , CM</b>	E IVSem)			
	Con	tact Hou	urs per V	Veek					
Prerequisite	L	Т	D	Р	CIE	SEE	Credits		
Programming for	3	-	-	-	40	60	3		
Problem Solving									
SES101CS									

- 1. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, difference between applet and application programs, using class libraries
- 2. To create Java application programs using sound OOP practices such as interfaces, exception handling, multithreading.
- 3. Use Collection framework, AWT and event handling to solve real world problems.

## **Course Outcomes:**

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

- 1. Identify classes, objects, members of a class and the relationships needed to solve a problem.
- 2. Use interfaces and creating user-defined packages.
- 3. Utilize exception handling and Multithreading concepts to develop Java programs.
- 4. Compose programs using the Java Collection API.
- 5. Design a GUI using GUI components with the integration of event handling.

## UNIT-I

**Introduction:** OOP concepts, benefits of OOP, history of Java, Java buzzwords, data types, variables, scope and life time of variables, operators, expressions, control statements, type conversion and casting.

**Classes and Objects:** Concept of classes, objects, constructors, methods, this keyword, super keyword, garbage collection, overloading methods and constructors, parameter passing, Arrays String handling: String, StringBuffer, StringBuilder

## UNIT -II

**Inheritance:** Base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes.

**Interfaces:** Defining and implementing an interface, differences between classes and interfaces and extending interfaces Polymorphism.

**Packages:** Defining, creating and accessing a package, importing packages, exploring packages

## UNIT -III

**Exception handling:** Concepts and benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating User defined exceptions.

**Multithreading:** Difference between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

## UNIT -IV

**Basic I/O Streams:** Java I/O classes and interfaces, Files, Stream and Byte classes, Character streams, Serialization Exploring java.lang: Object class, Wrapper classes Exploring java.util: Scanner, StringTokenizer, BitSet, Date, Calendar, Timer

**Collections:** Overview of Java Collection frame work, commonly used Collection classes – Array List, Linked List, Hash Set, Tree Set, Collection Interfaces – Collection, List, Set. Accessing Collection via iterator, working with Map.

#### UNIT -V

**GUI Programming with java:** The AWT class hierarchy, MVC architecture.

**Exploring Swing:** JLabel, ImageIcon, JTextField, the Swing buttons, JTabbedpane, JScrollPane, JList, JComboBox

Layout manager: Border, Grid, Flow, Card and Grid Bag layouts.

**Event Handling:** Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces. Handling mouse and keyboard events, Adapter classes.

**New Features in Java:** Major enhancement made in Java5, Java6, Java7 and Java8 like autoboxing, generics, var-args, java annotations, enum, premain method, lambda expressions, functional interface, method references.

#### **Text Books:**

- 1. Schildt and Herbert, Java The complete reference, McGraw, 8<sup>th</sup> edition, TMH, 2017.
- 2. R Nageswara Rao, Core JAVA: An Integrated Approach, Black Book, DreamTech, 2016.
- 3. Cay S. Horstmann, Core JAVA Volume I—Fundamentals, Kindle Edition, 2020.

- 1. Core Java: An Integrated Approach, Dr R. Nageswara Rao, dreamtech.
- 2. Java How to Program, H.M. Dietel and P.J. Dietel, Sixth Edition, Pearson Education/PHI.
- 3. An Introduction to Object Oriented programming with Java,C Thomas Wu, Tata McGraw Hill, 2005.

Course Code			Course	Title			Core/ Elective
SES302EC	Ι	Digital Ele	ctronics (	& Logic I	Design		Core
Drovoguicito	C	ontact Hou	ırs per W	eek			
Prerequisite	L	Т	D	Credits			
-	3	-	-	-	40	60	3

- 1. To give insights of the basic design concepts of digital hardware.
- 2. To explain the operation and design of combinational and arithmetic logic circuits.
- 3. To familiarize with the design of combinational logic circuits using PLDs.
- 4. To comprehend about the concepts of sequential circuits.
- 5. To comprehend about the concepts of synchronous sequential circuits.

**Course Outcome:** On successful completion of the course, the students will be able to

- 1. understand the deign process of digital hardware, use Boolean algebra to minimize the logical expressions and optimize the implementation of logical functions.
- 2. understand the number representation and design combinational circuits like adders, MUX etc.
- 3. design Combinational circuits using PLDS and write Verilog HDL code for basic gates and combinational circuits.
- 4. analyse sequential circuits using flip-flops and design registers, counters.
- 5. represent a sequential circuit using Finite State machine and apply state minimization techniques to design a FSM

## UNIT – I

**Design Concepts:** Digital Hardware, Design process, Design of digital hardware. Introduction to logic circuits – Variables and functions, Logic gates and networks. Boolean algebra, Synthesis using gates, Design examples. Optimized implementation of logic functions using K-Map upto 5 Variable maps and Quine-McCluskey Tabular method.

## UNIT – II

Number representation: Addition and Subtraction of signed and unsigned numbers.

**Combinational circuit building blocks:** Adders and Subtractors, Multiplexers. Demultiplexers, Parity Checkers and Generators, Decoders. Encoders. Code converters, BCD to 7-segment converter, Arithmetic comparator circuits.Design of combination logic using Verilog HDL.

## UNIT – III

**Design of combinational circuits using Programmable Logic Devices (PLDs):** General structure of a Programmable Array Logic (PAL), Programmable Logic Arrays (PLAs), Structure of CPLDs and FPGAs, 2-input and 3-input lookup tables (LUTs).

 $\mathbf{UNIT} - \mathbf{IV}$ 

**Sequential Circuits:** Basic Latch, Gated SR Latch, gated D Latch, Master-Slave edge triggered flip-flops, T Flip-flop, JK Flip-flop, Excitation tables. Registers and Counters. Design of FFs uing Verilog.

## UNIT – V

**Synchronous Sequential Circuits:** Basic Design Steps, Finite State machine (FSM) representation using Moore and Mealy state models, State minimization, Design of FSM for Sequence Generation and Detection, Algorithmic State Machine charts.

## **Text Books:**

- 1. Moris Mano and Michael D CIletti, Digital Design, Pearson, fourth edition, 2008.
- 2. Zvi Kohavi, Switching and Finite Automata Theory, 3<sup>rd</sup> ed., Cambridge University Press-New Delhi, 2011.
- 3. R. P Jain, Modern Digital Electronics, 4<sup>th</sup> ed., McGraw Hill Education (India) Private Limited, 2003.

- 1. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, "Digital Systems: Principles and Applications," PHI, 10/e, 2009.
- 2. Samir Palnitkar-Verilog HDL A guide to digital design and Synthesis<sup>||</sup>, Pearson, 2nd edition, 2015.

Course Code				Core/Elective			
SPC302IT	(C	DATA	Core				
	Cont	tact Ho	urs per V	Veek			
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
Programming for Problem Solving SES101CS, Data Structures SPC201IT	3	-	-	-	40	60	3

1.To get familiar with fundamental concepts of database managements and with data base designing.

- 2.To master hands on SQL and PL/SQL concepts.
- 3.To impart knowledge in Indexing, hashing, transaction Management, concurrency control techniques and recovery techniques.

## **Course Outcomes:**

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

1.Understand the role of database management system in an organization and learn the database concepts.

- 2.Construct database queries using relational algebra and SQL
- 3.Design databases using data modeling and Logical database design techniques.
- 4. Evaluating the indexing, hashing techniques and transaction management.
- 5.Understand the concept of a database transaction and related concurrent, recovery facilities.

## UNIT – I

**Introduction:** Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, E.F. Codd rules.

**Relational Databases**: Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators, History of Database Systems.

## UNIT – II

**Relational model:** Structure of relational databases, fuundamental relational-algebra operations. **Introduction to SQL:** Overview of the SQL, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database.

**Advanced SQL:** Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Indexes and types of indexes. Functions, Procedures, Triggers, Cursors, Exceptions, and Packages.

## UNIT – III

**Database Design and the E-R Model:** Overview of the Design Process, E-R Diagrams, Reduction to Relational Schemas, E-R Design Issues, Extended E-R Features.

**Relational Database Design:** Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, 2NF, 3NF, BCNF and 4NF.

## $\mathbf{UNIT} - \mathbf{IV}$

**Indexing and Hashing:** Sparse index and dense index, static and dynamic hashing.

**Transactions:** Transaction Concept, A Simple Transaction Model, Storage Structure, Properties of a transaction, Serializability, Implementation of Isolation Levels, Transactions as SQL Statements.

## UNIT – V

**Concurrency Control:** Lock-Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Weak Levels of Consistency in Practice.

**Backup and Recovery System:** Failure Classification, Storage structure, Recovery and Atomicity, log-based recovery with concurrent transactions, Buffer Management, Failure with Loss of Nonvolatile Storage, advanced recovery techniques, Remote Backup Systems.

## **Text Books:**

- 1. Abraham Silberchatz, Henry F Korth and Sudarshan S, "Database System Concepts", Tata McGraw- Hill, 7<sup>th</sup> Edition.
- 2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Tata McGraw-Hill, 3<sup>rd</sup> Edition.
- 3. RamezElmasri and Shamkant B Navathe, "Fundamentals of Database Systems", Addison Wesley, USA, 6<sup>th</sup> Edition

- 1. C J Date , "AN introduction to database systems", 8<sup>th</sup> Edition, Pearson.
- 2. Gupta G K, "Database Management System", Tata McGraw-Hill, New Delhi, 2011.

Course Code				Core/Elective			
SPC303IT		I (Com	S 8- IT)	Core			
	Con	tact Hou	ars per V	Veek	CIVIE, CSE		
Prerequisite	L	Т	Credits				
-	3	-	-	-	40	60	4

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics.

- 1. To learn mathematically correct terminology and notation and to perform the operations associated with sets, functions, groups and relations.
- 2. To apply logical reasoning to solve a variety of problems.
- 3. To analyze the properties of graphs and trees.

## <u> Course Outcomes</u> :-

After completion of the course, the students should be able to

- 1. Understand sets, functions, groups and relations.
- 2. Apply permutation and combination to handle different types of problems.
- 3. Apply propositional logic and predicate logic to solve logical statements.
- 4. Evaluate Boolean functions and simplify expressions using the properties of Boolean Algebra.
- 5. Develop the given problem as graph networks and solve with techniques of graph theory.

## UNIT – 1:-

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

## UNIT – 2:-

**Elementary Combinations** :-Basics of counting, combinations and permutations, with repetitions constrained repetitions ,Binomial coefficients. The principle of inclusion-exclusion, pigeon hole principle and its applications.

## <u>UNIT 3 :-</u>

**Propositional Logic:** Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

## UNIT 4:-

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

## UNIT -5:-

**Graphs and Trees**: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

## Text Books:-

- 1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw-Hill
- 2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc
- 3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer riented Approach, 3rd Edition by, Tata McGraw Hill

- 1. J.P.Trembly and R.Manohar ,Discrete Mathematical Structures with applications to Computer Science TMG Edition ,Tata MC Graw Hill.
- 2. JL Mott, A. Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition PHI.
- 3. Narsing Deo, Graph Theory: with Application to Engineering and Computer Science. Prentice Hall of India 2003.

Course Code			Core / Elective				
SAC903EE		Ele	Core				
Proroquisito	Contact Hours per Week						Credits
Trerequisite	L	Т	D	Р	OEE	Oreans	
_	2	-	-	-	50	_	_

- 1. To introduce Generation of energy through conventional sources such as: Thermal, Hydro and Nuclear and renewable energy sources.
- 2. To familiarize present practices in working of static and dynamic machines and devices.
- 3. To familiarize mechanical design of Electrical vehicle and hybrid vehicle.

## **Course Outcomes**

- 1. Gain knowledge of construction and operation of conventional and non-conventional sources of energy
- 2. Understand the working principle of single phase and three phase transformers
- 3. Understand the Working principle of generator and motor
- 4. Know the working of inverter and rectifier operation
- 5. Understand the concept of Electrical vehicles

## **UNIT I – Generation of Electrical Energy**

Importance of Electrical Energy, Conventional Energy sources for generation of electrical energy, schematic diagram of steam power station, Hydro Electric power plants, Fissile materials, working principle of nuclear power plants and reactor control, Importance of Non- Conventional energy sources, Generation of electrical energy by using Solar and wind, Hybrid power generation.

## **UNIT II – Transformers**

Electromagnetic induction, Faradays laws, statically induced Emf, Lenz law, BH characteristics, Construction and working of transformer, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections. Difference between single phase and three phase transformers. Applications of Transformers.

## **UNIT III – Generators and Motors**

AC & DC Generators: working principle of DC generator and AC generator.

Dynamically induced Emf, Fleming's Right hand and Left-hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications, Working principle of AC generator

**AC motors and DC Motors:** principle of operation of DC Motor, Types of DC motors, applications. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications, Construction and principle of operation, Capacitor start & capacitor run motor, applications

## **UNIT IV – Principles of Power Electronics**

Principle of operation of single-phase half wave and full wave rectifier, operation of Ac voltage controller and Cyclo converters, working principle of single phase and three phase inverters.

## **UNIT V – Electric Vehicles**

Introduction to Electrical vehicles, EV system, Components of Electrical Vehicle, Electrical vehicle advantages.

Batteries: LED acid, Ni-Cd, Li-Ion batteries and battery characteristics and parameters.

Hybrid Electrical Vehicle-Types of hybrid vehicles, advantages and disadvantages, comparison between Electrical vehicle and Hybrid Vehicle.

## **Text Books:**

- 1. J.B. Gupta "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria & Sons Publications, 2010.
- 2. P. S. Bimbhra, Electrical Machinery, Khanna Publishers, 2011.
- 3. Sunil R. Pawar "Electrical vehicle technology" Notion press, First edition 2021.

- 1. Dr. P.S. Bhimbra, Power Electronics, Khanna Publishers, 2009.
- 2. Wadhwa C.L., Electrical Power Systems, New Age International (P) Ltd., 4th Edition, 2007.
- 3. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.

Course Code				Core/Elective			
SPC311IT			Core				
	(C	ommoi	n to Al&	DS, CS	E, IT & CM	E SemIV)	
Prerequisite	Con	tact Hou	Credits				
rerequisite	L	Т	D	Р	CIL	<u><u>J</u></u>	Cicuits
Programming for	-	-	60	1.5			
Problem Solving							
SES101CS							

- 1. To introduce fundamentals of object-oriented concepts using java programming such as classes, inheritance, packages and interfaces.
- 2. To understand and apply concepts of exception handling, multithreading, collection framework.
- 3. To learn and use concepts of I/O streams, serialization, GUI programming using Swings, database connectivity.

## **Course Outcomes:**

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

- 1. Understand object-oriented programming fundamental and java programming fundamentals such as classes, inheritance, abstract classes, interfaces, packages.
- 1. Apply exception handling, multithreading, input output basics and string handling.
- 2. Design and apply collection framework.
- 3. Design AWT and Swings concept.
- 4. Apply input-output operations through IO package.

## List of Experiments: Write Programs using Java Language

- 1. To implement the concept of class with method overloading
- 2. To apply the concept of Single level and Multi level Inheritance.
- 3. To understand the concept of Interfaces.
- 4. To implement Abstract Classes concept.
- 5. To implement
  - a) Checked Exception (IOException).
  - b) Unchecked Exceptions. (Arithmetic Exception, Null Pointer Exception, Array Index Out Of Bounds Exception).
  - c) User defined exception handling when user enters marks for a subject beyond the minimum and maximum range.
- 6. To implement
  - a) The concept of threading using Thread Class and Runnable Interface.
  - b) The concept of Thread synchronization.
- 7. To implement collection classes like Array List, Linked List, Tree map and Hash map.

8. To execute iteration over Collection using Iterator interface and List Iterator

Interface.

9. To read a file name from the user, and display information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes. To copy contents of one file into another file.

10. To implement serialization concept

11. To implement event handlers: mouse and key board events

12. To design a basic calculator application using swings.

13. To develop an applet that displays a simple message in center of a screen.

#### **Text Books:**

1. Java The complete reference, 8th edition, Herbert Schildt, TMH.

2. Core and Advanced Java, Black Book, Recommended by CDAC, Revised and Upgraded Dream tech Press.

#### **References Books:**

1. Core Java: An Integrated Approach, Dr R. Nageswara Rao, dreamtech.

Java How to Program, H.M. Dietel and P.J. Dietel, Sixth Edition, Pearson Education/PHI.
An Introduction to Object Oriented programming with Java, C Thomas Wu, Tata McGraw Hill, 2005.

## Software Required: Java 8

Course Code				Core/Elective			
SPC312IT	DA	ТАВА	EMS LAB	Core			
	((	<u>Commo</u>	n to Ale	<u>&amp;DS, CN</u>	<u>1E, II, CSE</u>	Sem IV)	
Prerequisite	Cont	act Hou	urs per V	Veek	CIE	SEE	Credits
rerequisite	L	Т	D	Р	CIL	<u><u>SEE</u></u>	Cicuits
Programming for	-	-	-	3	40	60	1.5
Problem Solving							
SES101CS,							
Data Structures							
SPC201IT							

- 1. To practice various commands of SQL.
- 2. To write simple and Complex queries in SQL.
- 3. To familiarize with the PL/SQL programs.

## **Course Outcomes:**

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

- 1. Implement the basic knowledge of SQL queries and relational databases.
- 2. Design and implement a database schema for a given problem.
- 3. Implement different constraints for refining of the databases.
- 4. Implement various triggers, procedures and cursors using PL/SQL.
- 5. Generate forms and reports.

## List of Experiments:

- 1. Creation of database and writing SQL queries to retrieve information from the database.
- 2. Performing insertion, deletion, modifying, altering, updating and viewing records based on the conditions.
- 3. Creation of views, synonyms and save points.
- 4. To set various constraints.
- 5. Implementation of SQL inbuilt functions.
- 6. Implementation of Nested queries and Complex queries in SQL database.
- 7. Implementation of PL/SQL procedures and Functions?
- 8. Implementation of PL/SQL Cursors?
- 9. Implementation of different types of Exceptions in PL/SQL?
- 10. Implementation of Triggers in PL/SQL?
- 11. Implementation of PL/SQL Packages using various database objects?
- 12. Creation of Forms for Student information, Library information.
- 13. Report generation using SQL reports.
- 14. Creation of small full- fledged database application.

## **Text Books:**

- 1. Abraham Silberchatz, Henry F Korth and Sudarshan S, "Database System Concepts", Tata McGraw- Hill, 7<sup>th</sup> Edition.
- 2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Tata McGraw-Hill, 3<sup>rd</sup> Edition.

3. RamezElmasri and Shamkant B Navathe, "Fundamentals of Database Systems", Addison Wesley, USA, 6<sup>th</sup> Edition

- 1. C J Date , "AN introduction to database systems", 8<sup>th</sup> Edition, Pearson.
- 2. Gupta G K, "Database Management System", Tata McGraw-Hill, New Delhi, 2011.

	Course Code			0	ourse "	Title		1		
	SHS912EG	-						Core / Electiv		
			SOFT SKILLS LAB(SHS912EG) (Common to IT-III-SEM & AI&DS - IV-SEM) ContactHoursperweek							
		Ca	ntactHou	rsperwe	ek					
-	Prerequisite	L	Т	D	P	CIE	SEE	Croft		
-					2	40	60	Creux		
3. 4,	To enable the student	ts to acquir s with the r	v skills p ight attin	o face and	y inter	speak prof view techniques	essionally in pu	blic and while		
3. 4. 5. Cor By 1.	To enable the studen To equip the student: decision making. To develop leadershi urseOutcomes: the end of the course Listen to a variety of tasks	ts to acquir s with the r p skills req students wi of speakers	e skills p ight attin uired am ill be able and text	o face ar ade and ong stud t to: s and wi	iv inter toping coping lents to	speak prof view techniques speak profi le to comp	essionally in pu required to man essionally in but	blic and while age time and in ilding a team.		
3. 4. 5. Con By 1. 2.	To enable the studen To equip the students decision making. To develop leadership arseOutcomes: the end of the course Listen to a variety of tasks. Interact in a group of	ts to acquir s with the r p skills req students wi f speakers	v skills p ight artin uired am ill be able and texts	o face and ade and ong stud to: s and wi	iv inter toping coping lents to	speak prof view techniques speak profi le to comp	essionally in pu required to man essionally in but rehand and peri	blic and while uge time and in ilding a team. form the required		
3. 4. 5. Con By 1. 2. 3.	To enable the studen To equip the students decision making. To develop leadership arseOutcomes: the end of the course Listen to a variety of tasks. Interact in a group p Face any interview of	ts to acquir s with the r p skills req students wi of speakers professiona confidentiv	e skills p ight antin uired am ill be able and text: illy.	o face and ade and a ong stud to: s and wi	in the store of th	speak prof view techniques speak profi le to comp	essionally in pu required to man essionally in bui rehend and pert	blic and while age time and in ilding a team. form the required		
3. 4. 5. By 1. 2. 3. 4. 5.	To enable the studen To equip the students decision making. To develop leadership inseOutcomes: the end of the course Listen to a variety of tasks. Interact in a group p Face any interview of Manage time and m Demonstrate the rig	its to acquir s with the r p skills req students wi of speakers professiona confidently take a decis the attitude	e skills p ight artin uired am ill be able and text and text ion by sp and skill	o face and ade and a ong stud to: s and wi beaking : s to cop	approp e with t	speak prof view techniques speak profi le to comp riately acco team and c	essionally in pu required to man essionally in bui rehend and peri rding to the cor ommunicate pr	blic and while age time and in ilding a team. form the required ntext. ofessionally.		
3. 4. 5. Con By 1. 2. 3. 4. 5.	To enable the studen To equip the student: decision making. To develop leadership arseOutcomes: the end of the course Listen to a variety of tasks. Interact in a group p Face any interview of Manage time and m Demonstrate the rig ABUS:	Its to acquir s with the r p skills req students wi of speakers professiona confidently take a decis the attitude	e skills p ight artin uired am ill be able and text and text ion by sp and skill	o face and ade and ong stud to: s and wi beaking ; s to cop	approp e with t	speak prof view techniques speak profi le to comp riately acco team and o	essionally in pu required to man essionally in but rehend and per ording to the cor ommunicate pro	blic and while age time and in ilding a team. form the required ntext.		
3. 4. 5. Con By 1. 2. 3. 4. 5. TLL.	To enable the studen To equip the students decision making. To develop leadership inseOutcomes: the end of the course Listen to a variety of tasks. Interact in a group p Face any interview of Manage time and m Demonstrate the rig ABUS: DETAILS	ts to acquir s with the r p skills req students wi of speakers professiona confidently take a decis the attitude	e skills p ight artin uired am ill be able and text illy. ; ion by sp and skill	o face and ade and ang stud to: s and wi heaking : s to cop	approp e with t	speak prof view speak profi le to comp riately acco team and o	essionally in pu required to man essionally in bui rehend and perf ording to the cor ommunicate pro	blic and while age time and in ilding a team. form the required ntext. ofessionally.		

- Listening for comprehensive / critical /analytical. ÷.
- Listening for job recruitment. ٠
- Listening and watching to a variety of speakers in different contexts to dialogues from TV /

## П

IT:

- Speaking Skills I (Group Communication) Group Communication

  - Presentation Skills
  - · Public Speaking Skills (ceremonial, demonstrative, informative and persuasive)
  - Emcceing

Speaking Skills – 11 (Interview skills) Interview Skills

- Initial Round (Group Discussion, Debate and IAM)
- Fina's Round (Telephonic, HR and Panel)
- IV Specific Soft Skills-I(Activities& Situations)
  - Time Management
  - Decision Making
- V Specific Soft Skills-II (Activities& Situations)
  - Team Building
  - Leoderships Skills

#### Suggested Reading:

- Andrea J. Rutherford. Basic Communication Skills for Technology. Person Education. Inc. New Delhi. 2001.
- Anne Dannellon. Team Talk The Power of Language in Team Dynamics. Harvard Business School Press. Boston, Massachusetts, 1996.
- Antony Jay and Ros Jay. Effective Presentation: How to be a Top Class Presenter. Universities Press. (India) Limited. 1999.
- 4. Daniel Goldman. Emotional Intelligence. New York. Bantam Books. 1995.
- 5. Fnedrike Klippel. Keep Talking. Cambridge University Press London. 1984.
- Lewis, Hedwing Body Language: A Guide for Professionals. Response Book (a division of Saga Publications India. Pvt. Ltd.) New Delhi, 1998.
- Hari Mohan Prasad and Rajnish Mohan. How to prepare for Group Discussion and Interview. 2<sup>nd</sup> Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi. 2005.
- 8. Mitra, Barun. Personality Development and Soft Skills.
- 9. Good heart and Willcox. Soft Skills at Workplace.

		SEMESTER-IV								
	Course			Sci Ins	hem truc	ne of ction	S Ex n	chem amin	e of atio	its
S.No.	Code	Course Title	L	т	P/ D	Cont act Hrs/ Wk	CIE	SEE	SEE Duration in	Cred
	1	Т Са	heoi ours	ry es		1		1	1	1
1	SES401EC	Techniques on Signals and Systems	3	-	-	3	40	60	3	3
2	SPC401IT	Theory of Automata	3	-	-	3	40	60	3	3
3	SPC402IT	Operating Systems	3		-	3	40	60	3	3
4	SES402EC	Fundamentals of Digital Image Processing	3	-	-	3	40	60	3	3
5	SPC403IT	Computer Organization and Microprocessor	3	-	-	3	40	60	3	3
	1	Practical	l/Lat	ora	tory	Courses			1	1
6	SPC411IT	Python Lab	1		2	3	40	60	3	2
7	SPC412IT	Operating Systems Lab	-	-	3	3	40	60	3	1.5
8	SPC413IT	Microprocessor Lab	-	-	3	3	40	60	3	1.5
9	SPW511IT	Internship- 1	The unde of 4 after SEE	stuc ergo W W IV	lents a I eek ⁄-	s have to nternship duration Semester	50	-		1
		Total	16	-	8	24	370	540		21

Course Code					Core/Elective		
SES401EC	TI	ECHNI	QUES O	YSTEMS	Core		
Droroquisito		Conta	t Hours per Week				Credite
Prerequisite	L	Т	D	Р	SEE	Credits	
-	3	-	_	-	40	60	3

- 1. To give insights of the classification of continuous-time systems and basic operations on continuous-time signals.
- 2. To comprehend the mathematical representation of continuous time signals and Fourier series.
- 3. To describe Fourier and Laplace Transforms of continuous-time signals.
- 4. To familiarize with the discrete time signals, systems and Fourier analysis in discrete-time domain.
- 5. To give insights of Z-transform analysis.

**Course Outcomes:** On successful completion of the course, the students will be able to

- 1. define and differentiate types of signals and systems in continuous and discrete time
- 2. apply the properties of Fourier transform for continuous time signals
- 3. relate Laplace transforms to solve differential equations and to determine the response of the continuous time linear time invariant systems to known inputs.
- 4. apply Z-transforms for discrete time signals to solve difference equations.
- 5. obtain linear convolution and correlation of discrete time signals with graphical representation.

**UNIT-I: Definitions and classifications**: Classification of signals, Elementary continuous time signals, Basic operations on continuous-time signals

**Classification of continuous time Systems**: Continuous time & discrete time systems, Lumped Parameter and distributed parameter systems, Static and dynamic systems, Causal and Non-causal systems, Time-Variant & Time-invariant, Stable and unstable systems.

**UNIT-II: Representation of Continuous time signals**: Analogy between Signals and Vectors, Orthogonality & completeness

**Fourier Series Analysis of continuous time signals**: Fourier series- Existence of Fourier series, Trigonometric& Exponential Fourier Series, computational formulae, Symmetry conditions, complex Fourier spectrum.

**UNIT-III: Continuous-Time Fourier transform:** Direct & inverse Fourier Transform, existence and properties of Fourier Transform, Fourier Transform of standard signals, frequency spectrum, correlation between continuous time signals: Auto and cross correlation, graphical interpretation, properties of correlation.

**Laplace transform:** The direct LT, Region of Convergence, existence of LT, properties of LT, inverse LT, solution of differential equations, system transfer function.

**UNIT-IV: Discrete-time signals and systems**: Sampling, Classification of discrete time signals, basic operation on discrete time signals, Classification on discrete time systems, properties of systems.

**Fourier analysis of discrete-time signals**: Discrete time Fourier transform (DTFT), properties of DTFT, Transfer function, Discrete Fourier transform properties of DFT.

**UNIT-V: Z-Transform analysis of signals:** The direct Z-Transform, Region of Convergence, Z-plane & S-plane correspondence, inverse Z-transform, properties of Z-Transforms, Solution to linear difference equations, Linear constant coefficient systems,

system transfer function.

#### **Text Books:**

- 1. B. P. Lathi, Linear Systems and Signals, Oxford University Press, 2nd Edition, 2009.
- 2. A. V. Oppenheim, A.S. Willsky Signals & Systems 2nd Edition, Prentice Hall.
- 3. P. Ramesh Babu, R.Ananada Natarajan-Signals and Systems-4<sup>th</sup> Edition, Scitech Publications.
- 4. P. Ramakrishna Rao, Signals and Systems, 2e, TMH.

- 1. Rodger E. Ziemer, William H Trenter, D. Ronald Faninn Signals & Systems 4th Edition, Pearson 1998.
- 2. Douglas K. Linder. Introduction to Signals and Systems, MC Graw Hill, 1999.

<b>Course Code</b>		<b>Core/Elective</b>					
SPC401IT		CORE					
Prerequisite	C	Contact Ho	urs per W	eek	CIE	SEE	CREDITS
Discrete	L	Т	D	Р			
Mathemat	3	-	-	-	40	60	3
ics							
SPC303IT							

#### **Course Objectives:** The students will be able to

1.To give an overview of the theoretical foundations of computer science from the perspective of formal languages

2.To illustrate finite state machines and push down automata to solve problems in computing

3.To familiarize Regular grammars, context frees grammar and context sensitive grammar

## **Course Outcomes:**

After completion of this course, students will be able to

- 1. Gain the knowledge of basic kinds of finite automata and their capabilities.
- 2. Understand regular and context-free languages
- 3. Gain the knowledge to analyze regular expressions and grammars
- 4. Design finite automata, push down automata.
- 5. Constructing the Turing machine for Recursive languages.

#### UNIT-I

Automata: Introduction to Finite Automata, Central Concepts of Automata Theory. Finite Automata: An informal picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata, An Application, Finite Automata with Epsilon Transitions.

## UNIT-II

Regular Expression And languages: Regular Expressions, Finite Automata and Regular Expression, Applications of Regular Expressions, Algebraic Laws for Regular Expression. Properties of Regular Languages: Proving Languages not to be Regular, Closure Properties of Regular Languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

#### UNIT-III

Context Free Grammars and Languages: Context-Free Grammars, Parse Trees, Applications, Ambiguity in Grammars and Languages

Properties of Context Free Languages: Normal Forms for Context-Free Grammars, Pumping Lemma, Closure Properties, Decision Properties of CFL 's.

## UNIT-IV

PUSHDOWN AUTOMATA: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA. TURING MACHINES (TM): Formal definition and behaviour, Languages of a TM, TM as accepters, and TM as a computer of integer functions, Types of Tms.

#### UNIT-V

RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES (REL): Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.

## **Text Books:**

- 1. John Hopcroft, Rajeev Motwani, Jeffery D Ulman. Introduction to Automata Theory Languages and Computation, third edition, Pearson Education, 2009.
- 2. John C. Martin, Introduction to Languages and the Theory of computation, third Edition, Tata McGrawHill,2003.
- 3. Thomas Sudkamp, *Languages and Machines: An Introduction to the Theory of Computer Science*. (Third Edition)

- 1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 4<sup>th</sup> edition, Prentice Hall of India, India.
- 2. Kavi Mahesh, Theory of Computation A Problem solving approach, Wiley India Pvt. Ltd
- 3. Daniel I.A. Cohen, —Introduction to Computer Theory, John Wiley & Sons, 2nd Edition, 2004

Course Code		Core/Title						
SPC 402 IT	OPE							
	(Common							
Prerequisite	Contact Hours Per	CREDITS						
				-				
-	L	T	P					
	3	-	-	40	60	3		
Course Objec								
1. To learn fundamentals of Operating Systems.								
2. To understand the functions of Operating Systems.								
3. To learn memory management.								
Course Outcomes:								
After completi								
1. Understand System calls and evaluate process scheduling.								
2. Apply procedures for process synchronization.								
3. Understand the concepts of deadlock.								
4. Implement the concepts of memory management.								

5. Understand file system interface and I/O systems.

## UNIT-1

**Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine.

## UNIT-2

**Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

**Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads. **Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling Criteria, Scheduling algorithms, multiprocessor scheduling.

## UNIT-3

**Process Synchronization:** Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Peterson's Solution, classical problems of synchronization: The Bounded buffer problem, Producer\Consumer Problem, reader's & writer problem, Dinning philosopher's problem. Semaphores, Event Counters, Monitors, Message Passing,

**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Methods for Handling: Deadlocks: Deadlock prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

#### UNIT-4

**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation, fragmentation, and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, structure of page table, Protection and sharing, Disadvantages of paging.

#### UNIT-5

**File Management:** Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods, Free-space management, directory implementation, efficiency, and performance.

**Secondary-Storage Structure:** Disk structure, Disk scheduling algorithms, Disk Management, RAID structure.

#### **Text Books:**

- 1. AviSilberschatz,PeterGalvin,GregGagne,OperatingSystemConceptsEssentials,9th Edition, Wiley Asia Student Edition, 2017.
- 2. William Stallings, Operating Systems: Internals and Design Principles, 5th Edition,Prentice Hall of India, 2016.
- 3. Maurice Bach, Design of the Unix Operating Systems, 8th Edition, Prentice-Hall of India, 2009.

- 1. Daniel P. Bovet, Marco Cesati, Understanding the Linux Kernel, 3rd Edition, O'Reilly and Associates.
- 2. Naresh Chauhan, Principles of Operating Systems, Oxford University Press, 2014.

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Course Code		Core/Elective					
SES402EC	FU	Core					
<b>D</b>	Con						
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
-	3	-	-	-	40	60	3

- 1. To familiarize with the basic concepts and methodologies for digital image processing.
- 2. To give insights of various image transforms.
- 3. To describe the spatial and transform domain techniques used in image enhancement.
- 4. To comprehend the degradation functions for image restoration.
- 5. To evaluate the image segmentation and compression techniques

#### Course Outcomes: On successful completion of the course, the students will be able to

- 1. illustrate basic concepts of digital image processing
- 2. implement image transforms
- 3. distinguish spatial and frequency domain image enhancement
- 4. estimate degradation function for image restoration
- 5. apply image segmentation and compression techniques

#### **UNIT-I: Digital Image Fundamentals**

Image sensing, acquisition, Image formation model, sampling and Quantization, Basic relationships between pixels; neighbors of a pixel, adjacency, connectivity, regions, and boundaries. Image formation, brightness, adaptation, and discrimination, Color Image Processing – Color Models and Representation, Categorization of images according to their source of EM radiation.

## **UNIT-II: Qualitative Analysis of Image Transforms**

2D Fourier transform, Properties of 2D Fourier transform, Walsh, Hadamard, Slant, Haar, Discrete Cosine Transform and Hotelling transform.

#### **UNIT-III: Image Enhancement**

Spatial domain techniques: Contrast Stretching, Histogram Equalization and Histogram Specification method, Neighborhood averaging and adaptive Median filter.

Frequency domain methods: Ideal Low pass, Butterworth and Gaussian Low pass filters. Ideal High pass, Butterworth and Gaussian High pass filters. Homomorphic filtering.

## **UNIT-IV: Image Restoration**

Mathematical expression for degraded image.

Estimation of degradation functions: image observation, experimentation and by modeling, Inverse filter, Wiener filter, Geometric transformation, periodic noise reduction method.

## **UNIT-V: Image Segmentation and Compression**

Detection of discontinuities, point, line and Edge detection methods: Gradient operation, Laplacian, Prewitt, Sobel, Laplacian of Gaussian and Canny edge detector.

Image compression: Functional block diagram of a general image compression system, various types of redundancies, Huffman coding, Arithmetic coding.

#### **Text Books:**

- 1. Rafeal C. Gonzalez, Richards E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB," 2nd Edition, Tata McGraw Hill, 2010.
- 2. Jayaraman S., Esakkirajan S., Veera Kumar T., "Digital Image Processing," TGH, 2009.
- 3. Anil K. Jain, "Fundamentals of Digital Image Processing," Prentice-Hall of India Private Limited, New Delhi, 1995.

- 1. Vipula Singh, "Digital Image Processing with Matlab and LabView," Elsevier, 2013.
- 2. Milan Sonka, Vaclav Havel and Roger Boyle, "Digital Image Processing and Computer Vision," Cengage Learning India Pvt. Limited, 2008.
- 3. Qidwai, "Digital Image Processing: An Algorithmic Approach with MATLAB," Taylor & Francis, Yesdee Publications, First Indian Reprint 2013.

Course Code		Core/ Elective					
SPC403IT	C	Core					
	C	ontact Ho	urs per W	/eek	CIE	SEE	Cardita
Prerequisite	L	Т	D	Р	CIE		Credits
-	3	-	-	-	40	60	3

- 1. To understand the Instruction Set Architecture and the basic components of CPU.
- 2. To learn the interfacing of I/O Organization, Interrupt-driven I/O, and DMA
- 3. To understand the 8085 and 8051 architectures.

## **Course Outcomes**

Students will be able to

- 1. understand the Instruction Set Architecture: Instruction format, types, various addressing modes
- 2. understand the basic components of the CPU
- 3. understand the parallelism both in terms of a single processor and multiple processors
- 4. understand the 8085 and 8051 architectures
- 5. apply interfacing with I/O Organization, Interrupt-driven I/O, DMA

## UNIT-I

**Data Representation:** Fixed and Floating Point representations. Overview of Computer Function and Interconnections: Computer components, Interconnection structures, Bus interconnection, Bus structure, and Data transfer.

**Register Transfer Microoperations:** Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic, Logic and Shift microoperations, Arithmetic Logic Shift Unit.

## UNIT-II

**Basic Computer Organization and Design:** Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory reference instruction, Input-Output and Interrupt. Microprogrammed Control: Control memory, Address Sequencing, Microprogram example, Design of Control Unit.

## UNIT-III

**Central Processing Unit:** General Register Organization, Stack Organization, Instruction formats, Addressing modes, Data Transfer and Manipulation, and Program control. Floating Point Arithmetic Operations.

**Pipeline Processing:** Arithmetic, Instruction and RISC Pipelines.

Memory Organization: Cache memory, Virtual memory, Memory Management hardware

## UNIT-IV

**8085** Architecture: Introduction to microprocessors and microcontrollers, 8085 Processor Architecture, Internal operations, Instructions and timings. Programming the 8085 - Introduction to 8085 instructions, Addressing modes and Programming techniques with Additional instructions.

**Input-Output Organization:** Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), I/O Processor. Basic Interfacing concepts with 8085, Programmable Interrupt Controller(8259A). Direct Memory Access(DMA) - DMA Controller (Intel 8257)

## UNIT-V

**Introduction to Microcontrollers, 8051** – Architecture, Instruction set, Addressing modes and Programming techniques. Comparison of various families of 8-bit micro controllers. System Design Techniques - Interfacing of LCD, ADC, Sensors, Stepper motor, Keyboard and DAC using microcontrollers. Communication Standards - Serial RS 232 and USB. Features of Multi-Core Processors architectures and Graphics Processing Units.

## **Text Books:**

- 1.Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, 5th Edition, McGraw Hill, 2002.
- 2.Ramesh S Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5/E PrenticeHall,2002.
- 3.Pal Chouduri, Computer Organization and Design, Prentice Hall ofIndia,1994.

- 1. M. M. Mano, Computer System Architecture, 3rd Edition, PrenticeHall.
- 2. Ramesh S. Gaonkar "Microprocessor Architecture, Programming, and Applications with the 8085", 5/E, Prentice Hall, 2002.
- 3. Myke Predko "Programming and Customizing the 8051 Microcontroller", Tata McGraw Hill, 1994

Course Code		Core/ Elective					
SPC411IT		Pyt	Core				
D	Contact Hours per Week						
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
-	1	-	-	2	40	60	2

The students will be able to:

- 1. Learn basic Programming using Python
- 2. Learn Object-oriented programming.
- 3. Design graphical-user interfaces (GUI).

## **Course Outcomes**

After completing this course, the student will be able to:

- 1. Develop and execute simple programs using Python.
- 2. Use conditional control structures for problem solving
- 3. Decompose a problem using functions.
- 4. Represent compound data using lists, tuples, dictionaries using Python
- 5. Solve the complex problems using advanced Python concepts and design GUI.
- 1. Introduction to Python Programming:
  - a. Executing instructions in Interactive interpreter and a Python Script.
  - b. Raise Indentation Error and Correct it.
  - c. Compute distance between two points taking input from the user
  - d. Perform all arithmetic operations with minimum two numbers.
  - e. Display the following information: Your name, Full Address, Mobile Number, College Name, Subjects.
- 2. Decision Making and Loops
  - a. Check whether a given number is even or odd.
  - b. Find the largest three integers using if-else
  - c. To read a number (1-7) and display corresponding day using if\_elif\_else?
  - d. Receives a series of positive numbers and display the numbers in an ascending order and calculate the sum.
  - e. Get any number from user, Generate the series with reverse order (n to 1) using While loop.
- 3. Functions and Recursion
  - a. Write a function to find mean, median, mode for the given set of numbers in a list
  - b. Write a function to check whether two strings are nearly equal or not. Display how many characters are matching.
  - c. To print Fibonacci Sequence up to a given number n
  - d. To find GCD of two integers.
  - e. To display prime number from 2 to n.

- f. Functions that accept a string as an argument and return the number of vowels and consonants that the string contains.
- 4. Strings & List
  - a. To check whether the given string is palindrome or not.
  - b. To remove the n<sup>th</sup> index character from an nonempty string
  - c. To create a list and perform the following methods 1) insert() 2) remove() 3) append() 4) len() 5) pop() 6) clear()
  - d. To remove duplicates from a list
- 5. Tuples & Dictionaries
  - a. To Create a dictionary and apply the following methods 1) Print the dictionary items 2) access items 3) use get() 4)change values
  - b. To count the number of characters in the string and store them in a dictionary data structure
  - c. To convert nested list into dictionary.
- 6. Files
  - a. Generate 1 to n random numbers and write it in a file then read from a file.
  - b. To display a list of all unique words in a text file
  - c. To analyse the two text files using set operations
  - d. To print each line of a file in reverse order.
  - e. To count frequency of words in a given file.
- 7. Exceptions
  - a. Read two numbers n1 and n2. Write a function to compute n1/n2 and use try/except to catch the exceptions.
  - b. To detect and handle the exception while solving the quadratic equation.
  - c. To handle the run time errors while doing the file handling operation.
  - d. To create and raise user defined exceptions.
- 8. Object Oriented Programming
  - a. Program to implement the inheritance
  - b. Program to implement the polymorphism
- 9. GUI Programming
  - a. Design a GUI based calculator to perform arithmetic operations like addition, subtraction, multiplication and division.
  - b. Design a GUI based application to convert temperature from Celsius to Fahrenheit.

- c. Write a python program to perform various database operations (create, insert, delete, update)
- 10. Numpy-2
  - a. Write a basic array of operations on single array to add x to each element of array and subtract y from each element of array.
  - b. Write a program to add, subtract and multiply two matrices.
  - c. Create multi-dimensional arrays and find its shape and dimension.
  - d. Create a null matrix and unit matrix.
  - e. Reshape and flatten data in the array
- 11. Numpy-2
  - a. Append data vertically and horizontally
  - b. Apply indexing and slicing on array
  - c. Use statistical functions on array Min, Max, Mean, Median and Standard Deviation
  - d. Dot product and matrix multiplication of two arrays
  - e. Compute the Eigen values of a matrix.
- 12. Numpy-3
  - a. Compute the rank of a matrix
  - b. Compute the determinant of a 2-dimensional array.
  - c. Perform Sorting, Searching and Counting using Numpy methods.
- 13. Regular Expressions
  - a. Write a python program to check the validity of a password given by the user. The password should satisfy the following criteria:
    - i. Contain at least 1 letter between a and z
    - ii. Contain at least 1 number between 0 and 9
    - iii. Contain at least 1 letter between A and Z
    - iv. Contain at least 1 character from \$, #, @
    - v. Minimum length of password: 6
    - vi. Maximum length of password: 12
  - b. Write a Python program to validate mobile number.

#### **Text Books:**

- 1. Monu Singh Rakesh K. Yadav, Srinivas Arukonda "Zero To Mastery In Python Programming ", Vayu Education Of India, 2021
- 2. Martin C. Brown," PYTHON: The Complete Reference", McGraw-Hill, 2018
3. Allen Downey, "Learning with Python", Dreamtech Press; 1st edition, 2015

### **Reference Books:**

- Wesley J Chun," Core Python Applications Programming", Prentice Hall, 2012.
  R. Nageswara Rao, "Core Python Programming" Dreamtech Press India Pvt Ltd 2018.
  Allen B Downey," Think Python", O'Reilly, 2012.

Course Code		C	Course	e Title		Core/Title					
SPC412IT	<b>OPER</b> A	TIN	NG S	YSTE	MS LAB						
	(Common	to A	1&1	DS, CM	IE, CSE,IT)						
Prerequisite	Contact Hours Per	Wee	k	CIE	SEE	CREDITS					
-	L	T	P	10		15					
	3 - 40 60										
Course Obje	Course Objectives										
1. Unders	1. Understand unix commands.										
2. Implement Process management related techniques.											
3. Implen	nent memory manage	ment	techr	niques.							
Course Outo	omes										
Upon comple	tion of the course, th	e stud	lents	will be a	ble to:						
1. Exec	ute the unix comman	ds.									
2. Imple	ement CPU schedulin	ıg alg	orithr	ns.							
3. Imple	ement producer-consi	ımer	probl	em read	er-writers problem, d	inning					
philo	sophers' problem.										
4. Appl	4. Apply the Banker's algorithm for deadlock avoidance.										
5. Imple	ement page replacem	ent ar	nd dis	k schedi	iling techniques.						
5. Imple	ement page replacem	ent ar	10 015	K SCREDI	lling techniques.						

- 1. Program to implement Unix system calls (fork(), wait(), exec(), sleep()) and file management.
- 2. Program to implement multithread concepts.
- 3. Program to implement CPU scheduling algorithms :

(i) FCFS (ii) SJF (iii) Round Robin

- 4. Program to implement Shared memory and Inter Process Communication (IPC) techniques.
- 5. Program to implement Process Synchronization using Dining Philosopher
- 6. Program to implement Process Synchronization using Producer-Consumer.
- 7. Program to implement Process Synchronization using Readers-Writers.
- 8. Program to implement deadlock detection.
- 9. Program to implement Bankers Algorithm for Deadlock Avoidance.
- 10. Program to implement the following Page Replacement Algorithms using FIFO
- 11. Program to implement the following Page Replacement Algorithms using LRU and LFU.
- 12. Program to implement FCFS Disk Scheduling Algorithm.
- 13. Program to implement SSTF Disk Scheduling Algorithms

### **Text Books:**

- 1. AviSilberschatz, Peter Galvin, Greg Gagne, Operating System Concepts Essentials,9th Edition, Wiley Asia Student Edition, 2017.
- 2. Naresh Chauhan, Principles of Operating Systems, Oxford University Press, 2014

### **Software Required**: Putty interface, Windows

Course

Code							Elective
SPC413IT		Core					
		(Commo					
	C	ontact Ho	ours per W	Veek	OT L	000	
Prerequisite	L	Т	D	Р		SEE	Credits
-	-	-	-	3	40	60	1.5

The objectives of the course are to impart knowledge of the:

- 1. To become familiar with the architecture and Instruction set of Intel8085microprocessor.
- 2. To provide practical hands-on experience with Assembly Language Programming.
- 3. Tofamiliarize the students within terfacing of various peripheral devices with 8085 microprocessors

### **Course Outcomes**

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

- 1. Interpret the principles of Assembly Language Programming, instruction set in developing microprocessor-based applications.
- 2. Develop Applications such as: 8-bit Addition, Multiplication, Division, array operations, swapping, negative and positive numbers.
- 3. Analyse the interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.
- 4. Build interfaces of Input-output and other units like stepper motor.
- 5. Analyse the function of traffic light controller.

### List of Experiments

### PART A: Programs using VERILOG

- 1. Review of the different logic design ckts., a) Gates b) Flip/Flop(RS, JK, D, T)
- 2. Familiarity with state of art IC-chips, e.g. a) Multiplexer , b) Decoder, c) Encoder, d) Counter,

e)Shift-Register, f)adder Truth Table verification and clarification from Data-book.

- 3. Design a BCD adder.
- 4. Design an Adder/Subtracter composite unit
- 5. Design a carry-look ahead Adder
- 6. Design a ripple counter and carry-look ahead counter.
- 7. Design ALU and 4-bit processor

### PART B: 8085 Programming using Microprocessor Trainer Kit

8. Simple programming examples using 8085 instruction set. To understand the use of various instructions and addressing modes.

9. Interfacing and programming of 8255 (Eg. Traffic Light Controller)

10. Interfacing and programming of 8254 and 8279.

### PART C: 8051 Programming

- 11. Simple programming examples using 8051 Microcontroller
- 12. A/D and D/A converter interface
- 13. Stepper motor interface
- 14. Display Interface

# FACULTY OF ENGINEERING Scheme of Instructions & Detailed Syllabus of V & VI Semester

# For Four Year Degree Programme of

# **Bachelor of Engineering (B.E)**

in

# **INFORMATION TECHNOLOGY**

(With effect from the academic year 2022-23)

(Approved by College Academic Council on -- -- ----)



Issued by

# Dean, Academics, Stanley College of Engineering and Technology for Women (Autonomous)

(Affiliated to Osmania University) (Accredited by NAAC with "A" Grade) Abids, Hyderabad – 500 001, Telangana.

## SCHEME OF INSTRUCTION & EXAMINATION

## B.E. (Information Technology) - V Semester

	Course		Sch	eme o	of Instr	uction	Schen Exam	Scheme Examination		
S. No.	Code	Course Title	L	т	P/D	Contact Hrs / Wk	CIE	SEE	Duration in Hrs	
Theory	Courses									
1.	SHS501BM	Finance & Accounting	3	-	-	3	40	60	3	3
2.	SPC501IT	Compiler Construction	3	1	-	4	40	60	3	4
3.	SPC502IT	Data Communications & Computer Networks	3	1	-	4	40	60	3	4
4.	SPC503IT	Design Analysis and Algorithms	3	-	-	3	40	60	3	3
5.	SSPE501IT	Professional Elective – I	3	-	-	3	40	60	3	3
Practica	al / Laboratory	Courses								
6.	PC511IT	Compiler Construction Lab	-	-	2	2	40	60	3	1
7.	PC512IT	Web Application Development Lab	1	-	3	4	40	60	3	2.5
8.	PC513	Data Communications & Computer Network Lab	-	-	3	3	40	60	3	1.5
			16	2	08	26	320	480	24	22

	Professional Elective – I									
S. No.	Course Code	Course Title								
1.	SPE 521 IT	Network security & cryptography								
2.	SPE 522 IT	Computational Intelligence								
3.	SPE 523 IT	Advanced databases								
4.	SPE 524 IT	Wireless mobile communications								
5.	SPE 525 IT	Principles of Programming								

MC: Mandatory Course

PC: Professional Core

SPE: Professional Elective

OE: Open Elective

5

HS: Humanities and Social Sciences

SEE: Semester End Evaluation (Univ. Exam)

L: Lecture T: Tutorial P: Practical D: Drawing CIE: Continuous Internal Evaluation **Note:** 1.Each contact hour is a clock hour. 2. The duration of the Practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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MAR

Course Code			Core / Elective					
SPC501IT		Со		Core				
Droroquisito	Co	ntact ho	urs per	week				
Freiequisite	L	Т	D	P		SEE	Credits	
Theory of Automaton	3	1	4					

- 1. To introduce the steps in language translation pipeline and runtime data structures used in translation
- 2. To learn about Scanning (lexical analysis) process using regular expressions and use of LEX to generate scanner and introduce different Parsing strategies including top-down (e.g., recursive descent, Early parsing, or LL) and bottom-up (e.g., backtracking or LR) techniques
- 3. Describe semantic analyses using an attribute grammar and learn how to build symbol tables and generate intermediate code and introduce techniques of program analysis and code optimization

### **Course Outcomes:**

At the end of this course, students will be able

- 1. Create lexical rules and grammars for a given language
- 2. Generate scanners and parsers from declarative Specifications.
- 3. Describe an abstract syntax tree for a small language.
- 4. Use program analysis techniques for code optimization
- 5. Develop the compiler for a subset of a given language

### UNIT -I

**Compiler Structure**: Analysis and Synthesis Model of Compilation, different sub-phases within analysis and synthesis phases. Basic concepts related to Compiler such as interpreter, simple One-Pass Compiler, preprocessor, macros, and symbol table and error handler.

**Lexical Analysis:** Its role, Specification and Recognition of tokens, Input Buffer, Finite Automata relevant to compiler construction syntactic specification of languages, Optimization of DEA based pattern matcher

DFA based pattern matchers Muell'

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#### **UNIT-II**

**Syntax Analysis:** Its role, Basic parsing techniques: Problem of Left Recursion, Left Factoring, And And Ambiguous Grammar.

**Top Down Parsing**: Recursive descent parsing, LL (1) parsing, First and follow sets, Recursive descent parser, and Error recovery in top down parsers.

**Bottom-up Parsing**: Overview, LR (0) items and LR (0) Parsing, SLR (1) Parsing, general LR (1) and LALR (1) parsing, YACC, and Error recovery in bottom-up parsers.

#### **UNIT-III**

**Semantic Analysis**: Static & Dynamic Checks, Typical Semantic errors, Scoping, Type Checking; Syntax directed definitions (SDD) & Translation (SDT),

Attribute Types: Synthesized & Inherited, Annotated Parse Tree, S-attributed and L-attributed grammar, Applications of syntax directed translation, Type Systems, Type Checking and Conversion

#### UNIT-IV

**Symbol Table Design**: Function of Symbol Table, Information provided by Symbol Table, Attributes and Data Structures for symbol table, Run–time storage management

**Intermediate Code Generator**: High-level and Low-level Intermediate representation, Syntax tree & DAG representations, Three-address code, Quadruples, Triples, SDT for intermediate code, Intermediate code generation for Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls; Back patching

#### UNIT-V

**Code Generator**: Factors affecting a code generator, Target Language, Basic blocks and flow graphs, Dynamic programming code-generation algorithm.

**Code Optimization:** Need and criteria of Code Optimization, Basic optimization techniques Case Studies of some compilers like C compiler, C++ compiler

#### **Text Books:**

- 1. Ravi Sethi, Aho & Ullman JP, —Compilers: Principles, Techniques and Tools<sup>II</sup>, Addison Wesley publishing co., 2013
- 2. Kenneth C. Louden, —Compiler Construction: Principles and Practicel, Thomson Learning Inc., 1997.

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3. J.P. Tremblay and P.S. Sorenson, —The Theory and Practice of Compiler Writing, TMH-1985

#### **Reference Books:**

- 1. Douglas Thain, Introduction to Compilers and Language Design, 2nd edition, 2020.
- 2. Seth D. Bergmann, Compiler Design: Theory, Tools, and Examples Publisher: Rowan University 2010
- 3. Richard Bornat, Understanding and Writing Compilers Publisher: Middlesex University 2008

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Course Code			Core / Elective
SPC502IT	Data	a Commu	Core
	(Con	nmon to A	
Prerequisite	Con	itact hour	Credito
-	L	Т	Creats
-	3	1	4

- 1. To introduce internet routing architecture and protocols.
- 2. To learn the flow control and congestion control algorithms in Transport Layer
- 3. To learn basic and advanced socket system calls.

### Course Outcomes:

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

- 1. Identify various networking components.
- Explain the function of each layer of OSI and trace the flow of information from one node to another node in the network.
- 3. Understand the principles of IP addressing and internet routing
- Describe the working of various networked applications such as DNS, mail, file transfer and www
- 5. Implement client-server socket-based networked applications.

### UNIT-I

**Data Communications:** Components, analog and digital signals and Encoders, Modems, RS232 Interfacing Switching: Circuit Switching, Message switching and Packet Switching. Topologies – Concept of layering.-Protocols and Standards – ISO / OSI model, TCP/IP

### UNIT-II

**Data Link Layer:** Error Control: Error detection and correction (CRC and Hamming code for single bit correction) Flow Control: stop and wait – - sliding window protocols-go back-N ARQ – selective repeat ARQ MAC LAYER: Ethernet IEEE 802.3LAN, Manchester encoding, binary exponential algorithm, Efficiency calculation, ARP and RARP.

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### UNIT-III

**Network Layer:** Internetworks – virtual circuit and Datagram approach Routing – Distance Vector Routing, Link State Routing, OSPF and BGP IPv4, addressing, Sub netting, and IPv6, CIDR, ICMP and IGMP protocols.

#### UNIT-IV

**Transport Layer:** Services of transport layer, Multiplexing and crash recovery Transmission Control Protocol (TCP) – TCP window management Congestion Control, timer management and User Datagram Protocol (UDP)

#### UNIT-V

Application Layer: Domain Name Space (DNS) – SMTP – FTP – HTTP.

**Socket programming:** Primitive and advanced system calls, client/server iterative and concurrent programs IO multiplexing, Asynchronous IO and select system call.

#### Text Books:

- 1. Computer Networks (5th Edition), Authors: Andrew S. Tanenbaum , David J. Wetherall, Pearson-2012
- 2. Computer Networks: A Systems Approach(5th Edition), Authors: Larry Peterson and Bruce Davie, Elsevier -2012
- 3. Computer Networking: A Top-Down Approach (6th Edition), Authors: James F. Kurose, Keith W. Ross, Pearson

#### **References Books:**

- 1. Data Communications and Networking,4th edition, Behrouz A Forouzan, Tata Mc Graw Hill,2007.
- 2. Data Communications and Networking (SIE), 4<sup>th</sup> edition, Behrouz A Forouzan, Tata Mc Graw Hill,2017.
- 3. Data and Computer Communication, 8th Edition, William Stallings, Pearson PrenticeHall India.

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Course Code			Core / Elective				
SPC503IT		Desig	Core				
	(Con	nmon to C	Sem)				
Proroquisito	Con	tact hour	s per wee	k			
rerequisite	L	Т	D	Р			Credits
Problem-Solving	3	-	3				
Skills, Data							
Structures							

- 1. To explore elementary data structures, order notation and algorithm analysis
- 2. To learn algorithm design strategies such as Divide-and-Conquer, greedy method, dynamic programming, back tracking and branch & bound technique
- 3. To describe the concepts of NP-hard, NP-complete and text compressions.

### Course Outcomes:

Upon completion of the course, the students will be able to:

- 1. Compute and Analyze the complexity of algorithms using asymptotic notations.
- 2. Apply the divide and conquer and brute force techniques to a given problem
- 3. Demonstrate and apply greedy methods and dynamic programming techniques to real world problems
- 4. Relate the Backtracking and Branch and Bounds techniques to real world problems.
- 5. Understand NP-Hard and NP-Complete of algorithms and different tries methods.

### UNIT-I

**Introduction:** Algorithm definition and Specification, Asymptotic analysis, Performance measurements of Algorithms. Time and Space complexities, Analysis of Recursive algorithm.

**Basic Data Structures:** Disjoint set operations, Union and find algorithms, Dictionaries, Graphs and Trees.

### UNIT-II

Divide and Conquer:	General	method,	Control	abstraction,	Merge	sort, G	uick	sort,	Worst,
Best, and Average case.	Binary se	earch				(			$\rightarrow$

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Brute Force: Closest Pair, Convex-Hull Problems, Exhaustive Search Travelling Salesman Problem, Knapsack problem, Assignment problem.

#### UNIT-III

**Greedy Method:** General Method, Knapsack problem, Job sequencing with deadlines, Minimum cost Spanning trees, Single source shortest path problem.

**Dynamic Programming:** General Method, All pairs shortest path problem, Optimal Binary search trees, 0/1knapsack problem.

### UNIT-IV

**Backtracking:** General Method, Recursive backtracking algorithm, Iterative backtracking method, 8-Queen problem, Hamiltonian Cycle.

**Branch and Bound:** Control abstraction for Least Cost search, Bounding, FIFO branch and bound LC branch and bound, Traveling sales person problem, 0/1 Knapsack problem.

#### UNIT-V

**Tries and Text Compression:** Standard Tries, Compressed Tries, Suffix Tries, Huffman coding algorithm,

**Strings and Pattern Matching Algorithms:** String operations, Brute Force pattern matching, Boyer-Moore Algorithm

**NP- Completeness:** P and NP, NP-Completeness, NP Hard, Important NP-Complete Problems, Approximation Algorithms

#### **Text Books:**

- 1. Horowitz E.SahaniS: Fundamentals of Computer Algorithm, Second edition, University Press, 2007.
- 2. Anany Levitin, Introduction to the Design&Analysis, of Algorithms, SPEarson Education, 2003.
- 3. Aho, Hopcroft, Ulman, the Design and Analysis of Computer Algorithm, SPEarson Education, 2000.

#### **Reference Books**

1. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley – 2002

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Dept. of Computer Science & Engineering, University College of Engineering, Osmania University, Hyd-500.607

- 2. Alfred V Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures
- 3. Steven S. Skiena, The Algorithm Design Manual, Third edition , Springer, 2020
- Parag H.Dave, Himanshu B.Dave, Design and Analysis of Algorithms, SPEarson Education, 2008.

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CHAIRMAN CHAIRMAN Board of Studies (IT) Dept. of Computer Science & Engs. University CoSege of Engineering. Osmania University, Hyd-500.007

Course Code		Course Title										
PC511IT		<b>Compiler</b> Construction Lab										
Proroquisito	Co	ntact hour	s per wee	k								
Frerequisite	L	Т	D	Р	CIE	SEE	Credits					
C Languag <b>es</b>	-	-	1									
Course Objective	•											

#### uise Objectives:

- 1. To learn usage of tools LEX, YAAC
- 2. To develop a code generator
- 3. To implement different code optimization schemes

#### Course Outcomes:

Student will be able to:

- 1. Understand and define the role of lexical analyzer, use of regular expression and transition diagrams.
- 2. Understand and use Context free grammar, and parse tree construction.
- 3. Learn & use the new tools and technologies used for designing a compiler.
- 4. Develop program for solving parser problem
- 5. Apply the techniques and algorithms used in Compiler Construction in compiler component design
- 6. Build a code generator using different intermediate codes and optimize the target code.

### List of Experiments:

- 1. Write a Program to Scan and Count the number of characters, words, and lines in a file.
- 2. Write a program to identify whether a given line is a comment or not.
- 3. Write a program to check whether a string satisfies Regular \_Expression ( a/b)\*abb or not.
- 4. Write a program to remove white spaces and tabs from input file.
- 5. Write a program to Implement leftmost derivation for a given string
- 6. Write a program to check whether a grammar is LL(1)or not

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- 7. Write a program to implement LALR parsing.
- 8. Write a program to implement operator precedence parsing
- 9. Write a program to Construction of a Predictive parsing Table
- 10. Write a program to Implement unification Algorithm
- 11. Write a program to Parser Generation using YACC
- 12. Write a program on code generation
- 13. Write a program on code optimization

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CHAIN Board of Studies (IT) Board of Studies (IT) Dept. of Computer Science & Engineering University College of Engineering University College of Engineering Osmania University, Hyd-500 007

Course Code PC513IT	Data Co	Course Title Data Communication & Computer Network Lab										
Prerequisite	Co	Contact hours per week										
	L	Т	D	Р	CIE	SEE	Credits					
C or python Programming	2 40 60 1.5											
Course Objective	s:											

- 1. To familiarize POSIX: IPC
- 2. To use socket interface to write client-server network applications
- 3. To effectively use sockets to write simple network monitoring tools

#### Course Outcomes:

Student will be able to

- 1. Use the relevant network model for the specified data communication system.
- 2. Configure the network component and assign IP address.
- 3. Write concurrent programs using message queues and semaphores
- 4. Use connection-oriented, connectionless and Asynchronous sockets
- 5. Implement networked applications in TCP/IP protocol Suite

### List of Experiments:

- 1. To Study about different physical equipment used for networking.
- 2. Analyze the type of network topology used in your lab and prepare technical specifications for it.
- 3. Study of basic network command and Network configuration commands.
- Install/configure/Test Peer to Peer LAN and sharing of resources.
- 5. Write a program to generate CRC code for checking error.
- 6. Install and configure a Firewall for the network security.
- 7. Interconnect two PCs using RS282 cable and transfer data as null modem configuration.

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- 8. Write a program for error detecting code using CRC-CCITT (16- bits)
- 9. Write a program to find the shortest path between vertices using the bellman-ford algorithm
- 10. Using TCP/IP sockets, write a client-server program to make the client send the file name and to make the server send back the contents of the requested file if present.
- 11. Write a program on a datagram socket for the client/server to display the messages on the client side typed at the server-side
- 12. Write a program for congestion control using a leaky bucket algorithm
- 13. Program to capture each packet and examine its checksum field.



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Course Code		P. 1. 1.	Core / Elective				
rCS1211		Web Aj	plication	Core			
Prerequisite	Ce	intact ho	urs per w				
1	L	Т	D	P	CIE	SEE	Credits
-	1	-	2.5				
Course <b>Overvie</b>	W.					1	

Course Overview:

This course introduces students to developing web applications. This course presents the basics of HTML5 and CSS3, Other HTML tags for Web application Development. Learn to create links in HTML, Uses of HTML forms. Introduction to the use of Reactstrap for Bootstrap 4-based responsive UI design. React router and its use in developing single-page applications, designing controlled forms. Redux and use it to develop React-Redux powered applications, client-server communication and the use of REST API on the server side, React primitives render to native platform UI.

### Course Objectives:

The students will try to

- 1. Programming skills in Html5, CSS3, and Bootstrap 4.
- 2. Developing skills of Web Applications user interactions using JavaScript (i.e. ES6+).
- 3. Web application Development Database with React and React Native.

### Course Outcomes: Students will be able to:

- Design different layouts using HTML 5 and CSS
- Understand the BOOTSTRAP for designing applications.
- 3. Understand the concepts of JAVA script and implement dynamic forms.
- Design and develop games using HOOKS.
- Implement a full-stack web applications with React and MongoDB.

#### List of Experiments:

### 1. HTML Layouts & Links:

i. Develop a web application to control over different layouts

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- Create a webpage with HTML describing your department use paragraph and list tags.
- iii. Apply various colors to suitable distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.
- iv. Create links on the words e.g. "Wi-Fi" and "LAN" to link them to Wikipedia pages.

### 2. WEB Application Design Formatting:

- i. Develop a web application with background banner image and navigation menus.
- ii. Develop a web application with responsive images.
- iii. Develop a web application using left menu.
- iv. Develop setting to change the theme of entire web Application.

### 3. Introduction to Responsive Interface Using:

i. Write code for developing responsive web application with Admin panel and tables with static data.

### 4. Building Interfaces Using JavaScript:

- i. Set up the Folder Structure.
- ii. Write the Model code and initialize the application.
- iii. Implement the list objects and use cases.
- iv. Implement the create object use case.
- v. Implement the update object use case.

# 5. Introduction to Interactive Forms & Ajax Data binding:

- Developing Web Page Styles using JavaScript and CSS,
- ii. Develop Script interactive forms
- iii. Data binding using Ajax.

# 6. React Environment Setup:

i. Setting up development environment.



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- ii. Integration with Existing Apps.
- iii. Running on Device.
- iv. Debugging
- v. Testing
- vi. Write source code using Typescript.
- 7. Programming with React:
  - i. Basics Interactive examples.
  - ii. Function Components and Class Components
  - React Native Fundamental, Handling Text Input,
  - iv. Using a scroll View, using List View.
  - v. Platform Specific Code.

## 8. PHP Sessions Box React for Data Visualization:

- i. Introduction and scaffolding the Project.\
- ii. Pages and Layout.
- iii. Working with an API, CSS-in-JS.
- iv. Dynamic Pages and React Hooks.
- v. Custom React Hooks, Dynamic CSS-in-JS.
- vi. Finishing up and Deployment.
- vii. Optimization and PWA.

### 9. MongoDB

- i. Install and Run MongoDB
- ii. connecting to the MongoDB

### iii. MongoDB Examples: Basic CRUD Operations

- a) MongoDB C Examples for CRUD: Insert Operations
- b) MongoDB C Examples for CRUD: Read Operations

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- c) MongoDB C Examples for CRUD: Update Operations
- d) MongoDB C Examples for CRUD: Update Single Documents
- e) MongoDB C Examples for CRUD: Update Multiple Documents
- f) MongoDB C Examples for CRUD: Delete Operations

## 10. Chat Application:

- Firebase Environment. Introduction and Scaffolding the project. i.
- ii. Private and Public pages, Context API.
- iii. Creating Side bar and Dashboard
- iv. Creating and displaying Chat Rooms.
- v. Creating Layout for Chat page.

# 11. Chat Application API Responses:

- i. Context API Problem-solution for the chat messages.
- ii. Denormalization of the data to be stored in app.
- iii. Displaying chat feed for Interactive UI along with Real time user presence.

### 12. Databases Handling:

- i. Role Based Access.
- ii. Messages Likes and deletion.
- iii. File and Audio Chat Messages
- iv. Extended Chat Features and Deployment.

### Text Book

- 1. Adam Botch and Roy Derks, "React and React Native: A Complete Hands-on Guide to Modern Web and Mobile Development with React.js", 3rd Edition, 2020.
- 2. W Hans Bergsten, "Java Server Pages", O'Reilly, 3rd Edition, 2003.

### **Reference Books:**

- 1. D. Flanagan, "Java Script", O'Reilly, 6th Edition, 2011.
- 2. Jon Duckett, "Beginning Web Programming", WROX, 2nd Edition, 2008.

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Course Code			Car	The second second			1
SPE522IT		Comp		Core / Elective			
		Comp	ltational	Elective			
Droroquicito	Co	ntact ho	urs per v				
Frerequisite	L	Т	D	Credits			
_	3	-	-	2			

- 1. To enable Problem-solving through various searching techniques.
- 2. To apply these techniques in applications which involve perception, reasoning and learning.
- 3. To apply probabilistic approach for uncertainty problems.

### Course Outcomes:

Students will be able to

- 1. Apply the Intelligent techniques for problem solving
- 2. Apply heuristic search approach for problem solving
- 3. Apply improve problem solving skills using the acquired knowledge in the areas of, reasoning and uncertainty
- 4. Understand and apply the concepts of fuzzy logic.
- 5. Understand and apply the concepts of genetic algorithms in real world problems.

### UNIT-I

**Introduction to Computational Intelligence**; What is Computational Intelligence, types of Computational Intelligence, components of Computational Intelligence.

**Problem solving:** problem formulation, general problem solving, problem characteristic, searching for solutions, Uniformed Search Strategies, uniformed / exhaustive search strategies– Breadth first search, depth first Search. Iterative deepening DFS

### UNIT-II

**Heuristic search**: Generate and test, Hill climbing, best first search, A\* search AO\*, Iterative deepening A\*. Constraint satisfaction problem, Problem reduction, Game Playing-Adversial search, mini-max algorithm, Alpha-Beta pruning,

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#### UNIT-III

**Probabilistic Reasoning**: Probability, conditional probability, Bayes Rule, Bayesian Networksrepresentation, construction and inference, temporal model, hidden Markov model – Markov model, Markov chain, Hidden Markov Model (HMM), forward algorithm, Viterbi Algorithm, The Forward-Backward Algorithm

**Expert System:** Introduction, basic concepts, phases in building expert system Expert system architecture, Expert system Vs Traditional system, Rule based system, Non-production system, knowledge acquisition, case studies: MYCIN, RI.

#### UNIT-IV

**Fuzzy Systems**: Fuzzy sets and operations, Membership Functions, Concept of Fuzzy relations and their composition, Concept of Fuzzy Measures; Fuzzy Logic: Fuzzy Rules.

**Fuzzy Inferencing Systems**: Rule Based Design & Inferencing, Selection of Membership Functions, Fuzzification, Defuzzification. Components of Fuzzy Controllers, Fuzzy Controller Types: Table-Based Controller, Mamdani Fuzzy Controller, Takagi-Sugeno Controller.

#### UNIT-V

**Evolutionary Computing**: Introduction, Representation of Solution, Fitness Function, Initial Function. Selection Operator, General Evolutionary Algorithms. Evolutionary Computing Vs Classical Optimization.

**Genetic Algorithms:** Basic GA framework and different GA architectures, GA operators: Encoding, Crossover, Selection, Mutation. Genetic Programming, Building-Block Approach to Genetic Programming

#### Text Books:

- 1. Stuart Russell, Peter Nerving, Artificial Intelligence: A Modern Approachl, Third Edition, Pearson Education / Prentice Hall of India, 2010.
- 2. Andries P.Engelbrecht, Computational Intelligence :An Introduction, Wiley Publishing.2007.
- Russell C. Eberhart and Yuhui Shi, Computational Intelligence: Concepts to Implementations, Morgan Kaufmann Publishers.
- 4. Elaine Rich and Kevin Knight, —Artificial Intelligencel, Third Edition, Tata McGraw-

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Hill, 2010.

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### **References Book:**

- 1. Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
- 2. Dan Watterson, —Introduction to Artificial Intelligence and Expert Systems<sup>I</sup>, PHI, 2006.
- 3. Nils J. Nilsson, —Artificial Intelligence: A new Synthesisl, Harcourt Asia Pvt. Ltd., 2000.
- 4. K.R.Chowdhary, Fundamentals of AI, Springer, 2020



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Course Code SPE525IT			Сол	Core / Elective				
	6		Principl	es of Pro	Elective			
Prerequisite	U	ontact ho	urs per t	week				
,	L	T	D	D	CTE	SEE	Credits	
Programming for Problem Solving	3	-	-	Ľ	40	60	3	
Course Object	ives-	-	1					

- 1. To understand and describe syntax and semantics of programming languages
- 2. To understand data, data types, and basic statements
- 3. To understand object-orientation, concurrency, and event handling in programming languages

#### Course Outcomes:

Students will be able to

- 1. Describe syntax and semantics of programming languages
- 2. Explain data, data types, and basic statements of programming languages
- 3. Design and implement subprogram concepts
- 4. Apply object-oriented, concurrency, and event handling programming concepts
- 5. Understand and adopt new programming languages.

### UNIT-I

Syntax & Semantics: Evolution of programming languages – describing syntax – context-free grammars – Attribute Grammars – describing semantics – lexical analysis – parsing – recursivedecent – bottomup parsing,

### UNIT-II

Data, Data Types, & Basic Statements: Names – variables – binding – type checking – scope – scope rules – lifetime and garbage Collection – primitive data types – strings – array types – associative arrays – record types –Union types – pointers and references – Arithmetic expressions – overloaded operators – type conversions – relational and boolean expressions – assignment statements – mixed mode assignments – control structures – selection – iterations – branching – guarded Statements

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#### UNIT-III

**Subprograms & Implementations:** Subprograms – design issues – local referencing – parameter passing – overloaded Methods – generic methods – design issues for functions – semantics of call and return –Implementing simple subprograms – stack and dynamic local variables – nested Subprograms – blocks – dynamic scoping

#### UNIT-IV

**Object-Orientation, Concurrency, & Event Handling:** Object-orientation – design issues for OOP languages – implementation of object-oriented Constructs – concurrency – semaphores – monitors – message passing – threads –Statement level concurrency – exception handling – even handling

### UNIT-V

**Functional & Logic Programming Languages:** Introduction to lambda calculus – fundamentals of functional programming languages – Programming with Scheme – Programming with ML – Introduction to logic and Logic Programming – Programming with Prolog – multi-paradigm languages.

#### Text Books

- Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
- 2. Michael L. Scott, "Programming Language Pragmatics", Third Edition, Morgan Kaufmann, 2009.
- 3. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.

#### **References Books:**

- 1. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
- 2. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
- 3. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.

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University Content of Myd-500007 Osmania University, Hyd-500007

<b>Course Code</b>	Course Title									
SPE521IT	]	Network	Core / Elective							
			security (	Elective						
Droroquisito	Cor	ntact hou	irs per we	ek						
Freiequisite	L	Т	D	Р	CIE	SEE	Credits			
Computer	3	-	-	3						
Network							5			

Familiarize students with basics of Network Security and cryptography.

- 1. To understand the network security, services, attacks, mechanisms, types of attacks on TCP/IP protocol suite.
- 2. To comprehend and apply network layer security protocols, Transport layer Security protocols, Web security protocols.
- 3. To comprehend and apply authentication services, authentication algorithms and Provide a solid understanding of main issues related to network security

### Course Outcomes:

Students will be able to

- 1. Understand the most common type of information and network threat sources.
- 2. Able to determine appropriate mechanisms for protecting the network.
- 3. Design a security solution for a given application system with respect to security of the system.
- 4. Understand the information and network security issues and apply the related concepts for protection and communication privacy.
- 5. Comprehend various network security threats.

### **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

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.

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### UNIT-II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

**Asymmetric key Ciphers:** Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

### UNIT-III

**Cryptographic Hash Functions:** Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

**Key Management and Distribution**: Symmetric Key Distribution Using Symmetric& Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

### 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

**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

**Case Studies on Cryptography and security:** Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

### **Text Books:**

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

### SCHEME OF INSTRUCTION & EXAMINATION

### **B.E. (INFORMATION TECHNOLOGY) – VI Semester**

				Sch Inst	eme of ruction		S Ex	cheme of aminatio	n	_
S. No.	Course Code	Course Title	L	Т	P/ D	Contact	CIE	SEE	Duration in 1120	Credits
Theory Co	ourses							1		
1.	SPC 601 IT	Embedded System	3	-	-	3	40	60	3	3
2.	SPC 602 IT	Software Engineering	3	-	-	3	40	60	3	3
3.	SPC 603 IT	Artificial Intelligence & Machine Learning	3	-	-	3	40	60	3	3
4.	SPE – II	Professional Elective – II	3	-	-	3	40	60	3	3
5.	OE – I	Open Elective – I	3	-	-	3	40	60	3	3
Practical /	Laboratory Co	urses						1	<u>.</u>	
6.	SPC 611 IT	Embedded System Lab	-	-	3	3	40	60	3	1.5
7.	SPC 612 IT	Artificial Intelligence & Machine Learning Lab	-	-	3	3	40	60	3	1.5
8.	SPW 6113IT	Mini Project (Software Engineering Lab)	-	-	4	4	40	60	3	2
9.	SPW614IT	Technical Seminar	-	-	2	2	50	-	3	1
10.	SPW611IT	Internship-2	The students have to undergo an internship of 4 weeks duration after VI-semester SEE			50	-	3	1	
			15		12	27	420	480	30	22

	Professional Elective – II								
Sl. No.	<b>Course Code</b>	Course Title							
1.	SPE 621 IT	Information Security							
2.	SPE 622 IT	Natural Language Processing.							
3.	SPE 623 IT	Information retrieval systems							
4.	SPE 624 IT	Ad-hoc and Sensor Networks							
5.	SPE 625 IT	Parallel Algorithms							

	Open Elective – I									
S. No.	Course Code	Course Title								
1.	SOE 611 IT	OPERATING SYSTEMS								
2.	SOE 612 MBA	ENTREPRENEURSHIP								
3.	SOE 613 ECE	SIGNALS AND SYSTEMS								
4.	SOE 614ECE	SIGNAL ANALYSIS AND TRANSFORMATION TECHNIQUES								
5.	SOE 615 CSE	OPEN SOURCE TECHNOLOGIES								
6.	SOE 616 CSE	OOP USING JAVA								

PC: Professional Core SPE: Professional Elective MC: Mandatory Course OE: Open Elective SEE: Semester End Evaluation (Univ. Exam) CIE: Continuous Internal Evaluation SI: Summer Internship L: Lecture T: Tutorial P: Practical D: Drawing

### Note:

\* The students have to undergo a Summer Internship of four weeks duration after VI semester and credits will be awarded in VII semester after evaluation.

Course Code			<b>Core / Elective</b>					
SPC601 IT			Core					
<b>D</b>	Cont	tact hours	per week		0.77			
Prerequisite	L	Т	D	Р	CIE	SEE	Credits	
Microprocessor	3	-	_	_	40	60	3	

- 1. To provide knowledge on the basics, building blocks of Embedded System.
- 2. To teach automation using scheduling algorithms and Real time operating system.
- 3. To involve Discussions/ Practice/Exercise onto revising & familiarizing the concepts.

### **Course Outcomes:**

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

- 1. Gain adequate understanding of the software architecture of the Embedded OS.
- 2. Develop simple applications for Process Management, Synchronization Techniques, Message Passing, and POSIX based application development.
- 3. Describe the Linux Kernel environment; build system, kernel configuration, customization and compilation.
- 4. Set up a Linux environment with basic understanding of kernel programming concepts like Module. Programming and Device Drivers.
- 5. Understand cross tooling environments and be exposed to development of device drivers for a target hardware platform.

### UNIT- I

**Introduction to Embedded System:** Definition, Examples and components of embedded Systems, Classification of an Embedded system. Architecture of Embedded system. General purpose computers vs embedded system, Embedded System Design Process, Core of Embedded System, Memory, Sensors and Actuators, Communication Interface- Onboard communication interface, External communication interface.

### UNIT-II

**Hardware/Software Co-design for Embedded Systems:** Microcontrollers for embedded systems, 32-bit RISC Architectures for embedded Design, ARM architectural details, The ARM programmer's model, ARM development tools, ARM microcontroller programming in C, Peripheral Interfacing with ARM, Basic Wire and Wireless Protocols like, UART, I2C, SPI, PLCC, Bluetooth, Wi-Fi, Zig-Bee and Lora for IoT applications.

### UNIT- III

**Embedded Operating Systems:** Embedded OS overview, Study of Embedded OS principles and

requirements. Internal components of Embedded operating systems - Compare and contrast various Embedded OS platforms.

### UNIT -IV

Introduction to Device Drivers: Unix/Linux kernel fundamentals-Process Scheduling - Kernel

Synchronization, I/O devices - Architecture - Character, Block Device handling, file systems - The Ext2 file System - The Virtual File System and peripheral devices, Linux file system.

### UNIT-V

**Device Driver Internals**: Fundamentals of device drivers-Character and Block Devices -Polling and Interrupts - The Hardware, device enumeration and configuration, Data transfer and management mechanisms.

### **Text Books:**

- 1. Raj Kamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct. 2003
- 2. Christopher Hallinan, "Embedded Linux Primer: A practical Real-World approach", Prentice Hall, 2nd Edition, 2011.
- 3. Daniel P. Bovet and Marco Cesati, "Understanding the Linux Kernel, O'Reilly, 3rd Edition, 2005.
- 4. John Madieu, "Linux Device Drivers Development: Develop customized drivers for embedded Linux", Packt Publishing, 1st Edition, 2017.
- 5. Jonathan Corbet, Alessandro Rubini, Greg Kroah, "Linux Device Drivers", O'Reilly, 3rd Edition, 2005.

### **References:**

- 1. Steve Heath, Embedded Systems Design, Second Edition-2003, Newness,
- 2. David Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
- 3. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001
- 4. Frank Vahid and Tony Garages, Embedded Systems Design A unified Hardware /Software Introduction, John Wiley, 2002.

Course Code			<b>Core / Elective</b>				
SPC602 IT		S	Core				
Contact hours per week      CIE      SEE        D      P      CIE      SEE							
					CIE		Credits
_	3	-	_	_	40	60	3

- 1. To introduce the basic concepts of software development processes from defining a product to shipping and maintaining
- 2. To impart knowledge on various phases, methodologies and practices of software development
- 3. To understand the importance of testing in software development, study various testing strategies along with its relationship with software quality and metrics

### **Course Outcomes:**

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

- 1. Acquired working knowledge of alternative approaches and techniques for each phase of software development
- 2. Judge an appropriate process model(s) assessing software project attributes and analyze necessary requirements for project development eventually composing SRS
- 3. Creation of visual models to describe (non-) algorithmic solutions for projects using various design principles.
- 4. Acquire skills necessary as an independent or as part of a team for architecting a complete software project by identifying solutions for recurring problems exerting knowledge on patterns.
- 5. Concede product quality through testing techniques employing appropriate metrics by understanding the practical challenges associated with the development of a significant software system.

### UNIT-I

A generic view of Process: Software Engineering, Process Framework, CMM Process Patterns, Process Assessment.

**Process Models:** Prescriptive Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Models, Personal and Team Process Models, Process Technology, Product and Process.

An Agile view of Process: Introduction to Agility and Agile Process, Agile Process Models.

### UNIT-II

**Software Engineering Principles:** SE Principles, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment.

**System Engineering:** Computer-based Systems, The System Engineering Hierarchy, Business Process Engineering, Product Engineering, System Modeling.

**Requirements Engineering:** A Bridge to Design and Construction, Requirements Engineering Tasks, Initiating Requirements Engineering Process, Eliciting Requirements, Developing Use-Cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

### UNIT-III

**Building the Analysis Model:** Requirements Analysis Modeling Approaches, Data Modeling Concepts, Object-Oriented Analysis, Scenario-based Modeling, Flow-oriented Modeling, Class-based Modeling, Creating a Behavioral Model.

**Design Engineering:** Design within the context of SE, Design Process and Design Quality, Design Concepts, The Design Model, Pattern-based Software Design.

### UNIT-IV

**Creating an Architectural Design**: Software Architecture, DataDesign, Architectural Styles and Patterns, Architectural Design.

**Modeling Component-Level Design:** Definition of Component, Designing Class-based Components, Conducting Component-level Design, Object Constraint Language, Designing Conventional Components.

**Performing User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

### UNIT-V

**Testing:** Strategies: A Strategic Approach to Conventional Software Testing, Test Strategies for O-O Software. Tactics: Software Testing Fundamentals, Black-box and White-box Testing, Basis Path Testing, Control Structure Testing, O-O Testing Methods.

Debugging: Debugging Techniques, The Art of Debugging.

**Product Metrics:** A Framework for Product Metrics, Metrics for each phase of software development.

**Software Quality:** Definition, Quality Assurance: Basic Elements, Formal Approaches, Statistical Software Quality Assurance, Software Reliability, ISO9000 Quality Standards, SQA plan.

### **Textbooks:**

1. Roger S. Pressman, Software Engineering: A Practitioners Approach, Seventh Edition, McGraw-Hill, 2009.

- 2. AliBehforoz and Frederic Johansson, Software Engineering Fundamentals, Oxford University Press, 1996.
- 3. PankajJalote—An Integrated Approach to Software Engineering, Third Edition, Nervosa publishing house, 2008.

### **Reference Books:**

- 1. Software Engineering, a Precise Approach, Pankaj Jalote, Wiley India, 2010.
- 2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
- 3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
- 4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
- 5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

Course Code		Ca	<b>Core / Elective</b>					
SPC602 IT	A	rtificial Ir	ntelligence	Core				
D	Co	ntact hou	rs per we	ek	<b>CIT</b>		Credits	
Prerequisite	L	Т	D	Р	CIE	SEE		
Programming	3	-	-	-	40	60	3	
language, Data								
Structures								

- 1. To learn the concepts of Artificial Intelligence , machine learning and types of learning along with evaluation metrics.
- 2. To study various supervised learning algorithms and learn ensemble techniques and various unsupervised learning algorithms.
- 3. To explore Neural Networks and to learn reinforcement learning and study applications of machine learning.

### **Course Outcomes:**

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

- 1. Describe the concepts and applications of artificial intelligence and Machine Learning.
- 2. Understand and Compute the performance metrics for regression and classification problems.
- 3. Extract features that can be used for a particular machine learning approach in various applications.
- 4. Apply ensemble techniques for improvement of classifiers.
- 5. Understand reinforcement learning and Apply classification, clustering and reinforcement learning to various applications.

### UNIT-I

**Overview of Artificial Intelligence:** Introduction. The Turing Test, Strong AI Versus Weak, AI, Identifying Problems Suitable for AI, Applications and Methods, Early History of AI, Recent History of AI to the Present, AI in the New Millennium

**Introduction:** Learning, Concept of learning system, Machine Learning, Types of Machine Learning, data and data set, attribute types, Training, Testing, and Validation Sets, The Confusion Matrix, Accuracy Metrics, The Receiver Operator Characteristic (ROC) Curve, Unbalanced Datasets, Some basic statistics: Averages, Variance and Covariance, The Gaussian, the bias-variance trade-off.

### UNIT-II

**Regression:** Linear Regression, Logistic Regression.

**Supervised Learning**: Classification Learning with Trees: Using Decision Trees, Constructing Decision Trees, CART, Naïve Bayes, K-Nearest Neighbors, Support Vector Machines(SVM)
# UNIT-III

**Unsupervised Learning(clustering)**: Introduction, Similarity and Distance Measures, Outliers, Partitional Algorithms, Hierarchical Methods, Clustering Large Databases, Clustering with Categorical Attributes, Comparison

**Dimensionality Reduction**: Curse of Dimensionality, Linear Discriminant Analysis, Principal Component Analysis

### **UNIT-IV**

**Neural Networks:** Introduction Artificial neural Network, perceptron, Multilayer Perceptron, Back propagation Algorithm, Activation Functions, Gradient Descent for Machine Learning.

Ensemble Algorithms: Bagging, Boosting. Random forest,

#### UNIT-V

**Reinforcement learning**: Overview, State and Action Spaces, The Reward Function, Discounting, Action Selection, Policy, Markov decision processes, Q-learning, Uses of Reinforcement learning. Applications of Machine Learning.

#### Textbooks

- 1. Stuart Russell, Peter Norvig: Artificial Intelligence, A Modern Approach, Pearson Education, Global Edition. 2021
- 2. Stephen Marsland, Machine Learning: An Algorithmic Perspective, Second Edition, Chapman & Hall/CRC, 2014.
- 3. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.

### **Reference Books:**

- **1.** Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Second Edition, Springer Series in Statistics.(2009).
- 2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 1<sup>st</sup> edition, 2016.
- 3. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008.

Course Code				Core / Elective			
SPC611 IT			Core				
	Con	tact hours	per week				
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
C Programming	-	-	-	3	40	60	1.5
Language							

- 1. To understand basic concepts and structure of embedded systems.
- 2. To design and develop real time applications of embedded systems

# **Course Outcomes:**

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

- 1. Apply the basic concepts to develop an Interface for 8051 and ARM processors.
- 2. How to interface input and output units.
- 3. Develop control applications
- 4. Demonstrate the RTOS Concepts by designing real time applications.
- 5. Demonstrate multi-tasking, scheduling, priority inversion and Interrupt service routines in RTOS.

# List of Experiments:

- 1. **Interface Input-Output and other units such as:** Relays, LEDs, LCDs, Switches, Keypads, Stepper Motors, Sensors, ADCs, Timers
- 2. Demonstrate Communications: RS232, IIC and CAN protocols
- 3. **Develop Control Applications such as**: Temperature Controller, Elevator Controller, Traffic Controller
- 4. Understanding Real Time Concepts using any RTOS through Demonstration of:
  - i. Task management and Software timers.
  - ii. Real-time message queues, semaphores, and mutexs.
  - iii. Process management and Thread management.
  - iv. Scheduling policies and preemptions.
  - v. Embedded Linux Development environment set-up.
  - vi. Linux Kernel configuration.
  - vii. Building Embedded Linux Device Trees.

viii. Linux Kernel Modules and Device model.

- ix. Sysfs, Char device / drivers.
- x. Platform device/driver.

Course Code				<b>Core / Elective</b>			
SPC612 IT		AI 8	Core				
<b>D</b>	Con	tact hours	per week				
Prerequisite	L	Т	D	Р		SEE	Credits
Python	-	-	_	3	1.5		
Programming							

The main objectives of this course are:

- 1. Demonstration of different classifiers on different data.
- 2. Demonstrate unsupervised learning algorithms and dimensionality reduction techniques.
- 3. Make use of real-world data to implement machine learning models

## **Course Outcomes:**

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

- 1. Understanding the exploratory data analysis and data visualization
- 2. Understand the implementation procedures for the machine learning algorithms.
- 3. Design Python programs for various Learning algorithms.
- 4. Apply appropriate data sets to the Machine Learning algorithms.
- 5. Identify and apply Machine Learning algorithms to solve real world problems.

### **List of Experiments:**

- 1. Write a python program to import and export data using Pandas library functions
- 2. Demonstrate various data pre-processing (EDA) techniques for a given dataset
- 3. Write a Python program to demonstrate various Data Visualization Techniques
- 4. Develop Decision Tree Classification model for a given dataset and use it to classify a new sample
- 5. Implement Simple and Multiple Linear Regression Models
- 6. Develop Logistic Regression Model for a given dataset
- 7. Implement Naïve Bayes theorem to classify the text data
- 8. Implement k-nearest neighbours classification using python
- 9. Write a python program to implement K-Means clustering Algorithm
- 10. Implement Dimensionality reduction using Principle Component Analysis (PCA) method

- 11. Build Artificial Neural Network model with back propagation on a given dataset
- 12. Implement Random forest ensemble method on a given dataset.
- **13.** Implement Boosting ensemble method on a given dataset

Course Code				<b>Core / Elective</b>			
SPW6113 IT	1	Mini Proje	ect (Softwa	re Engine	ering Lab	)	Core
Prerequisite	Con	tact hours	per week		CIE	SEE	Credits
	L	Т	D	Р			
Programming for Problem Solving	-	-	-	3	40	60	2

- **1.** To have hands on experience in developing a software project by using various software engineering.
- 2. Principles and methods in each of the phases of software development.
- 3. Translate end-user requirements into system and software requirements

# **Course Outcomes:**

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

- 1. Ability to generate a high-level design of the system from the software requirements
- 2. Gain experience and/or awareness of testing problems and will be able to develop a simple testing report
- **3.** Understand the software engineering methodologies involved in the phases for Project development.
- 4. Gain knowledge about open-source tools used for implementing software engineering methods.
- 5. To develop product-prototypes implementing software engineering methods.

# I. FORWARD ENGINEERING

Students have to form a team with a batch size of two or three and take up a case study based project to analyze, plan, design UML models and create a prototypical model (identifying deliverables) by coding the developed design s and finally documenting considering any one example of the following domains:

- I. Academics (Course registration System , Student marks analyzing system)
- II. Health Care (Expert system to prescribe medicines forgiven symptoms, Remote Diagnostics, Patient/Hospital Management System)
- III. Finance (Banking: ATM/ Net Banking, UPI: Pay TM / Phone Pay)
- IV. E-Commerce(any Online shopping portal) Logistics(Postal/Courier: India Post /DTDC /UPS)

- V. Hospitality (Tourism Management: Telangana Tourism/Incredible India, Event Management)
- VI. Social Networking( LinkedIn, Face Book, Shaadi.com, Bharat Matrimony, Tinder)
- VII. Customer Support(Banking Ombudsman ,Indian Consumer Complaints Forum)
- VIII.Booking/Ticketing(Online Food Ordering ,Travel: {Cars: Uber/OLA/Zoom, Railways: IRCTC, Buses: Online TSRTC/Red Bus /Abhi Bus, Flights: Make MyTrip)
- II. **REVERSE ENGINEERING**: Students have to refer any project repository: GitLab/ GitHub, execute the code in order to observe its functionalities/features/requirements and by the help of any tool derive the designs from the code for understanding the relationships among various subsystems/ classes/ components and If the tool partially generates models then identify by associating elements to judge/make the appropriate relationships.

### III. TESTING: Prepare Test Plan and develop Test Case

Hierarchy monitor run cover/report errors using manual/automated testing tools Software Required: Star UML/ Umbrello Net Beans /Eclipse IDE , XAMP/MEAN stack, JUnit, JMeter, Selenium ,Bugzilla.

#### IV. GUIDELINES FOR MINI PROJECT

The students are required to carry out mini projects in any of the areas such as Data Structures, Micro processors and Interfacing, Database Management Systems, Operating Systems, Design and Analysis of Algorithms, Software Engineering, Data Communications, Web Programming & Services, Computer Networks, Compiler Construction, Object Oriented System Development.

Problems Statements are suggested to be taken can also be taken from Smart India Hackathon (SIH) Portal invited from the Ministries /PSUs /MNCs/ NGOs to be worked out through.

The project could be classified as hard ware, software, modeling, simulation etc. The project should involve one or many elements of techniques such as analysis, design, and synthesis.

### The department will appoint a project Coordinator who will coordinate the following:

- I. Grouping of students (maximum of 3 students in a group)
- II. Allotment of projects and project guides.
- III. All projects allotment is to be completed by the 4th week of the semester so that the students get sufficient time for completion of the project.
- IV. Disseminate guidelines given by monitoring committee comprising of senior faculty members to the students and their guides.

- V. Three periods of contact load will also be assigned to each project guide for project guidance and monitoring at regular intervals.
- VI. Sessional marks are to be awarded by the monitoring committee.
- VII. Common norms will be established for the final presentation and documentation of the project report by the respective departments.
- VIII. Students are required to submit a presentation and report on the mini project at the end of the semester.

#### **Text Books:**

- 1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 7thEdition, McGraw Hill, 2009.
- 2. Ali Beh forooz and Frederick J.Hudson, Software Engineering Fundamentals, Oxford University Press, 1996.
- 3. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, 2008.

#### **References Book:**

- 1. Summerville, Ian Software Engineering, Addison-Wesley, Boston, MA. (2011).
- 2. Stephens, Rod (2015) Beginning Software Engineering, Wrox.

Course Code				Core / Elective			
SPE 621 IT		]		Elective			
<b>D</b>	Contact hours per week						
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
Computer Network	3	-	—	-	40	60	3

- 1. Familiarize students with basics of Network Security and cryptography.
- 2. To understand the network security, services, attacks, mechanisms, types of attacks on TCP/IP protocol suite and comprehend and apply network layer security protocols, Transport layer security protocols, Web security protocols.
- 3. To comprehend and apply authentication services, authentication algorithms and Provide a solid understanding of main issues related to network security

### **Course Outcomes:**

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

- 1. Understand the most common type of information and network threat sources.
- 2. Understand basic Symmetric and Asymmetric cryptographic algorithms.
- 3. Apply the various Authentication schemes to simulate different applications.
- 4. Understand various email security services and IP security protocol
- 5. Understand basic web security protocol and firewalls

#### UNIT-I

**Attacks on Computers and Computer Security:** 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.

### UNIT-II

**Symmetric key Ciphers**: Block Cipher principles & Algorithms (DES, AES,Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution

**Asymmetric key Ciphers:** Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman,ECC), Key Distribution

## UNIT-III

**Message Authentication Algorithms and Hash Functions**: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

### UNIT-IV

**E-Mail Security**: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management

### UNIT-V

**Web Security:** Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

### Text books:

- 1. Cryptography and Network Security: William Stallings, Pearson Education, 5 th Edition
- 2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 2 nd Edition.
- 3. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

### **Reference Books:**

- 1. Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education
- 2. Cryptography and Network Security Principles and Practice, Fourth or Fifth Edition, William Stallings, Pearson
- 3. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.
- 4. Network Security Essentials: Applications and Standards, by William Stallings.

Course Code				Core / Elective			
SPE623IT		Natı	Elective				
Prerequisite	Ca L	ntact hou T	irs per we D	eek P	CIE	SEE	Credits
Theory Of automata	-	-	_	-	40	60	3

- 1. To learn the fundamentals of natural language processing
- 2. To understand the role of syntax, semantic, pragmatics in NLP
- 3. To apply the NLP techniques to Text processing application.

### **Course Outcomes:**

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

- 1. Tag a given text with basic Language features
- 2. Design an innovative application using NLP components
- 3. Implement a rule-based system to tackle morphology/syntax of a language.
- 4. Design a tag set to be used for statistical processing for real-time applications.
- 5. Compare and contrast the use of different statistical approaches for different types of NLP applications.

# UNIT- I

Definition, History of NLP, corpus, type of corpus, Ambiguity in Language, NLP phases , lexical resources, WordNet, Regular Expressions, Text Processing with Unicode, Regular Expressions for Detecting Word Patterns, Normalizing Text, Regular Expressions for Tokenizing Text, Segmentation, word count, type and token ratio, zips law

### UNIT -II

**Text Representation:** one-hot encoding model, Bag-of-word model, count vectors and TF-IDF vectors, N-gram language model, Word2VEC Embedding, Glove Embedding, Fast Text Embedding Morphology, types of morphology, lionization, stemming, Transducers for lexicon and rules,

Word Classes, tag and tag set, Part-of-Speech Tagging, Rule-based, Stochastic and Transformationbased tagging, Issues in Pops tagging – Hidden Markov and Maximum Entropy models.

# UNIT -III

Context-Free Grammar, Parsing with Context-Free Grammar, Dependencies and Dependency Grammar, Grammar Development, Shallow parsing – Probabilistic CFG

### UNIT -IV

**Semantics:** Representing meaning – Semantic analysis, Lexical semantics, Word Senses, Relations between Senses, Thematic Roles, Word sense disambiguation (WSD), WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods, Word Similarity using Thesaurus and Distributional methods.

## UNIT -V

**Pragmatics:** Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution, Coreference Resolution, Dialog and Conversational agents, Natural language generation, Statistical alignment and Machine translation: Text alignment, word alignment, statistical machine translation,

### **Textbooks:**

- Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
- 2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Pythonl, First Edition, O\_Reilly Media, 2009.

### **References:**

- Breck Baldwin, —Language processing with Java and Ling Pipe Cookbook, Atlantic Publisher, 2015.
- 2. Richard M Reese, —Natural Language Processing with Java, Oreille Media, 2015.
- 3. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
- 4. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrievall, Oxford University Press, 2008.
- 5. Daniel and Martin J. H., "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2009.

Course Code				<b>Core / Elective</b>			
SPE 624IT		Info	Elective				
Prerequisite	Contact hours per weekLTDP				CIE	SEE	Credits
Database Management System	-	-	-	_	40	60	3

- 1. To understand indexing and querying in information retrieval systems
- 2. To learn the different models for information retrieval
- 3. To expose the students to text classification and clustering and to learn about web searching

### **Course Outcomes:**

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

- 1. Apply IR principles to locate relevant information in large collections of data
- 2. Design different document Indexing and clustering algorithms
- 3. Understand various classes of Automatic Indexing and term clustering.
- 4. Design an Information Retrieval System for web search tasks.
- 5. Understand different text search and multimedia retrieval systems.

## UNIT-I

**Introduction:** Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses, Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

### UNIT-II

**Cataloging and Indexing:** History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

**Data Structure:** Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

# UNIT-III

**Automatic Indexing**: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages

**Document and Term Clustering:** Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

## UNIT-IV

**User Search Techniques:** Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext

**Information Visualization**: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

## UNIT-V

**Text Search Algorithms:** Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems

**Multimedia Information Retrieval**: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

### **Textbook:**

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. kowalski, Mark T. Maybury, Springer

### **References:**

- 1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
- 2. Information Storage & Retrieval by Robert Korfhage John Wiley & Sons.
- 3. Modern Information Retrieval by Yates and Neto Pearson Education.

Course Code				<b>Core / Elective</b>			
SPE625 IT		Ad Hoc 8		Elective			
<b>D</b>	Cor	ntact hour	rs per wee	ek			
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
Computer Networks	-3	-	_	_	40	60	3

- 1. Learn Ad hoc network and Sensor Network fundamentals
- 2. Understand the different routing protocols, sensor network architecture and design issues
- 3. Understand the transport layer and security issues possible in Ad hoc and Sensor networks

# **Course Outcomes:**

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

- 1. Know the basics of Ad hoc networks and Wireless Sensor Networks
- 2. Apply this knowledge to identify the suitable routing algorithm based on the network and user requirement
- 3. Apply the knowledge to identify appropriate physical and MAC layer protocols
- 4. Understand the transport layer and security issues possible in Ad hoc and sensor networks
- 5. Familiar with the OS used in Wireless Sensor Networks and build basic modules.

# UNIT-1

Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example commercial applications of Ad hoc networking, Ad hoc wireless Internet, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV), On–Demand Routing protocols –Ad hoc On–Demand Distance Vector Routing (AODV).

# UNIT-II

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.

## UNIT-III

MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols and Wakeup Concepts – S-MAC, The Mediation Device Protocol, Contention based protocols – PAMAS, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol, Routing Protocols Energy Efficient Routing, Challenges and Issues in Transport layer protocol.

### UNIT-IV

Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks.

### UNIT-V

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms – TinyOS, nesC, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM, Programming beyond individual nodes – State centric programming.

#### **Textbooks:**

- 1. C.Siva Ram Murthy and B.S.Manoj, —Ad Hoc Wireless Networks Architectures and 2 Protocols ||, Pearson Education, 2006.
- 2. Holger Karl, Andreas Willing, —Protocols and Architectures for Wireless Sensor Networks ||, John Wiley & Sons, Inc., 2005.

### **References:**

- 1. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, —Ad Hoc Mobile Wireless Networks, Auerbach Publications, 2008.
- 2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, —Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011.
- 3. Waltenegus Dargie, Christian Poellabauer, —Fundamentals of Wireless Sensor Networks Theory and Practice, John Wiley and Sons, 2010
- 4. Xiang-Yang Li, "Wireless Ad Hoc and Sensor Networks: Theory and Applications, 1227th edition, Cambridge university Press, 2008.

Course Code				<b>Core / Elective</b>			
SPC601 IT			Elective				
<b>D</b>	Con	tact hours	per week		<b>CIT</b>		
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
_	3	-	_	_	40	60	3

- 1. To learn parallel Algorithm development techniques for shared memory and message passing models.
- 2. To study the main classes of parallel algorithms
- 3. To study the complexity and correctness models for parallel algorithms.

# **Course Outcomes:**

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

- 1. Analyze Parallel Algorithms.
- 2. Implements PRAM and Basic Algorithms
- 3. Instrument with shared Memory Algorithms
- 4. Design Sorting and Selection Networks
- 5. Understand Distributed Algorithms.

# UNIT-1

Introduction to Parallelism: Parallel Processing Ups and Downs, Types of Parallelism: A Taxonomy

**Parallel Algorithms:** Simple Computations and Architectures, Algorithms for linear Array, Algorithms for a Binary Tree, Algorithm for 2D Mesh, Algorithm for a Linear Array, Algorithms for a Binary, Algorithm for 2D Mesh, Algorithms with Shared Variables.

# UNIT-II

**PRAM and Basic Algorithms:** PRAM Sub-models and Assumptions, Data Broadcasting, Semi-group or Fan, In Computations, Parallel Prefix Computations, Ranking the Elements of a Linked List, Matrix Multiplications.

# UNIT-III

**Shared Memory Algorithms:** Sequential Rank Based Selection, A Parallel Selection Algorithm, A Selection Based Sorting Algorithm, Alternative Sorting Algorithm, Bionic algorithm

# UNIT-IV

**Mesh Base Architecture:** Recursive Sorting Algorithms, Greedy Routing Algorithms, Graph Algorithms, Image Processing Algorithms.

## UNIT-V

**Distributed Algorithms:** Models and Complexity measures, Safety, liveness, termination, logic time and event ordering, Global state and snapshot algorithms, Mutual exclusion and Clock Synchronization and Distributed Graph algorithms.

#### **Text Books:**

- 1. Ananth Grama, Anushul Gupta, George Karypis and Vipin Kumar, Introduction to Parallel Computing, Second edition, Addison-Wesley/Pearson, 1994/2003.
- 2. Introduction to Parallel Processing Algorithms and Architecture, Behrooz Parhami, Platinum series of Computer science

#### **Reference Books:**

- 1. Vijaya K Garg," Elements of Distributed computing", Wiley Joseph F Jaja, An Introduction to Parallel Algorithms, Addison Wesley,1992.
- 2. MiChael J Quinn, Parallel Programming in C with MPI and OpenMP, first edition, McGraw Hill 2004/2003
- 3. Micheal J Quinn, Parallel Computing: Theory and Practice, Second edition, McGraw, 1994/2002.
- 4. Nancy Lynch, Distributed Algorithms, Morgan Kaufmann.
- 5. Andrew S. Tanenbaum, Distributed Operating System, ACM Press.

Course Code				<b>Core / Elective</b>			
SPW614IT				Seminar			
D	Con	tact hours	per week		<b>CIT</b>		
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
_	-	-	_	2	50	-	1

Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

## **Course Outcomes:**

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

- 1. Formulate a specific problem and give solution
- 2. Develop model/models either theoretical/practical/numerical form
- 3. Solve, interpret/correlate the results and discussions
- 4. Conclude the results obtained
- 5. Write the documentation in standard format

# **Guidelines for preparing Technical Seminar**

#### 1. Selection of topic/area

Select a paper according to the specialisation of students. Papers from any other approved journals can also be selected.

### 2. Approval to the selected topic

After selecting the paper, get approval from the concerned faculty in charge.

### 3. Study of topic

Students are requested to acquire a thorough knowledge on the subject by referring back papers and reference books (These may be included as references at the end of the paper) on the corresponding area.

### 4. Preparation of slides for presentation

Slides may be presented in MS power point. Time allowed for presentation is 20 minutes for presentation and 5 minutes for discussions. So, number of slides may be around 20 - 25 to adhere the time limit.

# **Seminar Report Guidelines**

- 1. The references shall be written using IEEE style of reference writing.
- 2. The report shall be computer typed (English- British, Font -Times Roman, Size-12 point, Double spacing between lines) and printed on A4 size paper.
- 3. The report shall be hard bound with cover page in white colour. The name of the candidate, degree (specifying the specialization), month & year of submission, name of

the University including college name shall be printed in black on the cover [Refer sample sheet (outer cover)]

- 4. The report shall be typed on one side only with double space with a margin 3.5 cm on the left, 2.5 cm on the top, and 1.25 cm on the right and at bottom.
- 5. In the report, the title page [Refer sample sheet (inner cover)] should be given first then the Certificate by the candidate, followed by an abstract of the report (not exceeding 1500 words). This should be followed by the acknowledgment, list of figures/list of tables, notations/nomenclature, and then contents with page nos.
- 6. The diagrams should be printed on a light/white background, Tabular matter should be clearly arranged and the font of the Tabular matter should be Font -Times Roman, Size-10 point, Single spacing between lines. Decimal point may be indicated by full stop (.). The caption for Figure must be given at the BOTTOM (center aligned) of the Fig. and Caption for the Table must be given at the TOP (center aligned) of the Table. The font for the captions should be Times Roman, Italics, Size-10 point.
- 7. The font for the chapter titles should be Times Roman, Bold, Capital, Size-16 point and center aligned. The font for the Headings should be Times Roman, Bold, and Size-14 point. The font for the sub-headings should be Times Roman, Bold, and Size-12 point.
- 8. Conclusions must not exceed more than one page.
- 9. The graphs should be combined for the same parameters for proper comparison. Single graph should be avoided as far as possible.
- 10. The report must consist of following chapters:

CHAPTER 1 - INTRODUCTION

CHAPTER 2 - CURRENT STATUS

CHAPTER 3 – IMPORTANCE AND APPLICATIONS

CHAPTER 4 – LATEST RESEARCH

CHAPTER 5 - FUTURE TRENDS

CHAPTER 6 - CONCLUSIONS

REFERENCES

APPENDIX (IF ANY)

ANNEXURES-I, II, III (IF ANY)

Paste a CD containing the soft copy of Report (in Docx and PDF), Reference papers and other material related to the work, on the inner side of back hard cover.

Course Code				Core / Elective			
SPW611IT			Seminar				
<b>D</b>	Con	tact hours	per week		<b>C1T</b>		
Prerequisite	L	Т	D	Р	CIE	SEE	Credits
_	-	-	_	-	50	-	1

Student is able to test theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.

### **Course Outcomes:**

- 1. Student is able to construct the company profile by compiling the brief history, management structure, products / services offered, key achievements and market performance for his / her organization of internship.
- 2. For his / her organization of internship, the student is able to assess its Strengths, Weaknesses, Opportunities and Threats (SWOT)
- 3. Student is able to determine the challenges and future potential for his / her internship organization in particular and the sector in general.
- 4. Student is able to test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.
- 5. Student is able to apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization

Summer Internship is introduced as part of the curricula of encouraging students to work on problems of interest to industries. A batch of three students will be attached to a person from the Computer Industry/Software Companies/R&D Organization for a period of 4-6 weeks. This will be during the summer vacation following the completion of the III year Course. One faculty coordinator will also be attached to the group of 3 students to monitor the progress and to interact with the industry co-ordinate (person from industry).

After the completion of the project, student will submit a brief technical report on the project executed and present the work through a seminar talk to be organized by the Department. Award of sessionals are to be based on the performance of the students, to be judged by a committee constituted by the department. One faculty member will co-ordinate the overall activity of Industry Attachment Program.

Each group will be required to:

- 1. Submit a one page synopsis before the seminar for display on notice board.
- 2. Give a 30 minutes presentation followed by 10 minutes discussion.
- 3. Submit a technical write-up on the talk.

# SCHEME OF INSTRUCTION & EXAMINATION

# **B.E. (INFORMATION TECHNOLOGY) – VII Semester**

			S In	cheme struct	of ion	urs /	Sche Exar	eme of ninati on	Hours	
S. No.	Course Code	Course Title	L	Т	P / D	Contact Ho	CI E	SEE	Duration in	Credits
Theory C	Courses			•	•					
1.	SPC 701 IT	Internet of Things	3	-	-	3	40	60	3	3
2.	SPE – IV	Professional Elective – III	3	-	-	3	40	60	3	3
3.	SPE – V	Professional Elective – IV	3	-	-	3	40	60	3	3
4.	SPE – VI	Professional Elective – V	3	-	-	3	40	60	3	3
5.	SOE – II	Open Elective – II	3	-	-	3	40	60	3	3
Practical	/ Laboratory	Courses						1		
6.	SPC 711 IT	Internet of Things Lab	-	-	4	4	40	60	3	2
7.	SPE 712 IT	Professional Elective – III Lab	-	-	2	2	40	60	3	1
8.	SPE 713 IT	Professional Elective – IV Lab	-	-	2	2	40	60	3	1
9.	SPW 711 IT	Project Work – I	-	-	6	6	50	-	3	3
			15	-	14	29	370	480	27	22

	Professional Elective – III							
S. No.	Course Code	Course Title						
1.	SPE 721 IT	Database Security						
2.	SPE 722 IT	Deep learning						
3.	SPE 723 IT	Data mining & Data ware housing						
4.	SPE 724 IT	Cloud computing						
5.	SPE 725 IT	PHP						

	Professional Elective – IV										
S. No.	Course Code	Course Title									
1.	SPE 731 IT	IOT Security									
2.	SPE 732 IT	Big Data Analytics									
4.	SPE 733 IT	Data Science using R									
5.	SPE 734 IT	VLSI Design									
6.	SPE 735 IT	Agile Software Development									

	Professional Elective – V								
S. No.	Course Title								
1.	SPE 741 IT	Computer Forensics							
2.	SPE 742 IT	Semantic Web							
3.	SPE 743 IT	Data Science & Virtualization							
4.	SPE 744 IT	Block chain Technology							
5.	SPE 745 IT	Software Quality Assurance & Testing							

	Open Elective – I									
S. No.	Course Code	Course Title								
1.	SOE 751 CSE	SOFTWARE ENGINEERING								
2.	SOE 752 CSE	DATA SCIENCE USING R								
3.	SOE 753 ADC	DATABASE MANAGEMENT SYSTEMS								
4.	SOE 754 ECE	INTERNET OF THINGS								
5.	SOE 755 ECE	FUNDAMENTALS OF IoT								
6.	SOE 756 ECE	DIGITAL SIGNAL PROCESSING								
7.	SOE 757ECE	EMBEDDED SYSTEMS AND ITS APPLICATIONS								
8.	SOE 758 IT	CYBER SECURITY								
9.	SOE 759 MBA	INTELLECTUAL PROPERTY RIGHTS								

Course Code		Core / Elective					
SPC 701 IT			Core				
Prerequisite	Cont	tact hours	per week	CIE	SEE	Credits	
-	L	Т	D	Р			
Embedded System	3	-	-	_	40	60	3

- 1. To explore the design characteristics of IoT, Communication models between processes or applications in heterogeneous environments for engineering problems.
- To impart knowledge on enabling technologies, techniques, resources, and use of modern IT tools for providing IoT-based based solutions.
- 3. To apply contextual knowledge to assess the commercial applications/tools/technologies by considering societal, health, safety, legal and cultural issues for IoT applications.

# **Course Outcomes:**

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

- 1. Demonstrate the basic principles as well as the core concepts related to the Internet of Things.
- 2. Analyze the core architectural concepts to meet the challenges in implementing the connected devices.
- 3. Describe different types of sensors and programming aspects for the domain specific IoT.
- 4. Differentiate between the Network Layer protocols and Application layer protocols.
- 5. Design an IoT network and push the real-time data to the cloud server.

# UNIT-I

# Introduction to the Internet of Things:

Definition & Characteristics of IoT, Genesis of IoT, IoT Impact and Challenges

**IoT Network Architecture and design:** M2M IoT Architecture, IoT World Forum Standardized Architecture, Simplified IoT Architecture, Core IoT Functional stack.

**Application Domains of IoT:** Smart Home, Smart Cities, Smart Environment, Logistics, Agriculture, Industry, Health, and Lifestyle.

#### UNIT-II

#### **Engineering IoT Networks**

**Things in IoT:** Sensors, Actuators, Smart Objects, Wireless Sensor Networks, Communication protocols in WSNs, Criteria for connecting smart objects, IoT Access Technologies, IEEE 802.15.4 standard.

#### UNIT-III

**IP at the IoT Network Layer:** Need for optimization in IP in IoT Networks, IP versions, 6LoWPAN, Comparison of IP protocol stack and IoT Protocol stack, IP Protocol for smart objects (IPSO) Alliances.

#### UNIT-IV

**IoT Application Layer protocols**: COAP, MQTT, Message format, Comparison between COAP and MQTT Protocol.

#### UNIT-V

**IoT Platforms Design Methodology:** Introduction, IoT Platform Design Methodology, IoT Physical Devices & Endpoints, Raspberry Pi interfaces, Programming Raspberry Pi with Python, Other IoT Devices, ESP32 functional diagram and programming.

IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs, WAMP – Auto Bahn for IoT, Firebase cloud operations, Integration of Firebase with ESP32.

### **Text Books:**

- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by David Hanes, et.al, Pearson Publisher, 1<sup>st</sup> Edition.
- Vijay Madisetti and Arshdeep Bahga, Internet of Things: A Hands-On Approach, VPT edition1, 2014.
- Jonathan Follett, Designing for Emerging UX for Genomics, Robotics, and the Internet of Things Technologies, O 'Reilly, 2014.

Course Code			Core / Elective				
SPE 721 IT			Elective				
Prerequisite	Con	tact hours	Credits				
	L	Т	D	Р			
Database Systems and Mathematics	3	-	-	-	40	60	3

- 1. To study the different models involved in database security and their applications in real time world
- 2. To protect the database and information associated with them.
- 3. To statistical Database Protection & Intrusion Detection Systems

## **Course Outcomes:**

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

- 1. understand unauthorized data, data modification and data confidentiality
- 2. Manage database security on application level
- 3. Conduct database auditing for security and reliability.
- 4. Design and implement secure database systems.
- 5. Implement typical security projects on enterprise systems.

### UNIT-I

Introduction to Databases Security Problems in Databases Security Controls Conclusions, Security Models

Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

### UNIT-II

**Security Models:-** Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion Security Mechanisms Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

#### UNIT-III

**Security Software Design Introduction** A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion Detection Systems Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison Introduction IDES System RETISS System ASES System Discovery

# UNIT-IV

Models For The Protection of New Generation Database Systems -1 Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object Oriented Systems SORION Model for the Protection of Object-Oriented Databases

### UNIT-V

Models For the Protection of New Generation Database Systems -2 A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

### **Textbooks:**

1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning, 2009.

2. Database Security, Castano, Second edition, Pearson Education.

## **Reference Book:**

1. Database security by alfred basta, melissa zgola, CENGAGE learning

Course Code			Core / Elective				
SPE 722 IT			Elective				
Prerequisite	Con	SEE	Credits				
-	L	Т	D	Р			
Machine Learning	3	-	-	-	40	60	3

- 1. To understand the theoretical foundations, algorithms and methodologies of Neural Network
- 2. To design and develop an application using specific deep learning models
- 3. To provide practical knowledge in handling and analyzing real world applications.

### **Course Outcomes:**

Upon completion of the course, the students will be able to

- 1. Understand and Apply different neural network algorithms for variety of problems.
- 2. Understanding the Deep learning architectures.
- 3. Identify and apply appropriate CNN and Transfer learning algorithms for variety of problems.
- 4. Understand and Apply different sequence to sequence models for variety of problems.
- 5. Apply auto-encoders in NLP, Speech applications

### UNIT-I

**Introduction:** History of Deep Learning, McCulloch Pitts Neuron, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, And Activation Functions: RELU, LRELU, ERELU, Unsupervised Training of Neural Networks.

#### UNIT-II

Activation functions and parameters: Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, Principal Component Analysis and its interpretations, Singular Value Decomposition, Parametersv/s Hyper-parameters

### UNIT-III

**Auto-encoders & Regularization:** Auto encoders and relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Encoder Decoder Models, Attention Mechanism, Attention over images, Batch Normalization

#### UNIT-IV

**Deep Learning Models:** Introduction to CNNs, Architecture, Convolution/pooling layers, CNN Applications, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Applications

#### UNIT-V

**Sequence Modelling:** Introduction to Recurrent Neural Networks (RNN), Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, Bidirectional RNNs, BPTT for training RNN, Long Short-Term Memory (LSTM) Networks.

**Deep Learning Applications:** Image Processing, Natural Language Processing, Speech recognition, Video Analytics

#### **Textbook:**

- 1. Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Press, 2017.
- 2. Josh Patterson, Adam Gibson "Deep Learning: A Practitioner's Approach", O'Reilly Media,2017
- 3. Umberto Michelucci "Applied Deep Learning. A Case-based Approach to understanding deep neural networks" Apress, 2018.

#### **Reference Books:**

- 1. Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1, Now Publishers, 2009
- 2. Deep Learning, Rajiv Chopra, Khanna Book Publishing, Delhi 2020.
- 3. NPTEL : <u>https://nptel.ac.in/courses/106/106/106106184/</u>
- 4. COURSEERA: <u>https://www.coursera.org/specializations/deep-learning</u>
- 5. Giancarlo Zaccone, Md. RezaulKarim, Ahmed Menshawy "Deep Learning with TensorFlow: Explore neural networks with Python", Packt Publisher, 2017.

Course Code			Core / Elective				
SPE 723 IT		Data mi	Elective				
Prerequisite	erequisite Contact hours per week CIE SEE					SEE	Credits
-	L	Т	D	Р			
Database Management and Systems	3	-	_	_	40	60	3

- 1. To understand the principles of Data warehousing and Data Mining.
- 2. To be familiar with the Data warehouse architecture and its Implementation.
- 3. To understand the various Data preprocessing Methods and perform classification and prediction of data.

#### **Course Outcomes:**

Upon completion of the course, the students will be able to

- 1. Design a data warehouse or data mart to present information needed by the clients.
- 2. Design and implement a quality data warehouse or data mart effectively and administer the data resources in such a way that it will truly meet management's requirements.
- 3. Evaluate standards and new technologies to determine their potential impact on your information resource for a large complex data warehouse/data mart.
- 4. Use data mining tools for projects and to build reliable products as per demand.
- 5. Technical know-how of the Data Mining principles and techniques for real time applications.

### UNIT-1

**Data Warehousing and Business Analysis:** - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

### UNIT-II

**Data Mining:** - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation-Architecture Of A Typical Data Mining Systems- Classification Of Data Mining Systems.

Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

### UNIT-III

**Classification and Prediction**: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

#### UNIT-IV

**Cluster Analysis**: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

#### UNIT-V

#### Mining Object, Spatial, Multimedia, Text and Web Data:

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

#### **Text Books**

1. Jiawei Han, Micheline Kamber and Jian Pei"Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.

#### **Reference Books**

- Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw

   Hill Edition, Tenth Reprint 2007.
- K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
- G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
- Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

Course Code			Cour	Core / Elective			
SPE 724 IT			Cloud Co	Core			
Prerequisite	Contact hours per week CIE SEE						Credits
_	L	Т	D	Р			
Distributed Systems	3	-	_	-	40	60	3

- 1. To introduce the concept of Virtualization and cloud computing
- 2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios
- 3. To enable students exploring some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

# **Course Outcomes:**

Upon completion of the course, the students will be able to

- 1. An ability to create VM, migrate and provide QOS to the committed users
- 2. Analyze, identify, and select suitable type of virtualization
- 3. Appreciate the requirements of various service paradigms in Cloud Computing
- 4. An ability to use techniques, skills in secured cloud environment
- 5. Design, implement and evaluate a cloud-based system, process, component, or program to meet desired needs

# UNIT-I

**Introduction:** Overview of Computing Paradigm, Cloud Computing- Types of cloud Deployment models - Private, Public, Hybrid, Agency Clouds - Cloud Service Models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Anything as a Service (XaaS)

**Virtualization:** Types - Implementation Levels –Structures-Tools, CPU, Memory, I/O Devices, Virtual Clusters and Resource management – Virtualization for Data-center Automation

### UNIT-II

**Virtualization Techniques**: Virtual Machine Basics – Taxonomy of Virtual machines - Server Virtualization – Physical and Logical Partitioning - Types of Server Virtualization, VM Provisioning and Manageability-Virtual Machine Migration Service-Distributed Management of Virtual Machines-Scheduling Techniques

### UNIT-III

**Cloud Platforms in Industry**: Cloud Environments - Case study: One cloud service provider per service model (e.g., Amazon EC2, Google App Engine, Sales Force, Azure, Open-Source tools) - Cloud application development using third party APIs, Working with EC2 API – Google App Engine API -Facebook API, Twitter API, HDFS, Map Reduce Programming Model.

#### **UNIT-IV**

**Security Overview**: Cloud Security Challenges and Risks – Software-as-a- Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

#### UNIT-V

**Legal issues & Metrics**: SLA Model-Types of SLA - SLA management. Legal issues in cloud computing, Selected Business Use Cases- The ERP Hosting Use Case Scenario- The Enterprise IT Use Case Scenario - The Service Aggregator Use Case Scenario- The eGovernment Use Case Scenario. - Performance metrics: Consistency, Availability and Partitioning (CAP theorem).

Advanced concepts in cloud : Scientific cloud applications - Energy efficiency in clouds- Market-based management of clouds - Federated clouds/InterCloud - Third-party cloud services – Mobile Cloud Computing

#### **Text Books:**

- 1. RajkumarBuyya, ChirstianVecchiola, S.ThamaraiSelvi, "Mastering Cloud Computing", Tata McGraw Hill,2017
- 2. Sehgal, Naresh, Bhatt, Pramod Chandra P., Acken, John M, "Cloud Computing with Security Concepts and Practices, Springer International Publishing", 978-3-030-24612-9,2020
- 3. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing: From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2013

#### **Reference Books:**

- 1. RajkumarBuyya, James Broberg, Andrzej, M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2013
- 2. Tim Mather, SubraKumaraswamy, and ShahedLatif, "Cloud Security and Privacy", Oreilly, 2009
- 3. Ronald L. Krutz, Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010

Course Code			Cour	Core / Elective			
SPE 725 IT			PI	Elective			
Prerequisite	Co	ntact hou	ırs per w	Credits			
	L	Т	D	Р			
Distributed Systems	3	-	-	_	40	60	3

- 1. To provide fundamental concepts of server-side script programming and client-side script programming using JavaScript and PHP respectively.
- 2. To provide server-side and client-side script programming
- 3. To provide script programming along with database connectivity.

# Course Outcomes:

Upon completion of the course, the students will be able to

- 1. Acquire skills in client-side scripting.
- 2. To gain knowledge on server-side scripting with Database Connectivity.
- 3. To design better and fast webpages using AJAX.
- 4. Able to develop more effective and efficient web-based application packages using WordPress.
- 5. To design simple and productive to build web applications using Ruby.

# UNIT-I

**Client Side Scripting: javaScript:** Introduction, Need of Client Side Scripting Language, Formatting and Coding Conventions, JavaScript Files, Comments, Embedding JavaScript in HTML, Using Script Tag, NoScript Tag, Operators, Control Structures, Array and For Each Loop, Defining and Invoking Functions, Built in Objects, Date Objects, Interacting With The Browser, Windows & Frames, Document Object Model, Event Handling, Forms, Cookies, Handling Regular Expression, Client Side Validations.

### UNIT-II

**Server Side Scripting with Database Connectivity: PHP:**Introduction to Server Side Scripting Language, PHP introduction. Basic PHP Syntax, Comments in PHP, Variables, PHP Operators, Control Structures(If else, switch, all loops), Arrays, For Each Loop, Functions, Form Handling, PHP \$\_GET, PHP \$\_POST, PHP \$\_REQUEST, PHP date (} Function, PHP include File, File Handling, File Uploading, PHP Sessions, Sending Emails, PHP Cookies.

**Advanced Server Side Scripting** : **Object Oriented Programmtng in PHP:**Classes and Objects, Defining and Using properties and methods, Constructors and Destructors, Method Overriding, Encapsulation, Inheritance, Polymorphism, Static Members, Exception Handling

## UNIT-III

## AJAX(Asynchronons JavaSeript and XML): Using PHP, Using PHP + MySQL

**jQ uery:**Playing With Elements, Hiding and Unhiding Images. Jquery UI

**JOOMLA:**Introduction To CMS, Installation, Handling Joomla Back End.. Customization In Joomla, Introduction To Extensions, Installation and Uses Of Extensions in Joomla, Template Development In Joomla, Artiseer(IDE), Module Development In Joomla, Component Development In Joomla, Introduction To MVC(Model, View and Controller)

### UNIT-IV

**WordPress Administrator Level:**Theme Integration, Creating pages, Managing Posts, Managing Widgets

### UNIT-V

**Introduction**: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

### **Text Books**

- 1. Harvey M. Deitel, Paul J. Deitel & Abbey Deitel, "Internet and World Wide Web: How to Program",5thEdition, Pearson Education, 2012, ISBN: 9780273764021
- Robin Nixon, "Learning PHP, MySQL, JavaScript and CSS", 2<sup>nd</sup>Edition, 0' Reilly Media, 2012, ISBN 978-44-9319267
#### **Reference Books:**

- 1. Da Flanagan. "JavaScript; The Definitive Guide", O' Reilly Media, 2011. ISBN. 139780596505524
- 2. David Sawyer McFarland, "JavaScript & jQuery; The Missing Manual"2ndEdition, Pogue Press, 2011, ISBN: 978-1449399023
- 3. Luke Welling & Laura Thomson, "PHP and MySQL Web Development", 5thEdition, Developer's Library, 2014, ISBN: 978-0321833891

Course Code			Cour	<b>Core / Elective</b>			
SPE 731 IT			IOT S	Elective			
Prerequisite	Со	ntact hou	rs per we	ek	CIE	SEE	Credits
_	L	Т	D	Р			
ΙΟΤ	3	-	-	_	40	60	3

- 1. Reduce hacks and breaches.
- 2. Gain early compliance with relevant standards.
- 3. Increase IOT security and business agility.

#### **Course Outcomes:**

Upon completion of the course, the students will be able to

- 1. Understand the Security requirements in IOT.
- 2. Understand the cryptographic fundamentals for IOT
- 3. understand the authentication credentials and access control
- 4. Understand the various types Trust models.
- 5. Understand the Cloud Security for IOT.

#### UNIT-I

**Introduction: Securing the Internet of things:** Security Requirements in IOT Architecture-Security in Enabling Technologies-Security Concerns in IOT Applications. Security Architecture in the Internet of Things - Security Requirements in IOT-Insufficient Authentication/Authorization-Insecure Access Control-Threats to Access Control, Privacy, and Availability- Attacks Specific to IOT. Vulnerabilities –Secrecy and Secret-Key Capacity -Authentication/Authorization for Smart Devices - Transport Encryption – Attack & Fault trees

#### UNIT-II

**Cryptographic Fundamentals for IOT :** Cryptographic primitives and its role in IOT – Encryption and Decryption – Hashes – Digital Signatures – Random number generation – Cipher suites – key management fundamentals – cryptographic controls built into IOT messaging and communication protocols – IOT Node Authentication

#### UNIT-III

**Identity & Access Management Solutions for IOT:** Identity lifecycle – authentication credentials – IOT IAM infrastructure – Authorization with Publish / Subscribe schemes – access control.

#### **UNIT-IV**

**Privacy Preservation and Trust Models for IOT :** Concerns in data dissemination – Lightweight and robust schemes for Privacy protection – Trust and Trust models for IOT – self-organizing Things - Preventing unauthorized access.

#### UNIT-V

**Cloud Security for IOT :**Cloud services and IOT – offerings related to IOT from cloud service providers – Cloud IOT security controls – An enterprise IOT cloud security architecture – New directions.in cloud enabled IOT computing.

#### **Textbooks:**

- 1. Fei HU, "Security and Privacy in Internet of Things (IOTs): Models, Algorithms, and Implementations", CRC Press, 2016
- 2. Russell, Brian and Drew Van Duren, "Practical Internet of Things Security", Packet Publishing, 2016.
- 3. Ollie Whitehouse, "Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things Devices and Beyond", NCC Group, 2014

#### **References:**

- 1. Practical Internet of Things Security (Kindle Edition) by Brian Russell, Drew Van Duren
- 2. Securing the Internet of Things Elsevier
- 3. Security and Privacy in Internet of Things (IOTs): Models, Algorithms, and Implementation

Course Code			Cour		Core / Elective		
SPE 732 IT		I	Big Data	Elective			
Prerequisite	te Contact hours per week CIE SEE						Credits
	L	Т	D	Р			
Database Management System	3	-	_	_	40	60	3

- 1. Understand the Big Data Platform and its Use cases
- 2. Provide an overview of Apache Hadoop, HDFS and Map Reduce
- 3. Provide hands on Hodoop Eco System and Apply analytics on Structured, Unstructured Data.

### **Course Outcomes:**

The students will be able to:

- 1. Identify Big Data and its Business Implications.
- 2. Understand the components of Hadoop and Hadoop Eco-System
- 3. Access and Process Data on Distributed File System
- 4. Develop Big Data Solutions using Hadoop Eco System
- 5. Analyze Infosphere Big Insights Big Data Recommendations.

### UNIT-I

**Introduction to Big Data and Hadoop:** Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

### UNIT-II

**HDFS(Hadoop Distributed File System) :** The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

### UNIT-III

### Map Reduce

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

### UNIT-IV

**Hadoop Eco System: Pig**: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. **Hive:** Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

**HBase:** Basics, Concepts, Clients, Example, Hbase Versus RDBMS.

Big SQL: Introduction

### UNIT-V

**Spark Framework:** Overview of Spark, Hadoop vs Spark, Cluster Design, Cluster Management, performance, Application Programming interface (API): Spark Context, Resilient Distributed Datasets, Creating RDD, RDD Operations, Saving RDD, Lazy Operation, Spark Jobs

**Data Analysis with Spark Shell:** Writing Spark Application, Spark Programming in Scala, Python, R,Analyzing big data with twitter ,Big data for E-Commerce Big data for blogs,Review of Basic Data Analytic Methods using R.

### Textbooks:

- 1. Tom White, "Hadoop: The Definitive Guide", O'Reilly, 4th Edition, 2015.
- 2. Garrett Grolemund, "Hands-On Programming with R", O'Reilly Media, Inc, 2014.
- 3. Mohammed Guller, Big Data Analytics with Spark, Apress, 2015.
- 4. Chuck Lam, "Hadoop in Action", Manning Publications, 2010.

### **Reference Books:**

- 1. Frank Pane, "Hands On Data Science and Python Machine Learning", Packt Publishers, 2017.
- 2. Nick Pentreath, Machine Learning with Spark, Packt Publishing, 2015
- 3. Seema Acharya, SubhashiniChellapan, "Big Data and Analytics", Wiley, 2015.

Course Code	Course Title	Core / Elective

SPE 733 IT		Γ	Data Scie	Elective			
Prerequisite	Co	ntact hou	ırs per w	eek	CIE	SEE	Credits
-	L	Т	D	Р			
Probability &	3				40	60	3
Statistics							

1.To learn basics of R Programming environment: R language

2. To learn various statistical concepts like linear and logistic regression

3. To learn Decision tree induction

#### **Course Outcomes:**

The students will be able to:

1. Identify and execute basic syntax and programs in R.

2. Perform the Matrix operations using R built in functions and apply non numeric values in vectors

3. Create the list and data frames and exploit the graph using ggplot2.

4. Perform exploratory analysis on the datasets and understand the various distribution and sampling

5. Apply statistical inference for Regression.

#### UNIT-I

**Introduction:** Introduction to Data Science, Need of Data Science, Data science process, Life Cycle of Data Science, Data science toolkit, Big Data and Data Science hype – and getting past the hype – Datafication - Current landscape of perspectives

**Types of Data:** Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes.

### UNIT-II

**Basic Statistical Descriptions of Data:** Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Statistical Hypothesis Testing, Confidence Intervals, P hacking, ANOVA.

UNIT-III

**Data Pre-Processing:** Data Pre-Processing Overview, Data Cleaning: Missing values, dealing with noisy data, Spread, outliers Data. Transformation Discretization: Transformation strategies overview, transformation by normalization, discretization by binning, feature selection and feature engineering.

### UNIT-IV

Data Visualization: Introduction, Types of Visualization, Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations. Data Encoding, Visual Encoding, Redundant Encoding, Color Encoding

### UNIT-V

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting,

Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class.

**Factors and Data Frames**: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, sub setting of Data Frames, Extending Data Frames, Sorting Data Frames.

**Lists:** Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

### **Textbooks:**

- 1. Kennedy R.Behrman, "Foundation python for data science", Addison Wesley, 2021
- 2. Vijay Kotu and Bala Deshpande, "Data Science concepts and practice", Morgan Kaufmann Publishers, 2<sup>nd</sup> edition, 2018.
- 3. Doing Data Science, Straight Talk from the Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
- 4. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd Ed. The Morgan Kaufmann Series in Data Management Systems.

### **Reference Books:**

- 1. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi, 2018.
- 2. Peter Bruce, Andrew Bruce & Peter Gedeck, "Practical Statistics for Data Scientists", 2<sup>nd</sup> edition, 2020.
- 3. Seema Acharya, "Data Analytics using R", 1<sup>nd</sup> edition, McGraw Hill Publication.2018.
- 4. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
- 5. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
- 6. Paul Teetor, "R Cookbook", O'Reilly, 2011

Course Code			Cour	Core / Elective			
SPE 734 IT		V	LSI Desi	Elective			
Prerequisite	Co	ntact hou	rs per we	ek	CIE	SEE	Credits
	L	Т	D	Р			
Digital Electronics	3	-	_	-	40	60	3

This course will provide an opportunity to the students to learn about various topics of VLSI such as MOSFET fabrication, its physics, and analysis as well as design of digital circuits using MOSFET device. **Course Outcomes:** 

The students will be able to:

- 1. Describe working of MOSFET and develop its mathematical model
- 2. Analyze, design, and simulate various static and dynamic CMOS circuits
- 3. Prepare layout of MOSFET based circuits
- 4. Understand CMOS latch-up, clocking strategy, and testing principles
- 5. Write programs in VHDL/ Verilog for digital circuits and realize them on FPGA/CPLD

### UNIT-I

**Introduction:** Overview of VLSI design methodology, VLSI design flow, Design hierarchy, Concept of regularity, Modularity, and Locality, VLSI design style, Design quality, package technology, introduction to FPGA and CPLD, computer aided design technology.

Fabrication of MOSFET : Introduction, Fabrication Process flow: Basic steps, C-MOS n-WellProcess, Layout Design rules, full custom mask layout design.

### UNIT-II

**3 MOS Transistor:** The Metal Oxide Semiconductor (MOS) structure, The MOS System underexternal bias, Structure and Operation of MOS transistor, MOSFET Current-Voltage characteristics, MOSFET scaling and small-geometry effects, MOSFET capacitances

**MOS Inverters** - Static Characteristics: Introduction, Resistive load Inverter, Inverter with n-type MOSFET load(Enhancement and Depletion type MOSFET load), CMOS Inverter

#### UNIT-III

**MOS Inverters Switching characteristics and Interconnect Effects:** Introduction, Delay-time definitions, Calculation of Delay times, Inverter designwith delay constraints, Estimation of Interconnect Parasitic, Calculation of interconnect delay, Switching Power Dissipation of CMOS Inverters Combinational MOS Logic Circuits: Introduction, MOS logic circuits with Depletion nMOS Loads, CMOS logiccircuits, Complex logic circuits, CMOSTransmission Gates (TGs)

#### UNIT-IV

**Sequential MOS Logic Circuits:** Introduction, Behavior of Bistable elements, The SR latch circuit, Clockedlatch and Flip-flop circuit, CMOS D-latch and Edge-triggered flip-flop

**Dynamic Logic Circuits:** Introduction, Basic Principles of pass transistor circuits, Voltage Bootstrapping, Synchronous Dynamic Circuit Techniques, CMOS DynamicCircuit Techniques, Highperformance Dynamic CMOS circuits

#### UNIT-V

Chip I/P and O/P Circuits: On chip Clock Generation and Distribution, Latch – Up and its Prevention

Design for testability: Introduction, Fault types and models, Controllability and observability, AdHoc Testable design techniques, Scan –based techniques, built-in SelfTest (BIST) techniques, current monitoring IDDQ test

FinFET Device: Introduction (Need of FinFET device), structure, Comparison between FinFET and Planar MOSFET (gm, gds, leakage current, DIBL, Subthreshold Slope)

#### **Text Books:**

- 1. Neil H.E. Weste, David Money Harris —CMOS VLSI Design: A Circuits and Systems Perspectivel, 4th Edition, Pearson , 2017 (UNIT I,II,V)
- 2. Jan M. Rabaey , Anantha Chandrakasan, Borivoje. Nikolic, "Digital Integrated Circuits: A Design perspective", Second Edition , Pearson , 2016. (UNIT III, IV)

#### **Reference Books:**

- 1. CMOS Digital Integrated circuits Analysis and Design by Sung Mo Kang, Yusuf Leblebici, TATA McGraw-Hill Pub. Company Ltd.
- 2. Basic VLSI Design By Pucknell and Eshraghian, PHI,3rd ed.
- 3. Introduction to VLSI Systems by Mead C and Conway, Addison Wesley
- 4. Introduction to VLSI Circuits & Systems John P. Uyemura
- 5. Fundamentals of Digital Logic Design with VHDL, Brown and Vranesic

Course Code			Course		Core / Elective		
SPE 735 IT		Ag	ile Softw	Elective			
Prerequisite	Co	ntact ho	urs per v	veek	CIE	SEE	Credits
	$\mathbf{L}$	Т	D	Р			
Software Engineering	3	-	_	_	40	60	3

1. To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.

2. To provide a good understanding of software design and a set of software technologies and APIs.

3. To do a detailed examination and demonstration of Agile development and testing techniques.

### **Course Outcomes:**

The students will be able to:

- 1. Realize the importance of interacting with business stakeholders in determining the requirements for a software system
- 2. Perform iterative software development processes: how to plan them, how to execute them.
- 3. Point out the impact of social aspects on software development success.
- 4. Develop techniques and tools for improving team collaboration and software quality.
- 5. Perform Software process improvement as an ongoing task for development teams.

### UNIT-I

**Agile Methodology:** Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

### UNIT-II

**Agile Processes:Lean Production** - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

# UNIT-III

**Agility & Knowledge Management: Agile Information Systems** – Agile Decision Making - Earl\_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement,

Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

## UNIT-IV

**Agility& Requirements Engineering:** Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

### UNIT-V

**Agility& Quality Assurance:** Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

### Text Books:

- 1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results<sup>||</sup>, Prentice Hall, 2003.
- 2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

### **References:**

- 1. Craig Larman, —Agile and Iterative Development: A Manager\_s Guidel, Addison-Wesley, 2004.
- 2. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

Course Code		(	Course Ti	tle			Core / Elective
SPE 741 IT		Comp	Elective				
Prerequisite	Con	tact hour	s per wee	k	CIE	SEE	Credits
-	L	Т	D	Р			
<b>Operating Systems</b>	3	-	-	_	40	60	3

- 1. To understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
- 2. To understand how to examine digital evidences such as the data acquisition, identification analysis.
- 3, To be well-trained as next-generation computer crime investigators.

# **Course Outcomes:**

The students will be able to:

- 1. Understand the basic terminology of Computer forensics
- 2. Understand the basics of computer forensics
- 3. Apply a number of different computer forensic tools to a given scenario
- 4. Analyze and validate digital evidence data
- 5. Analyze acquisition methods for digital evidence related to system security

# UNIT-I

Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns, and private issues.

# UNIT-II

**Understanding Computing Investigations** – Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations.

# UNIT-III

**Data acquisition-** understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools.

### UNIT-IV

Processing crimes and incident scenes, securing a computer incident or crime, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case.

### UNIT-V

**Current computer forensics tools-** software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool.

### **Text Books:**

- 1. Warren G. Kruse II and Jay G. Heiser, "Computer Forensics: Incident Response Essentials", Addison Wesley, 2002.
- 2. Nelson, B, Phillips, A, Enfinger, F, Stuart, C., "Guide to Computer Forensics and Investigations, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5.

### **Reference Books:**

1. Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

Course Code			Course		Core / Elective		
SPE 742 IT		Se	emantic V	Elective			
Prerequisite	Со	ntact hou	irs per w	eek	CIE	SEE	Credits
_	L	Т	D	Р			
Database Systems &Web Application Development	3	-	_	_	40	60	3

- 1. Explain the fundamentals of Semantic Web technologies.
- 2. Implementation of semantic web applications and the architectures of social networking.
- 3. Social network performance analysis

### **Course Outcomes:**

The students will be able to:

- 1. Able to gain knowledge on intelligent web applications
- 2. Demonstrate the semantic web technologies like RDF Ontology and others
- 3. Learn the various semantic web applications
- 4. Identify the architectures and challenges in building social networks
- 5. Analyze the performance of social networks using electronic sources

### 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:

- 1. Thinking on the Web Berners Lee, Godel and Turing, Wiley inter science, 2008.
- 2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

#### **Reference Books:**

- 1. Semantic Web Technologies, Trends and Research in Ontology Based Systems.
- 2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group).
- 3. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly.

Course Code			Course	Core / Elective			
SPE 743 IT		Data	science	Elective			
Prerequisite	Co	ntact hou	irs per w	veek	CIE	SEE	Credits
	L	Т	D	Р			
Mathematics and Statistics	3	-	-	-	40	60	3

- 1. Data Science and Visualization delivers a simplified, unified, and integrated view of trusted business data in real time.
- 2. Understand and view data sources in an agnostic manner
- 3. Introduce the fundamental concepts in Data Science, visualization, exploration and find insights from data using R.

### **Course Outcomes:**

The students will be able to:

- 1. Demonstrate the understanding of data, analytics, and visualization importance for explaining the insights and data driven decision making.
- Understand and apply the tools from R & Python for data collection, cleaning, and pre-processing.
  Understand and apply the visualization tools from R & Python for various data. Infer insights from visualization.
- 3. Apply concepts from Exploratory data analysis tools to check assumptions, hypothesis, trends in data.
- 4. Understand business scenarios, data requirements and Apply visualization techniques to create effective data storytelling to drive change

#### UNIT–I

**Data Definitions**: Elements, Variables, and Data categorization, NOIR classification, Levels of Measurement, Data analytics.

**Analytics with Data visualization:** introduction, exploration, explanation, insight visualization, insight to action, Data driven decision making, Data storytelling – Psychology, anatomy, narrative, visuals structure.

### UNIT-II

**Introduction to R:** Install R studio, R markdown, data structures: Vector, list, matrix, data frame, factors. Data import/export: read/write csv files, excel files, loading datasets.

Descriptive stats: Central tendency, dispersion measurements.

**Data Pre-processing:** Tabularizing, cleaning, imputation, scaling, normalizing, selection, filtering, sort, aggregate, joining with Tidyverse, dplyr R libraries.

### UNIT-III

**Visualizations in R:** Intro to ggplot2, Basic visualization – Histogram, Bar / Line Chart, Box plot, Scatter plot. Advanced Visualization: Heat Map, Mosaic Map, Map Visualization, 3D Graphs, Correlogram.

**Visualization using Seaborn**: – Histogram, Bar / Line Chart, Box plot, Scatter plot, Heat Map, 3D Graphs.

### UNIT-IV

Hypothesis testing: z-test, t-test, Chi-square test.

**Exploratory Data Analysis**: univariate, bivariate, multivariate analysis using descriptive and visualization to check assumptions, hypothesis, anomalies and discover trends and patterns in the data.

Interactive Dashboards: Interactive dash boards with shiny library. Intro to Tableau, PowerBI.

#### UNIT-V

**Business case studies**: in health, finance, transport, food, and supply chain: Understanding business scenarios, Feature engineering and visualization, creating your own data story, exploration, insight to action, driving change.

### Text books

1. Effective Data Storytelling: How to Drive Change with Data, Narrative, and Visuals by Brent Dykes.

2. The Big Book of Dashboards. Visualize Your Data Using Real-World Business Scenarios by Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave.

3. Data visualizations in R

### **Reference Books:**

1. Comprehensive Guide to Data Visualization in R

- 2. <u>https://www.datacamp.com/</u>
- 3. https://seaborn.pydata.org/
- 4. <u>https://www.r-project.org/</u>
- 5. https://www.ibm.com/in-en/cloud/learn/exploratory-data-analysis

SPE 744 IT		Bl	ock chair	Elective			
Prerequisite	C	Contact h	ours per	week	CIE	SEE	Credits
-	L	Т	D	Р			
Knowledge of security and applied cryptography	3	-	-	_	40	60	3

- 1. To introduce block chain technology and cryptocurrency
- 2. To provide conceptual understanding of how blockchain technology can be used to innovate and improve business processes.
- 3. Blockchain technology helps to allow digital information to be recorded and distributed, but not edited.

#### **Course Outcomes:**

The students will be able to:

1. Acquire the basic concepts and uses of blockchain with different applications/Systems.

2.Understand the Extensibility of Blockchain Concepts.

3. Understand and analyze Blockchain Science.

- 4. Understand Technical challenges, Business model challenges.
- 5. Learn about research advances related to one of the most popular technological areas today.

#### UNIT-I

Introduction: Blockchain or distributed trust, Protocols, currency, cryptocurrency, How a cryptocurrency works, crowdfunding.

#### UNIT-II

Extensibility of blockchain concepts, Digital identity verification, Block chain Neutrality, Digital art, Blockchain Environment.

### UNIT-III

Blockchain Science: Gridcoin, Floding coin, Blockchain Genomics, Bitcoin MOOCs

### UNIT-IV

Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Multiplicity, Demurrange currency.

### UNIT-V

Technical challenges, Business model challenges, Scandals and Public perception , Government Regulations.

#### **Text Book:**

1. Melanie Swan, Blockchain Blueprint for Economy, O'relily.

#### **Reference Books:**

- 1. Building Blockchain Apps, Michael Juntao Yuan, Pearson Education.
- 2. Daniel Drescher, Block Basics: A Non-Technical Introduction in 25 steps 1<sup>st</sup> Edition
- 3. Bradley Lakeman, Blockchain Revolution: Understanding the crypto Economy of the Future. A Non-Technical Guide to the Basic of Cryptocurrency Trading and investing.

### E BOOKS

1. https://www.velmie.com/practical-blockchain-study

### MOOC

1. https://www.udemy.com/course/build-your-blockchain-az/

Course Code			Course T	<b>Core / Elective</b>			
SPE 745 IT	So	ftware Qu	uality Ass	Elective			
Prerequisite	Сог	ntact hou	rs per we	ek	CIE	SEE	Credits
	L	Т	D	Р			
Software Engineering and UML	3	-	_	_	40	60	3

1. Study fundamental concepts of software testing and its application with different testing strategies, methods, and tools.

#### **Course Outcomes:**

The students will be able to:

- 1. Understand importance of testing techniques in software quality management and assurance
- 2. Identify various types of software risks and its impact on different software application.
- 3. Create test case scenarios for different application software's using various testing techniques.
- 4. Apply different testing methodologies used in industries for software testing.
- 5. Able to execute test cases and prepare reports and test summary.

#### UNIT-I

**Introduction:** Software Testing, Importance of testing, Roles and Responsibilities, Testing Principles, Attributes of Good Test, V-Model, Test Case Generation, SDLC Vs STLC, Software Testing Life Cycle-in detail.

**Types of Testing: Testing Strategies:** Unit Testing, Integration Testing, System Testing, Smoke, Regression Testing, Acceptance Testing. Clean Room Software Engineering. Functional/Non-Functional Testing.

**Testing Tools, Categorization of testing methods:** Manual Testing, Automation Testing and Automated Testing Vs. Manual Testing.

#### UNIT-II

**Non Functional Testing:** Performance Test, Memory Test, Scalability Test, Compatibility Test, Security Test, Cookies Test, Session Test, Recovery Test, Installation Test, Ad-hoc Test, Risk Based Test, Compliance Test. McCall's Quality Factors, FURPS.

#### **UNIT-III**

**Software Testing Methodologies:** Validation & Verification, White/Glass Box Testing, Black Box Testing, Grey Box Testing, Statement Coverage Testing, Branch Coverage Testing, Path Coverage Testing, Conditional Coverage Testing, Loop Coverage Testing, Boundary Value Analysis, Equivalence Class Partition, State Based Testing, Cause Effective Graph, Decision Table, Use Case Testing, Exploratory testing and Testing Metrics, Testing GUI

### UNIT-IV

**Software Testing Life Cycle:** Requirements Analysis/Design, Traceability Matrix, Test Planning, Objective, Scope of Testing, Schedule, Approach, Roles & Responsibilities, Assumptions, Risks & Mitigations, Entry & Exit Criteria, Test Automation, Deliverables.

**Test Cases Design:** Write Test cases, Review Test cases, Test Cases Template, Types of Test Cases, Difference between Test Scenarios and Test Cases. Test Environment setup, Understand the SRS, Hardware and software requirements, Test Data.

#### UNIT-V

**Test Execution:** Execute test cases, Error/Defect Detecting and Reporting, DRE(Defect Removal Efficiency), Object ,Types of Bugs , Art of Debugging,. Debugging Approaches, Reporting the Bugs, Severity and priority, Test Closure, Criteria for test closure, Test summary report.

**Test Metrics:** Test Measurements, Test Metrics, Metric Life Cycle, Types of Manual Test Metrics.

### Text Books:

1. William E. Lewis, Software Testing and Continuous Quality Improvement, CRC Press, 3rd edition, 2016

2.M. G. Limaye, Software Testing: Principles, Techniques and Tools, TMH, 2017

3. Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black, Foundations of Software Testing, Cengage Learning

4. Paul C. Jorgenson, Software Testing: A Craftsman's Approach, CRC Press, 4th Edition, 2017.

#### **References:**

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Editions

2. Ian Sommerville, Software engineering, Pearson education Asia

3. Software Testing Techniques, 2nd edition, Boris Beizer, 1990

4. Software Testing: Principles and Practices by Srinivasan Desikan

5. Software Testing and Quality Assurance: Theory and Practice by Kshirasagar Naik and Priyadarshi Tripathy

6. Software Quality Approaches: Testing, Verification, and Validation: Software Best Practice by Michael Haug and Eric W Olsen

Course Code			Course		Core / Elective		
SPC 711 IT			IOT L	Core			
Prerequisite	(	Contact h	ours per	week	CIE	SEE	Credits
	L	Т	D	Р			
Embedded Systems		-	_	2	40	60	2

1.To become familiar with the different blocks of an IoT ecosystem.

2.To understand the working principles of Actuators

3.To be familiar with IoT devices like sensors microcontrollers, Raspberry Pi, etc.

### **Course Outcomes**

The students will be able to:

1.Use microcontroller-based embedded platforms in IoT

2.Interface wireless peripherals for the exchange of data.

3. Make use of the Cloud platform to upload and analyze any sensor data

4.Use of Devices, Gateways, and Data Management in IoT.

5. Apply the knowledge and skills acquired during the course to build and test a complete IoT system involving prototyping, programming, and data analysis.

### List of Experiments:

- 1. Introduction to Arduino platform and programming.
- 2. Interfacing Arduino to Zigbee module.
- 3. Interfacing Arduino to Blue tooth Module/ GSM Module
- 4. Sensor / Actuator interfacing using ESP32 or Raspberry Pi
- 5. Introduction to Raspberry PI platform and Python programming.
- 6. Communicate between Arduino and Raspberry PI using any wireless medium.
- 7. Set up a cloud platform to upload the data from the Raspberry Pi
- 8. Design a Mobile App for a simple user interface
- 9. Case study 1: Smart Street Light management system

- 10. Case study 2: Soil State Monitoring System
- 11. Case study 3: Internet-enabled home safety and security system.

#### **Text Books:**

- 1) Embedded Controllers using C and Arduino/2E by James M. Fiore
- 2) Simon Monk, "Programming the Raspberry Pi<sup>™</sup> Getting Started with Python",

McGraw-Hill Publications.

### Suggested Weblinks:

- 1. <u>https://microcontrollerslab.com/hc-05-bluetooth-module-interfacing-arduino/</u>
- 2. <u>https://www.electronicshub.org/interfacing-ir-sensor-with-raspberry-pi/</u>
- 3. https://www.arduino.cc/en/Tutorial/HomePage,
- 4. https://www.w3schools.com/python/andhttps://pythonprogramming.net/introductionraspberrypi-tutorials/

Course Code			Core / Elective				
SPC 712 IT			Elective				
Prerequisite	Co	ntact hou	rs per we	ek	CIE	SEE	Credits
	L	Т	D	Р			
Machine Learning		-	_	2	40	60	1

- 1. To carry out fundamental and applied research using deep learning mechanisms
- 2. To identify innovative tools usage Deep Learning

#### **Course Outcomes**

The students will be able to:

- 1. Able to train a model using deep learning
- 2. Understand Convolution Neural Networks
- 3. Understand Sentiment Analysis in network graph using RNN
- 4. Learn about Deep learning model by tuning hyper parameters
- 5. Gain knowledge in Image generation using GAN

### List of Indicative Experiments:

- 1. Implementation of different activation functions to train Neural Network
- 2. Implementation of different Learning Rules.
- 3. Implementation of Perceptron Networks.
- 4. Pattern matching using different rules.
- 5. Train a Deep learning model to classify a given image using pre trained model
- 6. Object detection using Convolution Neural Network
- 7. Recommendation system from sales data using Deep Learning
- 8. Improve the Deep learning model by tuning hyper parameters
- 9. Perform Sentiment Analysis in network graph using RNN
- 10. project related to Image generation using GAN
- 11. Project related to application of deep learning in healthcare.

- 12. Project related to application of deep learning in business analysis.
- 13. Project related to application of deep learning in Time Series Analysis & Forecasting

Course Code			Course	Core / Elective			
SPE712IT		Cloud	Computi	Elective			
Prerequisite	Co	ntact hou	ırs per w	eek	CIE	SEE	Credits
	L	Т	D	Р			
Python /Java		-	_	2	40	60	1

- 1. To develop web applications in cloud
- 2. To learn the design and development process involved in creating a cloud based application
- 3. To learn to implement and use parallel programming using Hadoop

### **Course Outcomes**

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

- 1. Configure various virtualization tools such as Virtual Box, VMware workstation.
- 2. Design and deploy a web application in a PaaS environment.
- 3. Learn how to simulate a cloud environment to implement new schedulers.
- 4. Install and use a generic cloud environment that can be used as a private cloud.
- 5. Manipulate large data sets in a parallel environment

### List of Experiments:

- 1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows.
- 2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
- 3. Test ping command to test the communication between the guest OS and Host OS
- 4. Install Google App Engine. Create hello world app and other simple web applications using python/java.
- 5. Use GAE launcher to launch the web applications.
- 6. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
- 7. Find a procedure to transfer the files from one virtual machine to another virtual machine.
- 8. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
- 9. Install Hadoop single node cluster and run simple applications like wordcount.
- 10. Develop hadoop application to process given data and produce results such as finding the year of maximum usage, year of minimum usage.

Course Code			Course	Core / Elective					
SPE713IT		Big Da	ta Analy	Elective					
Prerequisite	Co	ntact hou	irs per w	veek	CIE	SEE	Credits		
-	L	Т	D	Р					
Database Systems		-	-	2	40	60	1		

To understand the basic programming constructs of R and understand the use of R in Big Data analytics.

- 1. To solve Big data problems using Map Reduce Technique in R, HADOOP.
- 2. To develop Pig scripts for analyzing large un-structured and semi-structured data.
- 3. To develop program for Query processing using Hive and to perform analytics on Big data streams using Hadoop Streaming API.

### **Course Outcomes**

The students will be able to:

- 1. Solve Big Data problems using R and HADOOP.
- 2. Understand setting up of Pig and solve Big Data problems.
- 3. Understand setting up of Hive and perform query processing.
- 4. Apply Hadoop Streaming API for Big Data problems.
- 5. Apply Sqoop for data loading into HDFS

### List of Experiments:

- 1. Perform descriptive and predictive analytics using "R programming"
- 2. MapReduce application for word counting on R HADOOP after successful installation of three R packages(rhdfs, rmr, and rhbase)
- 3. Understand data pipeline using Pig Interactive Shell Commands after successful "Pig" installation
- 4. Develop Pig Scripts and call UDF's to accomplish functionalities to meet the problem objectives
- 5. Embedding PIG Latin in Python
- 6. Log analysis using "Pig" on semi structured data
- 7. Perform query processing on data warehousing after successful installation of "Hive"
- 8. Perform adhoc query on HDFS data using Hive Query Language (HQL)

- 9. Accomplish MapReduce Job by using Hadoop Streaming API
- 10. Perform various HDFS commands
- 11. Loading data into HDFS using Sqoop

Course Code			Course	Core / Elective					
SPE7143T		Data So	cience us	Elective					
Prerequisite	Co	ntact hou	urs per w	veek	CIE	SEE	Credits		
-	L	Т	D	Р					
		-	_	2			1		

#### The course should enable the students to:

- 1. understand the data science basics.
- **2.** Understand the R Programming Language.
- **3.** Exposure on Solving of data science problems.

#### Course Outcomes:

The students will be able to:

- 1. Understand and explain the main steps in a data science project.
- 2. Be able to apply wisely different data manipulation solutions.
- 3. Describe key concepts of data summarization and visualization and how to apply them in R.
- 4. Describe the problem of model evaluation and selection and be able to apply adequate methods to select a model for a concrete data set.
- 5. Understand and describe the basic foundations of several key descriptive modelling methods like clustering, outlier detection and association rules.

#### List of Experiments:

### 1. Basic R Programming

- i. Develop the R program for Basic Mathematical computation –Square, Square root, exponential etc.
- ii. Create an object X that stores the value then overwrite the object in by itself divided by Y. Print the result to the console.
- iii. Create and store a sequence of values from x to y that progresses in steps of 0.3
- iv. Extract the first and last elements of already created vector from, storing them as a new object.
- v. Create and store a three-dimensional array with six layers of a 4 X 2 matrix, filled with a decreasing sequence of values between 4.8 and 0.1 of the appropriate length
- vi. Create a factor with levels of confidence as follows: Low for percentages [0,30]; Moderate for percentages (30,70]; and High for percentages (70,100].

### 2. Reading and Writing Different Types of Datasets

i.Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.

- ii. Reading Excel data sheet.
- iii. Reading XML dataset.
- iv. Reading data from database.

### **3. Descriptive Statistics**

- i. Write a program to calculate, that measures the central tendency and dispersion of data.
- ii. Write a program to find basic descriptive statistics using summary, str, quartile function on mt cars dataset.
- iii. Write a program to find subset of dataset by using subset (), aggregate () functions on iris dataset.

### 4. Perform data preprocessing operations.

- i. Noise Removal
- ii. Filling Missing Values
- iii. Outlier Detection

### 5. Perform Data Transformation Operations

- i. Min max normalization
- ii. Z-score normalization

# 6. Inferential Statistics

Write a program to find F Test, T Test for the given dataset.

### 7. Correlation and Covariance

- i. Find the correlation matrix.
- ii. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.
- iii. Analysis of covariance.

# 8. Visualizations

- i. Find the data distributions using box and scatter plot.
- ii. Find the outliers using plot.
- iii. Plot the histogram, bar chart and pie chart on sample data.
- 9. Write a program to build a linear regression model, check the model on test data and predict

the result.

- 10. Find the outliers in the Housing Price dataset
- 11. For a given dataset, display a chosen feature using different mean values
- 12. Display the confidence interval of a chosen feature based on a sample

Course Code			Core / Elective				
SPW711IT			internship				
Prerequisite	Conta	act hours pe	er week		CIE	SEE	Credits
_	L	Т	D	Р			
-	-	-	-	6	50	-	3

- 1. To enhance practical and professional skills and To familiarize tools and techniques of systematic Literature survey and documentation
- 2. To expose the students to industry practices and team work
- 3. To encourage students to work with innovative and entrepreneurial ideas

### Course Outcomes:

At the end of this course, the students will

- 1. Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to real-world problems
- 2. Evaluate different solutions based on economic and technical feasibility
- 3. Effectively plan a project and confidently perform all aspects of project management
- 4. Demonstrate effective written and oral communication skills

The department can initiate the project allotment procedure at the end of VI semester and finalize it in the first two weeks of VII semester.

The department will appoint a project coordinator who will coordinate the following:

- Collection of project topics/ descriptions from faculty members (Problems can also be invited from the industries)
- Grouping of students (max 3 in a group)
- Allotment of project guides

The aim of project work is to develop solutions to realistic problems applying the knowledge and skills obtained in different courses, new technologies and current industry practices. This requires students to understand current problems in their domain and methodologies to solve these problems. To get awareness on current problems and solution techniques, the first 4 weeks of VII semester will be spent on special lectures by faculty members of the department and invited lectures by engineers from industries and R&D institutions. After completion of these seminars each group has to formalize the project proposal based on their own ideas or as suggested by the project guide.

Seminar schedule will be prepared by the coordinator for all the students from the 5th week to the last week of the semester which should be strictly adhered to.

Each group will be required to:

- 1. Submit a one page synopsis before the seminar for display on notice board.
- 2. Give a 30 minutes presentation followed by 10 minutes discussion.
- 3. Submit a technical write-up on the talk.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items stated above.

The seminar presentation should include the following components of the project:

- Problem definition and specification
- Literature survey
- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of bar (activity) charts
- Presentation- oral and written.

# SCHEME OF INSTRUCTION & EXAMINATION B.E. (INFORMATION TECHNOLOGY) – VIII Semester

S. No. Course Code			Sc	heme of	Instruct	ion	S Ez			
		Course Title	L	Т	P/D	Contact Hrs / Wk	CIE	SEE	Duration in Hrs	Credits
Theory Courses										
1.	OE – III	Open Elective – III	3	-	-	3	40	60	3	3
Practica	Practical / Laboratory Courses									
2.	PW 861 XX	Project Work – II	-	-	16	16	40	120	3	8
	•		03	-	16	19	80	180		11

	<b>Open Elective – III</b>						
Course Code	Course Title						
SOE811EEE	ENERGY CONSERVATION AND MANAGEMENT						
SOE812HS	TECHNICAL WRITING FOR RESEARCH						
SOE813MBA	SUPPLY CHAIN MANAGEMENT						
SOE814MBA	MANAGEMENT INFORMATION SYSTEM						
SOE815MBA	HUMAN RESOURCE MANAGEMENT						
SOE816MBA	BASICS OF ENTREPRENEURSHIP						
SOE817MBA	INTELLECTUAL PROPERTY RIGHTS						
SOE818IT	SOFTWARE ENGINEERING						
SOE818ECE	INTERNET OF THINGS						
SOE819IT	POWER MANAGEMENT FOR IOT DEVICES						