B. TECH
COMPUTER SCIENCE AND ENGINEERING

CYBER SECURITY

CURRICULUM & SYLLABUS (CBCS)

SCHOOL OF COMPUTING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

KALASALINGAM UNIVERSITY

(KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION)

(Under Section 3 of the UGC Act 1956)

Anand Nagar,Krishnankoil-626126

Srivilliputtur(via), Virudhunagar (Dt.), Tamil Nadu, INDIA

(www.kalasalingam.ac.in)

B. TECH CURRICULUM & SYLLABUS

(CHOICE BASED CREDIT SYSTEM)

2020

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

VISION

To be a Center of Excellence of International Repute in Education and Research

MISSION

To Produce Technically Competent, Socially Committed Technocrats and Administrators through Quality Education and Research

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION

To become a Centre of Excellence in Teaching and Research in the field of Computer Science and Engineering

MISSION

To prepare the students for a prospective career in IT industry and for higher learning. To carry out research in cutting edge technologies in computer engineering to meet the requirement of the industry and society

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: The graduates will demonstrate technical proficiency in Computer Science and Engineering during employment or higher studies.
PEO2: The graduates will imbibe problem solving skills through continuous learning and innovative mindset to provide sustainable solutions.
PEO3: The graduates will operate in a diverse environment as a professional or an entrepreneur to solve societal problems with professional ethics.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

PSO1 : Problem-Solving Skills: The ability to apply mathematics, science and computer engineering knowledge to analyze, design and develop cost effective computing solutions for complex problems with environmental considerations.
PSO2 : Professional Skills: The ability to apply modern tools and strategies in software project development using modern programming environments to deliver a quality product for business accomplishment.
PSO3 : Communication and Team Skill: The ability to exhibit proficiency in oral and written communication as individual or as part of a team to work effectively with professional behaviors and ethics.
PSO4 : Successful Career and Entrepreneurship: The ability to create a inventive career path by applying innovative project management techniques to become a successful software professional, an entrepreneur or zest for higher studies.

PROGRAMME OUTCOMES (POs)

PO1 : Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2 : 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.
PO3 : 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.
PO4 : 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.
PO5 : 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.
PO6 : 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.
PO7 : Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge

of, and need for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 : Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 : 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.

PO11 : 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 multidisciplinary environments.

PO12 : 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.

ABET STUDENT OUTCOMES

Computing Accreditation Commission (CAC)

CSO1 : Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

CSO2 : Design, implement, and evaluates a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

CSO3 : Communicate effectively in a variety of professional contexts.

CSO4 : Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

CSO5 : Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

CSO6 : Apply Computer Science theory and software development fundamentals to produce computing-based solutions.

Engineering Accreditation Commission (EAC)

ESO1 : Ability to identify, formulate and solve complex engineering problems by applying principles of Engineering, Science, and Mathematics.

ESO2 : Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

ESO3 : An ability to communicate effectively with a range of audiences.

ESO4 : Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

ESO5 : Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

ESO6 : Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

ESO7 : Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Contents

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
B.Tech CSE - CURRICULUM STRUCTURE

S.no	Curriculum Components	Credits
I	Basic Science and Mathematics	26
II	Humanities and Social Science	3
	Soft Skills	3
	Humanities Elective	6
III	Basic Engineering	23
IV	**Program Core**	**61**
	Core Courses	48
	Community Service Project	3
	Project Work	10
V	**Professional Elective Courses**	**36**
	Professional Elective	18
	Open Elective	18
VI	Internship/Industry Training	2
VII	Mandatory Courses	....
	Total Credits	160

1. Basic Science and Mathematics

S.No	Course Code	Course Name	Course Type	L	T	P	C
1	PHY18R174	Semiconductor Physics	IC	3	1	2	5
2	CHY18R171	Chemistry	IC	3	1	2	5
3	MAT18R101	Calculus and Linear Algebra	TP	3	0	2	4
4	MAT18R103	Multiple Integration, Ordinary Differential Equations and Vector Spaces	TP	3	0	2	4
5	MAT18R202	Probability and Statistics	TP	3	0	2	4
6	MAT18R207	Discrete Mathematics	TP	3	0	2	4
Total Credits						26	

2. Humanities and Social Science

S.NO	Course Code	Course Name	Course Type	L	T	P	C
1	HSS18R151	English for Technical Communication	TP	2	0	2	3
2	HSS18R101	Soft skills-I	T	3	0	0	1
3	HSS18R102	Soft skills-II	T	3	0	0	1
4	HSS18R201	Soft skills-III	T	3	0	0	1
5	HSS18R0XX	Humanities Elective I	T	3	0	0	3
6	HSS18R0XX	Humanities Elective II	T	3	0	0	3
Total Credits						12	

3. Humanities Electives

S.NO	Course Code	Course Name	Course Type	L	T	P	C
1	HSS18R001	Management Concepts and Techniques	T	3	0	0	3
2	HSS18R002	Marketing Management	T	3	0	0	3
3	HSS18R003	Organizational Psychology	T	3	0	0	3
4	HSS18R004	Project Management	T	3	0	0	3
5	HSS18R005	Stress Management and Coping Strategies	T	3	0	0	3
6	HSS18R006	Economics for Engineers	T	3	0	0	3
7	HSS18R007	Human Resource Management and Labour Law	T	3	0	0	3
8	HSS18R008	Entrepreneurship Development	T	3	0	0	3
9	HSS18R009	Cost Analysis and Control	T	3	0	0	3
10	HSS18R010	Product Design and Development	T	3	0	0	3
11	HSS18R011	Business Process Reengineering	T	3	0	0	3
12	HSS18R012	Political Economy	T	3	0	0	3
13	HSS18R013	Professional Ethics	T	3	0	0	3
14	HSS18R014	Operations Research	T	3	0	0	3
15	HSS18R015	Total Quality Management	T	3	0	0	3
16	HSS18R016	Advanced Softskills	T	3	0	0	3

4. Basic Engineering

S.NO	Course Code	Course Name	Course Type	L	T	P	C
1	CSE18R108	IT Infrastructure Landscape Overview	T	3	0	0	3
2	CSE18R153	Programming in C	TP	2	0	2	3
3	EEE18R171	Basic Electrical and Electronics Engineering	IC	3	1	2	5
4	CSE18R172	Data Structure and Algorithms	IC	3	0	2	4
5	CSE18R174	Computer Architecture and Organization	IC	3	0	2	4
6	ECE18R277	Digital Electronics	IC	3	0	2	4
Total Credits							23

5. Program Core

S.NO	Course Code	Course Name	Course Type	Pre requisite	L	T	P	C
1	CSE18R111	Information Security Fundamentals	T	NIL	3	0	0	3
2	CSE18R173	Design and Analysis of Algorithms	IC	CSE18R172	3	0	2	4
3	CSE18R211	IT Physical Security & System Security	TP	NIL	2	0	2	3
4	CSE18R252	Formal Language and Automata	TP	NIL	3	0	1	4
5	CSE18R254	Introduction to Python Programming	TP	NIL	2	0	2	3
6	CSE18R272	Java Programming	IC	NIL	3	0	2	4
7	CSE18R273	Operating Systems	IC	CSE18R174	3	0	2	4
8	CSE18R274	Compiler Design	IC	CSE18R252	3	0	2	4
9	CSE18R371	Computer Networks	IC	CSE18R273	3	0	2	4
10	INT18R371	Database Management Systems	IC	Nil	3	0	2	4
11	CSE18R375	Digital Forensics	IC	NIL	3	0	2	4
12	CSE18R393	IT Network Security	IC	NIL	3	0	2	4
13	CSE18R395	Information Security Governance, Management Practices, Security Audit & Monitoring	T	NIL	3	0	0	3
Total Credits							48	

6. Community Service Project

S.No	Course Code	Course Name	Credits
1	CSE18R399	Community Service Project	3

7. Project Work

S.No	Course Code	Course Name	Credits
1	CSE18R499	Project Work	10

8. Professional Elective Courses

S.No	Course Code	Course Name	Course Type	L	T	P	C
1	CSE18R256	Software Engineering	T	3	0	0	3
2	CSE18R264	IT Application Security	TP	3	0	2	4
3	CSE18R291	IT Data Security	TP	3	0	2	4
4	CSE18R356	Software Testing	T	3	0	0	3
5	CSE18R358	Free and Open Source Software	T	3	0	0	3
6	CSE18R360	Internet of Things	T	3	0	0	3
7	CSE18R365	Artificial Intelligence	T	3	0	0	3
8	CSE18R366	Game Theory	T	3	0	0	3
9	CSE18R367	Virtual Reality	T	3	0	0	3
10	CSE18R369	Computational Intelligence	T	3	0	0	3
11	CSE18R394	Ethical Hacking & Penetration Testing	TP	3	0	2	4
12	CSE18R452	Cloud Computing Techniques	T	3	0	0	3
13	CSE18R453	Applied Cryptography and its applications	T	3	0	0	3
14	CSE18R456	Web Technology	T	3	0	0	3
15	CSE18R457	Mobile Application Development	T	3	0	0	3

9. Mandatory Courses

S.No	Course Code	Course Name
1	MAN18R001	Environmental Sciences
2	MAN18R002	Indian constitution
3	MAN18R003	Essence of Indian Traditional Knowledge

1 Basic Science and Mathematics

1.1 PHY18R174: Semiconductor Physics

PHY18R174	Semiconductor Physics	L	T	P	C
		3	1	2	5
Course Category:	Basic science and Mathematics				
Course Type:	Integrated Course				
Pre-requisite:	Basic knowledge in Physics				

Course Objectives:

- To provide the students a firm understanding of the basics of Semiconductors.

- To introduce the students, the application of semiconducting materials and some of its measurements

Course Outcomes:

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

CO1 Describe the theories of Electronic materials.

CO2 Understand the basic concepts of semiconducting materials.

CO3 Understand the basic knowledge on light based semiconductor interaction.

CO4 Understand the fundamental measurements in semiconducting materials.

CO5 Design, fabrication, and characterization of engineered semiconductor materials

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	M				M						L		S			
CO2	L		M			M					L		S			
CO3	M		L								L		S			
CO4	M	M									L		S			
CO5	M	L									L		S			

UNIT I: BASIC CONCEPTS AND ELECTRONIC MATERIALS Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of energy states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT II: SEMICONDUCTORS Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

UNIT III: LIGHT-SEMICONDUCTOR INTERACTION Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

UNIT IV: ENGINEERED SEMICONDUCTING MATERIALS Density of states in 2D, 1D and 0D (qualitatively), Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication (lithiography,CVD), and characterization techniques(XRD, TEM) .

UNIT V: MEASUREMENTS : CONDUCTING AND SEMI CONDUCTING MATERIALS Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, band gap by UV-Vis spectroscopy

List of Experiments

1. Diode V-I characteristics

2. Transistor Static characteristics C.E. mode

3. Transistor characteristics C.B. mode

4. Logic Gates AND, OR, NOT truth table verification discrete components

5. Zener diode characteristics & Break down Voltage

6. Zener regulated power supply.

7. Hall co-efficient of a semiconductor sample

8. Resistivity of a semiconductor crystal with temperature by four probe method and to determine band gap.

9. Determination of band gap of a semiconductor using P.O box.

TEXT BOOK(S):

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Incorporation, 1995.

2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Incorporation, 2007

3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley , 2008.

REFERENCE BOOK(S):

1. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York ,2007

2. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India, 1997

3. Online course: Semiconductor Optoelectronics by M R Shenoy on NPTEL

4. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

1.2 CHY18R171: Chemistry

CHY18R171	Chemistry	L	T	P	C
		3	1	2	5
Course Category:	Basic science and Mathematics				
Course Type:	Integrated Course				
Pre-requisite:	Basic knowledge in Chemistry				

Course Objectives:

- To introduce the fundamental concepts and applications of Chemistry to engineering students to understand, analyze and apply the same to complex technical issues.

Course Outcomes:

CO1 Understand the significance and role of water quality parameters in the domestic and engineering applications and analyzing the same through modern methods.

CO2 Elucidate and apply the principles of thermodynamics for solving engineering problems.

CO3 Summarize the basic concepts of electrochemistry, batteries, corrosion and to apply the same for the betterment of society. interaction.

CO4 Illustrate synthesis, characteristics and applications of technologically important polymers, composites and nano materials.

CO5 Utilize the underlying principles, instrumentation and applications of analytical techniques.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S				M								S			
CO2	S												S			
CO3	S		M				M						S			
CO4	S										L		S			
CO5	S										L		S			

UNIT I: ATOMIC AND MOLECULAR STRUCTURE   Schrodinger wave equation: Derivation of time independent Schrodinger wave equation, Representation of Schrodinger wave equation in polar coordinates - Radial distribution function graphs of s, p, d and f orbitals. Molecular Orbital Theory: MOT concept, MO diagrams of homo-nuclear diatomic molecules (hydrogen, nitrogen and oxygen) and hetero-nuclear diatomic molecules (carbon monoxide and nitric oxide). Crystal field theory: CFT concept, weak and strong ligands, energy level diagrams of transition metal ions (Fe^{2+} & Fe^{3+}) in octahedral and tetrahedral complexes and their magnetic properties. Intermolecular forces - Ionic, dipolar and van der Waals interactions.

UNIT II: PERIODIC PROPERTIES Effective nuclear charge - Factors affecting effective nuclear charge: Penetration or shielding of orbitals - Variation of s, p, d and f orbital energies of atoms in the periodic table - Aufbau principle (Building-up principle): Application of Aufbau principle in writing electronic configuration, Deviation from Aufbau principle - Periodicity of properties in a periodic table - Periodic properties: Atomic and ionic sizes, ionization energies, electron affinity and electronegativity - Variation of periodic properties in the periodic table - Hard soft acids and bases: Concept and examples.

UNIT III: FREE ENERGY AND CHEMICAL EQUILIBRIA Thermodynamic functions: Definition and mathematical expression for Work, Energy, Enthalpy, Entropy and Free energy - Nernst equation: Derivation, apply Nernst equation to determine of solubility product, pH (glass electrode). Potentiometric titrations: Acid-Base, Redox and precipitation reaction - Water analysis: Hardness by EDTA method and chloride ion by Argentomentric method - Corrosion: Definition, types (dry & wet) and mechanism. and control of Dry and Wet corrosion.

UNIT IV: ORGANIC REACTIONS Nucleophilic substitution reactions: Definition, types and examples of nucleophile, Compare nucleophilicity and basicity of a nuceophile - Types of nucleophilic substitution (case RX and ArX): Mechanism of SN1, SN2, SNi and Benzyne. Electrophilic substitution reactions: Definition, types and examples of electrophile - Electrophilic substitution reactions of hydrocarbons: Halogenation, sulphonation, nitration. Friedel crafts alkylation and acylation reaction. Nucleophilic addition reactions (case aldehydes and ketones): Polarity of C=O bond. General mechanism of nucleophilic addition reactions on aldehydes and ketones: HCN, HOH, ROH and NaHSO3 addition. Electrophilic addition reactions (case alkenes): General mechanism of electrophilic addition reactions on alkene - Addition of HBr [Markownikoff & Anti-Markownikoff (peroxide effect)] - Addition of alkene (polymerization of ethylene). Elimination reactions: Types of elimination reactions (case alkyl halides): Dehydrohalogenation of alkyl halides - E1 and E2 mechanism - Dehydration of alcohols to alkene and ethers. Greener synthesis of drug molecules (Aspirin and Ibuprofen)

UNIT V: STEREOCHEMISTRY & SPECTROSCOPIC TECHNIQUES Stereochemistry - Definition with examples: Geometrical isomers (alkene) and stereoisomers, symmetry, chirality, enantiomers, diastereomers, meso and racemic mixture. Representation of 3D structures: Wedge formula, Fischer projections, Newmann and Sawhorse formula (upto 2 carbons) - Conformational analysis: Ethane, butane and cyclohexane - Configurational analysis: Rules of RS nomenclature and application of RS nomenclature to molecules containing one chiral centre. Electronic spectroscopy: Principle, instrumentation, selection rules and medicinal application of fluorescence spectroscopy. Nuclear magnetic resonance spectroscopy (1H-NMR): Principle, instrumentation, chemical shift, coupling constant and application (structural identification of the compound C3H6O from 1H-NMR data). X-ray diffraction: Principle, instrumentation and applications X-ray diffraction.

List of Experiments

1. Determination of Viscosity by Ostwald Viscometer.

2. Determination of surface tension by stalagmometer.

3. Adsorption of acetic acid by charcoal.

4. Determination of chloride content of water.

5. Estimation of hardness of water by EDTA method.

6. Determination of the rate constant of a reaction

7. Thin layer chromatography.

8. Determination of the partition coefficient of a substance between two immiscible liquids.

9. Determination of Saponification /acid value of oil.

10. Preparation of Aspirin

11. Potentiometric titration of strong acid vs strong base.

12. Potentiometric titration of weak acid vs strong base.

13. Determination of cell constant and conductance of solutions.

TEXT BOOK(S):

1. Engineering Chemistry, 2nd Edition, Wiley India (P) Ltd., 2018.

2. Stereochemistry of Organic Compounds, Ernest L. Eliel, Samuel H. Wilen Student edition, Wiley India (P) Ltd., 2017.

3. University Chemistry, by B. M. Mahan and R.J.Mayers, Pearson Publishers, 11th Edition, Noida, 2017.

4. Chemistry Laboratory Manual, Department of Chemistry, Kalasalingam University, 2018.

REFERENCE BOOK(S):

1. Fundamentals of Molecular Spectroscopy, by C. N. Banwell and E.M. McCash, Tata McGraw-Hill Publishers, 4th Edition, New Delhi, 2008.

2. Physical Chemistry, by P. W. Atkins and J.D. Paula, W H Freeman & Co Publishers, 10th Edition, 2014.

3. Modern Inorganic Chemistry, R. D. Madan, 4th Edition S. Chand & Company Ltd., 2009.

4. Organic Chemistry, Paula Y. Bruice, 7th Edition, Pearson (Dorling Kindersley India (P) Ltd.) 2014.

5. Principles of Physical Chemistry, B. R. Puri, L. R. Sharma, M. S. Pathania, 47th Edition, Vishal Publishing Co., 2017.

6. Spectrometric Identification of Organic Compounds, Robert M. Silverstein, Francis X. Webster, David J. Kiemle, David L. Bryce, 8th Edition, Wiley India (P) Ltd., 2010.

7. Inorganic Chemistry, Peter Atkins, Mark Weller, Fraser Armstrong, Jonathan Rourke, Tina Overton, Michael Hangerman 5th Edition, Oxford press, 2015.

8. Organic Chemistry, Volume 1, I. L. Finar, 6th Edition, Pearson (Thomson press India (P) Ltd.) 2014.

1.3   MAT18R101: Calculus and Linear Algebra

MAT18R101	Calculus and Linear Algebra	L	T	P	C
		3	0	2	4
Course Category:	Basic science and Mathematics				
Course Type:	Theory with Practical				
Pre-requisite:	NILL				

Course Objectives:

- To enable the students to acquire knowledge and skills in basic components of calculus, to handle the situations involving multivariable calculus, and to diagonalize a symmetric matrix using eigenvalues and eigenvectors.

Course Outcomes:

Upon successful completion of this course, students will be able to.

CO1 Understand the fundamental theorems such as Rolles theorem, Mean value theorem, Taylors theorem and its applications.

CO2 Understand the basic concepts of limit, continuity, derivative, partial derivative and total derivative and its applications.

CO3 Solve the real world problems using differentiation and integration.

CO4 Understand the concepts of sequence, convergent of sequences, series and testing of convergent of series using different methods.

CO5 Find the solution of simultaneous linear equations using matrices and to find the eigen values and eigen vectors of a matrix, Cayley-Hamilon theorem and orthogonal transformations.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S	M											S			
CO2	S	S		S	M		L						S			
CO3	S	S		S	M		L						S			
CO4	S	S		S	M		L						S			
CO5	S	S		S	M		L						S			

UNIT I: CALCULUS   Rolles Theorem- Mean value theorems - Taylors and Maclaurin theorems with remainders -indeterminate forms and L'Hospital's rule - Maxima and minima.

UNIT II: MULTIVARIABLE CALCULUS (DIFFERENTIATION)   Limit, continuity and partial derivatives - directional derivatives - total derivative - Maxima, minima and saddle points - Method of Lagrange multipliers.

UNIT III: CALCULUS (APPLICATIONS)   Curvature (Cartesian coordinates) - Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT IV: SEQUENCES AND SERIES   Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

UNIT V: MATRICES   System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Cayley-Hamilton Theorem - Diagonalization of matrices - Orthogonal transformation- Reduction of Quadratic form to Canonical form.

TEXT BOOK(S):

1. Grewal, B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi,43rd Edition, 2015.

REFERENCE BOOK(S):

1. Kreyszig, E, Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 10th Edition, 2001.

2. Ramana B. V., Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2005.

3. Modern Inorganic Chemistry, R. D. Madan, 4th Edition S. Chand & Company Ltd., 2009.

4. Veerarajan,T., Engineering Mathematics (For First Year), Tata McGraw-Hill publishing company Limited, 2008.

1.4 MAT18R103: Multiple Integration, Ordinary Differential Equations and Vector Spaces

MAT18R103	Multiple Integration, Ordinary Differential	L	T	P	C
	Equations and Vector Spaces	3	0	2	4
Course Category:	Basic science and Mathematics				
Course Type:	Theory with Practicals				
Pre-requisite:	NILL				

Course Objectives:

- To enable the students to understand the concepts of multiple integrations and their application, vector spaces, linear system of equations, rank of matrix, and to solve ordinary differential equations.

Course Outcomes:

Upon successful completion of this course, students will be able to.

CO1 Understand the concepts of double and triple integral and its applications.

CO2 Know about the applications of double and triple integral in vector calculus.

CO3 Know the methods of solving differential equations of first and second orders.

CO4 Find the solution of system of linear equations using matrix methods.

CO5 Understand the concept of vector space and linear independent and dependent of vectors, linear transformations and orthogonalization process.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S	M											S			
CO2	S	S		S	M		L						S			
CO3	S	S		S	M		L						S			
CO4	S	S		S	M		L						S			
CO5	S	S		S	M		L						S			

UNIT I: MULTIVARIABLE CALCULUS (INTEGRATION) Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volume; Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT II: INTEGRAL THEOREMS Gradient, curl and divergence - Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

UNIT III: ORDINARY DIFFERENTIAL EQUATIONS   Exact, linear and Bernoullis equations, Eulers equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairauts type. Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation.

UNIT IV: MATRICES   Matrices, vectors: Linear systems of equations, linear Independence, rank of a matrix, Cramers Rule, inverse of a matrix, Gauss elimination method and Gauss-Jordan elimination method.

UNIT V: VECTOR SPACES   Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), Matrix associated with a linear map; range and kernel of a linear map, rank nullity theorem; Inner product spaces, Gram-Schmidt orthogonalization.

TEXT BOOK(S):

1. Grewal, B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Edition, 2015.

2. Dr. S. Arumugam, Modern Algebra, Scitech Publications, August , 2003.

REFERENCE BOOK(S):

1. Kreyszig, E, Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore , 10th Edition., 2001.

2. Ramana B. V., Engineering Mathematics, Tata McGraw-Hill Publishing Company, New Delhi, Edition 2005.

3. Veerarajan,T., Engineering Mathematics (For First Year), Tata McGraw-Hill publishing company Limited, 2008.

1.5　MAT18R202: Probability and Statistics

MAT18R202	Probability and Statistics	L	T	P	C
		3	0	2	4
Course Category:	Basic science and Mathematics				
Course Type:	Theory with Practicals				
Pre-requisite:	NILL				

Course Objectives:

- To enable the students to acquire skills to handle bivariate distributions and to solve real world problems using statistical methods.

Course Outcomes:

Upon successful completion of this course, students will be able to.

CO1　Understand the concepts of probability, random variable, distribution function and expectation.

CO2　Learn standard distributions and its applications.

CO3　Evaluate the moments, skewness and kurtosis for standard distributions and to know about the correlation and regression.

CO4　Solve the physical world problems using small and large sample theory.

CO5　Solve real world problems using analysis of variance.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S	M											S			
CO2	S	S		S	M		L						S			
CO3	S	S		S	M		L						S			
CO4	S	S		S	M		L						S			
CO5	S	S		S	M		L						S			

UNIT I: BASIC PROBABILITY AND RANDOM VARIABLES　Axiomatic definition of Probability - Conditional probability Independent events - Total probability Bayes theorem - Random variables Discrete random variable - Probability mass function Continuous random variable - Probability density functions Cumulative distribution function-Properties- Expectation.

UNIT II: STANDARD DISTRIBUTIONS AND BIVARIATE DISTRIBUTIONS　Binomial, Poisson, Uniform, Exponential and Normal distributions and their properties. Two dimensional random variables Joint probability density function Cumulative distribution function Marginal density function.

UNIT III: STATISTICS Measures of Central tendency: Moments, skewness and Kurtosis - evaluation of statistical parameters for Binomial, Poisson and Normal distributions, Correlation and regression Rank correlation- Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

UNIT IV: APPLIED STATISTICS Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Small samples: Test for single mean, difference of means- Chi-square test for goodness of fit and independence of attributes.

UNIT V: DESIGN OF EXPERIMENTS Analysis of variance One way classification Completely Randomised Design(C R D) Two-way classification Randomised Block Design(R.B.D) Latin Square Design(L S D).

TEXT BOOK(S):

1. T. Veerarajan, Probability, Statistics and Random process, Fourth edition, Tata McGraw-Hill Education (India) Pvt. Ltd., 2016.

REFERENCE BOOK(S):

1. Flynn M., Probability, Random variables and random processes, Harper & Row Publishers, New York, 1982.

2. Gupta, S.C, and Kapur, J.N., Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi, 11th Edition., 2006.

1.6   MAT18R207: Discrete Mathematics

MAT18R207	Discrete Mathematics	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Theory with Practicals				
Pre-requisite:	NILL				

Course Objectives:

- To enable the students to understand the concept of sets, relations, functions, logic and algebraic structures, and basic graph theory and its applications.

Course Outcomes:

Upon successful completion of this course, students will be able to.

CO1 Understand the concepts of cartesian product, binary operation, partially order, relation, function and its properties.

CO2 Know about the pigeon-hole principle, inclusion and exclusion principles, tautology and normal forms.

CO3 Understand the concepts of lattice, homomorphism, modular and distributive lattices.

CO4 Understand the concepts of semi group, group, Boolean algebra, Boolean ring and duality.

CO5 Understand the concepts in graph theory such as walk, cycle, path, trees, Hamiltonian and Eulerian graphs.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S	M											S			
CO2	S	S		S	M		L						S			
CO3	S	S		S	M		L						S			
CO4	S	S		S	M		L						S			
CO5	S	S		S	M		L						S			

UNIT I: 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 The well-Ordering Principle - Recursion.

UNIT II: Basic counting techniques-inclusion and exclusion- pigeon-hole principle-permutation and Combination- Propositional Logic: Introduction TF(True/ False) Statements Connectives Atomic and Compound statements Truth table of a formula Tautology Tautological implications Equivalence of formulae Replacement process Normal forms Principal normal forms Theory of Inference.

UNIT III: Lattices Hasse Diagrams - Some properties of lattices Duality principle Lattice through Algebraic operations - Lattice Homomorphisms Product lattice of two lattices - Modular and Distributive lattices Boolean Algebras.

UNIT IV: APPLIED STATISTICS Algebraic Structures with one Binary Operation, Semi Groups, Groups - Congruence Relation and Quotient Structures - Boolean Algebra and Boolean Ring - Identities of Boolean Algebra - Duality, Representation of Boolean Function - Disjunctive and Conjunctive Normal Form.

UNIT V: DESIGN OF EXPERIMENTS Graphs and their properties - Degree, Connectivity - Path, Cycle, Sub Graph, Isomorphism - Eulerian and Hamiltonian Walks - definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

TEXT BOOK(S):

1. M. K. Venkataraman, N. Sridharan and N. Chandrasekaran, Discrete Mathematics, National Publishing Company, 2009.

REFERENCE BOOK(S):

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and Its Application to Computer Science, TMG Edition, TataMcgraw-Hill Publishing Company, 2001.

2. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill Publishing Company, 1999.

2 Humanities and Social Science

S.NO	Course Code	Course Name	Course Type	L	T	P	C
1	HSS18R151	English for Technical Communication	TP	2	0	2	3
2	HSS18R101	Soft skills-I	T	3	0	0	1
3	HSS18R102	Soft skills-II	T	3	0	0	1
4	HSS18R201	Soft skills-III	T	3	0	0	1
5	HSS18R0XX	Humanities Elective I	T	3	0	0	3
6	HSS18R0XX	Humanities Elective II	T	3	0	0	3
Total Credits					12		

3 Humanities Electives

3.1 HSS18R001: Management Concepts and Techniques

HSS18R001	MANAGEMENT CONCEPTS AND TECHNIQUES	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To introduce students about the definition of management, its characteristics, evolution and importance as well as the functions performed by managers-planning, organizing, directing and controlling in order to achieve the organizational goals.

- To illustrate students about the applications of management functions in various enterprises in the field of marketing, finance, personnel, production, etc.

Course Outcomes:

CO1 Understand the historical backdrop and fundamentals of management thoughts vital for understanding the conceptual frame work of Management as a discipline.

CO2 Apply various concepts of planning, decision making and controlling to help solving managerial problems

CO3 Understand the concepts of Ethics, Delegation, Coordination and Team work

CO4 Understand the management concepts and styles in Global context

CO5 Understands about emerging concepts in management thought and philosophy

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1							L				M			M	L	L
CO2		M				S	S	S		M				M	L	L
CO3								S		L	L			M	L	L
CO4						M		L	L	L		S		M	L	L
CO5											S			M	L	L

UNIT I: DEVELOPMENT OF MANAGEMENT THOUGHTS Scientific Management Movement - Administrative Movement - Human Relations Movement - Decision Movement - Behavioral Science Movement - Systems Movement - Contingency Movement.

UNIT II: ESSENTIALS OF PLANNING Planning Objectives Goals - Programmed Decisions and Unprogrammed Decisions; Decision Making - Creativity in Decision - Making, Forecasting and Strategy to Formulation.

UNIT III: EFFECTIVE ORGANIZING Span of Control Departmentation - Authority; Responsibility - Bureaucracy and Adhocracy; Group Dynamics.

UNIT IV: STAFFING AND DIRECTING Staffing: Manpower Planning Recruitment Sources Selection Procedure Training Methods Performance Evaluation Methods Executive Development Programs - Directing: Communication Process and Barriers Motivation Techniques Financial and Non Financial Motivation- Leadership Qualities and Styles.

UNIT V: CONTROLLING AND RECENT CONCEPTS Controlling: Meaning and Process - Requisites of Effective Control - Control Techniques. Emerging Issues in Management: Japanese and American Management Management by Objectives Knowledge Management Technology Management Business Process Outsourcing- Social Responsibility and Business Ethics.

TEXT BOOK(S):

1. Harold Koontz & Heinz Weihrich, Essentials of Management: An International, Innovation and Leadership Perspective, 10th Edition, McGraw Hill Education (India) Private Ltd. New Delhi, 2016.

2. Stephen P. Robbins, Mary A. Coulter, Management, 13th Edition, Pearson Education Limited, New Delhi, 2016.

REFERENCE BOOK(S):

1. C.B.Gupta, Management Theory and Practice, 19th Revised Edition, Sultan Chand & Sons, New Delhi.2017.

2. L.M.Prasad, Principles and Practices of Management, 9th Edition, Sultan Chand and Sons Private Limited, 2015.

3. K.Aswathappa, Essentials of Business Environment: Text Cases and Exercises 12th, edition, Himalaya Publishing House, Mumbai, 2014.

4. Tripathi & Reddy, Principles of Management, 5th Edition, Tata McGraw Hill publishing company Ltd, New Delhi, 2012.

3.2 HSS18R002: Marketing Management

HSS18R002	MARKETING MANAGEMENT	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To develop students understanding the gap between how organizations match the requirements of consumers in competitive environments, and develop strategies to create the competitive edge.

- To familiarize students with analysis, planning, implementation, and control, as well as the marketing mix, exportation, and the social aspects of marketing.

Course Outcomes:

CO1 Understand marketing concepts, philosophies and historical background.

CO2 Understand of marketing operations and complexities for students to apply in practical business situations.

CO3 Understand concepts related to segmentation, targeting and positioning, product attributes, and pricing strategies prevalent in domestic and international scenario.

CO4 Apply various tools and techniques of promoting the products in ethical manner.

CO5 Understand emerging concepts of marketing in the emerging global markets.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S	S		L	M	M	L		M	L	L
CO2						S			M	S				M	L	L
CO3						L	S	S	L	S	M	L		M	L	L
CO4						S	S		L	M	M	L		M	L	L
CO5						S				S				M	L	L

UNIT I: MARKETING   Meaning - concept - functions - marketing Planning & implementation marketing Programmes - Marketing environment Market Segmentation and consumer behaviour Influencing factors, Decision process Marketing mix Marketing department.

UNIT II: PRODUCT   Meaning - Product planning - policies - positioning - New product development Product life cycle BCG Matrix - branding. Packing, labeling.

UNIT III: PRICING   Pricing objectives Setting and modifying the price Different pricing method Product line pricing and new product pricing.

UNIT IV: DISTRIBUTION   Nature of Marketing channels - Types of Channel flows Channel functions - Channel co-operation, conflict and competition - Direct Marketing Telemarketing, Internet shopping.

UNIT V: PROMOTION   Promotion Mix - Advertisement - Message - copy writing Advertisement - budgeting - Measuring advertisement effectiveness - Media strategy - sales promotion - Personal selling steps, publicity and direct marketing.

TEXT BOOK(S):

1. Philip.T.Khotler, Kevin Lane Keller, Marketing Management, 15th Edition, Pearson Education, New Delhi, 2016.

2. Ramaswamy.VS & Namakumari. S, Marketing Management Global Perspective, Indian Context, McGraw Hill Education (India) Private Limited, New Delhi, 2013.

REFERENCE BOOK(S):

1. Rajan Saxena, Dorector, Jain S.P., Marketing Management, 1st edition, Tata McGraw Hill, New Delhi, 2006.

2. K.S.Chandrasekar, Marketing Management, Text & Cases, 1st edition, Tata McGraw hill Education Pvt. Ltd. 2013.

3. Tapan K.Panda, Marketing Management Text and Cases, 2nd Edition, Excel Books.2008.

3.3 HSS18R003: Organizational Psychology

HSS18R003	Organizational Psychology	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To clarify the principles and basic concepts of organizational psychology based on efficiency and quality of employee life. It also aims at enhancing the quality of life of employees.

- To make students to understand organizations aspects in terms of psychological assessment, personnel decisions in line with training and development, organizational change and organizational health in specific the intrinsic problems.

Course Outcomes:

CO1 Apply basic concepts of industrial and organizational psychology

CO2 Illustrate different ways of achieving organizational effectiveness through individual behavior.

CO3 Examine the concepts relating to individual behavior to achieve group target and achieve leadership position in organization.

CO4 Understand the organizational changes and means to evaluate based on nature of organizations.

CO5 Analyze implications of changes aligning the interest of individual, group and organization as a whole.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						M	S	S		S		M		M	L	M
CO2						L	S		M		L			M	L	M
CO3						M		L						M	L	M
CO4						M		S		M				M	L	M
CO5						L	S		S		L	M		M	L	M

UNIT I: MARKETING   Meaning - concept - functions - marketing Planning & implementation marketing Programmes - Marketing environment Market Segmentation and consumer behaviour Influencing factors, Decision process Marketing mix Marketing department.

UNIT II: PRODUCT   Meaning - Product planning - policies - positioning - New product development Product life cycle BCG Matrix - branding. Packing, labeling.

UNIT III: PRICING   Pricing objectives Setting and modifying the price Different pricing method Product line pricing and new product pricing.

UNIT IV: DISTRIBUTION   Nature of Marketing channels - Types of Channel flows Channel functions - Channel co-operation, conflict and competition - Direct Marketing Telemarketing, Internet shopping.

UNIT V: PROMOTION   Promotion Mix - Advertisement - Message - copy writing Advertisement - budgeting - Measuring advertisement effectiveness - Media strategy - sales promotion - Personal selling steps, publicity and direct marketing.

TEXT BOOK(S):

1. Philip.T.Khotler, Kevin Lane Keller, Marketing Management, 15th Edition, Pearson Education, New Delhi, 2016.

2. Ramaswamy.VS & Namakumari. S, Marketing Management Global Perspective, Indian Context, McGraw Hill Education (India) Private Limited, New Delhi, 2013.

REFERENCE BOOK(S):

1. Rajan Saxena, Dorector, Jain S.P., Marketing Management, 1st edition, Tata McGraw Hill, New Delhi, 2006.

2. K.S.Chandrasekar, Marketing Management, Text & Cases, 1st edition, Tata Mc-Graw hill Education Pvt. Ltd. 2013.

3. Tapan K.Panda, Marketing Management Text and Cases, 2nd Edition, Excel Books.2008.

3.4 HSS18R004: Project Management

HSS18R004	Project Management	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To describe concepts relating to project management and enable students to evolve project objectives appropriately with relevance to business proposals.

- To make students to understand about evaluation of project by testing the technical feasibility, financial viability, market acceptability and social desirability of projects.

- To give an account on risk and profitability analysis that facilitates the making of the effective project proposal and guides learners in project planning, implementation and control and also emancipates the scope of project management in undertaking foreign collaboration projects

Course Outcomes:

CO1 Understand and have clarity about the concept of project and steps in project management.

CO2 Prepare business proposals.

CO3 Evaluate the technical feasibility, financial viability, market acceptability and social desirability of projects.

CO4 Analyze the Risk and profitability of the project proposals

CO5 Empathize oneself as a project manager and also as part of project teams and enable effective decision making.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1							M				S			M	L	M
CO2						L		S	S	L		S		M	L	M
CO3											M			M	L	M
CO4						M		L				M		M	L	M
CO5									S	M	S	L		M	L	M

UNIT I: INTRODUCTION TO PROJECT MANAGEMENT Projects - Project ideas and preliminary screening. Developments - Project planning to Project completion - Pre-investment phase, Investment phase, operational phase - Governmental Regulatory framework. Capital Budgeting .

UNIT II: STAGES OF PROJECT MANAGEMENT Opportunity studies - prefeasibility studies, functional studies or support studies, feasibility study expansion projects, data for feasibility study. Market and Technical Appraisal : Market and Demand analysis, Market Survey, Demand forecasting. Technical analysis- Materials and inputs, Choice of Technology, Product mix, Plant location, capacity, Machinery and equipment.

UNIT III: APPRAISAL PROCESS Concepts. Time value of money - Present and future value. Appraisal criteria - Urgency, Payback period, Rate of return, Debt service coverage ratio, Net present value, Benefit cost ratio, Internal rate of return, Annual capital charge, Investment appraisal in practice.

UNIT IV: RISK AND PROFITABILITY ANALYSIS Risk analysis- Measures of risk, Sensitivity analysis, and Decision tree analysis. Means of financing, Term Loans, Financial Institutions. Cost of capital. Profitability - Cost of Production, Break-even analysis. Assessing the tax burden and financial projections.

UNIT V: PROJECT PLANNING, IMPLEMENTATION, AND CONTROL Forms of Project Organization, Project Planning, Implementation, and Control - Network construction, CPM, PERT, Development of Project schedule, Crashing of Project Network. Introduction to Foreign collaboration projects - Governmental policy framework, Need for foreign technology, Royalty payments, Foreign investments and procedural aspects.

TEXT BOOK(S):

1. Prasanna Chandra, Projects: Planning, Analysis, Selection, Financing, Implementation, 8th Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2014.

2. M.R. Gopalan, Project Management Core Textbook,(Paper Back) 2nd edition, Wiley India, 2015

REFERENCE BOOK(S):

1. Harold Kerzne, Project Management - Best Practices: Achieving Global Excellence, 3edition, Wiley Publications, 2013.

2. George Ritz, Sidney Levy, Project Management in Construction, Sixth Edition, Mc. Graw Hill Education, 2011.

3. Gary Heerkens, Project Management, Second Edition, Mc. Graw Hill Education, 2013.

4. P.Gopalakrishnan and V.E.Rama Moorthy Text Book of Project Management,1st Edition, Macmillan India Ltd., New Delhi, 2014.

5. John M.Nicholas,

3.5 HSS18R005: Stress Management and Coping Strategies

HSS18R005	Stress Management and Coping Strategies	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To make students to approach stress and its effect in the right manner and to develop the skills required to understand and to overcome the same.

- To make them to be aware of the intricacies of stress and overcoming it through appropriate approaches.

Course Outcomes:

CO1 Understand the responsibility of tackling stress

CO2 Identify and modify the approaches of stress accordingly while dealing with team in workplace.

CO3 Analyze to tackle stress appropriately without ignoring who are prone to face high-pressure working conditions.

CO4 Implement a stress-free work environment.

CO5 Understand the way of behavior and personality as a whole and ensure professional working condition and balanced quality of life.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1								M		M				M	L	M
CO2						S			M					M	L	M
CO3							L	S		L				M	L	M
CO4								S		S		S		M	L	M
CO5						L		M	L	L	L	S		M	L	M

UNIT I: UNDERSTANDING STRESS Meaning - Symptoms: Biological and Behavioural - Work Related Stress - Individual Stress Reducing Stress Burnout.

UNIT II: COMMON STRESS FACTORS TIME Common Sources of Stress Biological, Personality and Environmental Time Management Techniques Importance of planning the day Time management schedule Developing concentration Organizing the Work Area - Prioritizing Beginning at the start Techniques for conquering procrastination Sensible delegation Taking the right breaks Learning to say No.

UNIT III: CRISIS MANAGEMENT Implications People issues Structure issues, environmental issues, psychological fall outs Learning to keep calm Preventing interruptions Controlling crisis Importance of good communication Taking advantage of crisis Pushing new ideas Empowerment

UNIT IV: WORK PLACE HUMOUR Developing a sense of Humour Learning to laugh, role of group cohesion and team spirit, using humour at work, reducing conflicts with humour. Coping Styles Defensive Behaviours and Problem-Solving.

UNIT V: SELF DEVELOPMENT Improving Personality Leading with Integrity, enhancing creativity Effective Decision Making Sensible Communication The Listening Game Managing Self - Meditation for Peace Yoga for Life.

TEXT BOOK(S):

1. D. Girdano and G. Everly., "Controlling Stress and Tension", 9 th Edition, Prentice-Hall, 2013.

2. Greenberg Jerrold S., Comprehensive Stress Management, 14th Edition, McGraw Hill Education, 2017.

REFERENCE BOOK(S):

1. Dr. P.K.Dutta, Stress Management Himalaya Publishing House, First Edition 2010.

2. Schafer, Stress Management, 4th Edition, Cengage Learning, Delhi, 2008

3. Wolfgang Linden, Stress Management, Sage Publication, 1st Edition 2005.

4. Daniel Girdano, Dorothy Dusek and George S. Everly, Controlling Stress and Tension, 8th Edition, Pearson Education, 2009.

5. Brian Luke Seaward, Essentials of managing Stress, 1st edition, Jones & Bartlett Publishers, 2013.

3.6 HSS18R006: Economics for Engineers

HSS18R006	Economics for Engineers	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To introduce students to a broad range of economic concepts, theories and analytical techniques by considering both microeconomics and macroeconomics.

- To analyze demand and market structure at the firm level by understanding government policies and market failures in various levels using case studies.

Course Outcomes:

CO1 Identify and learn economic concepts into market economies.

CO2 Understand the pricing methods; interpret the market factors to determine the price for products or services and to making decisions based on demand factors.

CO3 Understand the major characteristics of different market structures and the implications for the behavior of the firm.

CO4 Measure living standards, inflation, and unemployment for use as economic indicators.

CO5 Understand the role of international trade; analyze the determinants of the relative strengths of monetary policy for sustainable growth of our nation and International Trade.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S		M		M		M		M	L	M
CO2							L	M			S	M		M	L	M
CO3						S			M			L		M	L	M
CO4							L	M			L	M		M	L	M
CO5						L		M		M		M		M	L	M

UNIT I: DEFINITION AND SCOPE OF ECONOMICS Definitions by A. Smith, A. Marshal and L. Robbins, P.Samuels on and their critical examination - Nature and scope of Economics - Micro-economics in relation to other branches of Economics.

UNIT II: PRICING AND LAW OF DEMAND Demand, Factors influencing demand, Elasticity of demand - price, income and cross, concepts and measurement - Break Even Analysis Law of Demand - Price, income and substitution effects - Giffen goods- Pricing Methods.

UNIT III: MARKET STRUCTURE Definition of market. Concepts of product and factor markets. Different types of market: perfect competition, monopoly, imperfect competition, monopolistic, competition and oligopoly. Demand and Supply schedules. Price determination under perfect competition in long and short run. Price determination under monopoly. Discriminating monopoly.

UNIT IV: MACRO-ECONOMICS Meaning, Macro-economic Policy and Its Objectives and Instruments - National Income and Social Accounting - Concepts, components, and measurement - Basic circular flow of income model, Unemployment, trade cycle, Inflation - causes, types, effects and control.

UNIT V: COMMERCIAL AND CENTRAL BANKS Credit creation, monetary policy and tools - Balance of payments - Items in the balance of payments account, equilibrium in the balance of payments.

TEXT BOOK(S):

1. Gupta, S.B., Monetary Economics, S. Chand & Co., New Delhi, 2nd Edition, 2009.

2. Ruddar Datt and K.P.M.Sundharam, Indian Economy, 70th Edition, S.Chand & Company Ltd., New Delhi, 2013.

REFERENCE BOOK(S):

1. D.N.Dewedi, Managerial Economics, 8th Edition, S.Chand & Company Ltd., New Delhi, 2005.

2. Gupta, G.S. Macroeconomics, Theory and Applications, 2nd edition, Tata McGraw-Hill publishing company Ltd., New Delhi, 2004.

3. Macroeconomic Theory and policy, 3rd Edition, Tata McGraw-Hill publishing company Ltd., New Delhi, 2010.

4. Micro Economics, Mas Colell, 1st edition, Oxford Press, Delhi, 2012.

3.7 HSS18R007: Human Resource Management and Labour Law

HSS18R007	Human Resource Management and Labour Law	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To explore key issues related to the management, performance, and development of human resources in the workplace.

- To emphasis on making decisions and developing plans that will enable managers to make the best possible use of their human resources.

- To gain knowledge about manpower planning, analysis and evaluation, recruitment and selection, wages and salaries, training and management development, performance appraisal, and industrial relations.

Course Outcomes:

CO1 Develop skills for employment relations and knowledge to resolve the issues.

CO2 Design an appropriate and suitable role of HR specialist for implementing Human Resource Management policies.

CO3 Manage the manpower to motivate and attract them to retain in the organization

CO4 Develop the skills necessary to hold responsibility of employer and legal system to manage the employment relations

CO5 Understand the applicability of business law on various functional domains this in turn enhancing a strong human relation.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S	L		L	L	L			M	L	M
CO2							L	M	S	S	L			M	L	M
CO3							S					M		M	L	M
CO4						L			M	L	M			M	L	M
CO5									S	M		L		M	L	M

UNIT I: FUNDAMENTALS OF HRM   Human Resource Development Systems-HR environment in India-Functions and Operations of a Personnel Office - Emerging HR Trends - HR information system

UNIT II: HRM FUNCTIONS   Job analysis and job design - HR planning Recruitment - selection and induction- Staff Training and Development-Career planning and Development- Job Evaluation-Performance Appraisal and Potential Evaluation-Wage determination; salary structure-Wage policies and Regulations-Employee benefits and services

UNIT III: MOTIVATING HUMAN RESOURCES   Team and Team work - Collective Bargaining Employee Morale Participative Management Quality Circle Empowerment counseling and mentoring.

UNIT IV: MAINTENANCE OF WORKERS   Compensation Management- Reward system Labour relations Employee Welfare, Safety and Health Employee benefits and services Promotion , Transfers and separation Ethical issues in HR Management and International Human Resource Management - Legal Aspect of Labour

UNIT V: BUSINESS LAW   Factories Act, 1948 - Industrial Dispute Act, 1947 Industrial employment Standing Orders Act, 1946 Trade Union Act, 1926 - Workmen Compensation Act, 1923, Employees State Insurance Act, 1948, Employees Provident Fund and Miscellaneous Provision Act, 1952, Payment of Gratuity Act, 1972. Payment of Wages Act 1936, Minimum wages Act, 1948 Payment of Bonus Act, 1965.Tamil Nadu Shops and Establishments Act.

TEXT BOOK(S):

1. Decenzo and Robbins, Human Resource Management, Wilsey, 12th edition, 2015.

2. Prasad L.M., Human Resource Management, 3rd edition, Sultan Chand, New Delhi, 2014.

REFERENCE BOOK(S):

1. Biswajeet Pattanayak, Human Resource Management, 3rd edition, Eastern Economy Edition, New Delhi, 2010.

2. C.B. Gupta, Human Resource Management, 13th Edition, Sultan Chand, New Delhi 2011.

3. V.S.P. Rao, Human Resource Management, 3rd edition, Excel Books, New Delhi, 2010.

4. Frank B. Cross and Roger LeRoy Miller, The Legal Environment of Business Text and cases, 9th Edition, Cengage Learning, 2015.

3.8 HSS18R008: Entrepreneurship Development

HSS18R008	Entrepreneurship Development	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To focus on the entrepreneurial process and the different kinds of entrepreneurial outcomes by making students to understand about opportunity identification through analysis of industry niches, skills needed in order to turn an opportunity into reality, business plans, launch decisions, and obtaining risk capital.

- To deal with the problems and challenges facing the management of businesses in raising funds, marketing products and services, improving effectiveness and flexibility, and achieving growth.

Course Outcomes:

CO1 Understand the concept of entrepreneurship and which in turn leads to think creatively for new business opportunities to sustain individual as well as social goals.

CO2 Realize entrepreneurial spirit and provide a framework of successful business world with relation to agencies to promote employment opportunities.

CO3 Understand women entrepreneurship and promote a successful business models and explains operational implementations for investment details.

CO4 Understand the role of government in promoting the entrepreneurship among the individuals and organizations as a whole

CO5 Understand emerging concepts of marketing in the emerging global markets and provide more insights into project management and venture promotion

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S		S		S		S		M	L	S
CO2						M	L	S		L	M	L		M	L	S
CO3						L	L	M	S	L		S		M	L	S
CO4						M		M			M	S		M	L	S
CO5										L				M	L	S

UNIT I: INTRODUCTION Concepts of entrepreneur, entrepreneurship and entrepreneur - Characteristics and competencies of a successful entrepreneur - General functions of an entrepreneur - Type of entrepreneurs - Role of entrepreneur in economic development - Distinction between an entrepreneur and a manager - Entrepreneur and Intrepreneur.

UNIT II: GROWTH OF ENTREPRENEURSHIP Emergence of entrepreneurship - Economic and non economic factors for stimulating entrepreneurship development - Obstacles to entrepreneurship development in India - Growth of entrepreneurship in India.

UNIT III: WOMEN AND ENTREPRENEURSHIP Concept of women entrepreneurship - Reasons for growth of woman entrepreneurship - Problems faced by them and remedial measures.

UNIT IV: Concept of women entrepreneurship - Reasons for growth of woman entrepreneurship - Problems faced by them and remedial measures. Concept and meaning of entrepreneurship development - Need for entrepreneurship development programmes (EDPs) - Objectives of EDPs - Organizations for EDPs in India; NIESBUD, SISI their roles and activities.

UNIT V: VENTURE PROMOTION AND PROJECT FORMULATION Concept of projects classification of projects and project report - Project identification and selection - Constraints in project identification - Techniques of Project Identification, Significance contents - formulation of project report - Need for Project Formulation - Elements of project Formulation

TEXT BOOK(S):

1. Michael H Morris, Corporate Entrepreneurship and Innovation in Corporations, 7th Edition, CENGAGE Learning, Delhi, 2010

2. Jerry Katz, Entrepreneurship Small Business, 5th edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.

REFERENCE BOOK(S):

1. Khanka S.S., Entrepreneurial Development, 1st edition, S.Chand and Company Limited, New Delhi, 2013.

2. Prasama Chandra, Projects: Planning, Analysis, Selection, Implementation and Reviews, 2nd edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1996.

3. Robert D. Hisrich, Entrepreneurship, 10th edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2017.

3.9   HSS18R009: Cost Analysis and Control

HSS18R009	Cost Analysis and Control	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To exhibit the concepts on costing by describing its elements, types and cost sheet preparation.l.

- To encompasses the analytical framework that can be applied in cost analysis like Marginal costing, CVP analysis, Break even analysis, etc enabling the students to make decisions on cost parameters.

- To enable students to apply techniques like standard costing, activity based costing, etc to manage and control cost effectively.

Course Outcomes:

CO1 Understand the basics of Costing and preparation of Cost sheet.

CO2 Analyze the cost by applying tools like marginal costing, CVP analysis and other applications.

CO3 Evolve budgets for controlling cost in manufacturing or production centers.

CO4 Define cost standards and critically examining the application of standard costing in a production Centre.

CO5 Understand the application of various strategic cost alternatives including Activity based costing.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						M		S			L	S	M	M		M
CO2							M		S			L	M	M		M
CO3						L				S		M	M	M		M
CO4						M		S			L	S	M	M		M
CO5							M		S			L	M	M		M

UNIT I: INTRODUCTION TO COSTING   Costing, Elements of costing, Types of cost, Preparation of cost sheet.

UNIT II: COST ANALYSIS   Marginal costing, Cost - volume   Profit analysis, Break-Even- Analysis, Break Even - Chart, Applications.

UNIT III: CONTROL TECHNIQUES   Budgeting and Budgetary control, Types of Budgets , Preparation of purchase Budget, Flexible budgets, Cash Budget, Sales Budget, Materials Budget, Master Budget, Zero based Budgeting.

UNIT IV: STANDARD COSTING   Types of Standards, Setting up of standards, Advantages and Criticism of Standard Costing Control through variances.

UNIT V: ACTIVITY BASED COSTING   Transfer Pricing, Target costing, Life Style Costing, Activity Based Costing (only theory).

TEXT BOOK(S):

1. K.Saxena & C.D. Vashist, Advanced Cost Accounting and Cost Systems, 2nd Edition, V.Sultan Chand & Sons Publishers. 2014.

2. S.P. Jain & K. L. Narang, Advances Cost Accounting Kalyani Publishers, 1st Edition, 2017.

REFERENCE BOOK(S):

1. J. Blocher, K. H. Chen, G. Cokins and T. W. Lin., Cost Management: A Strategic Emphasis, Irwin/McGraw-Hill, 3d edition, 2008.

2. Don R. Hansen, Maryanne M. Mowen, Cornerstones of Cost Management, 6th Edition,Cengage Learning, 2015

3. Roger Hussey, Audra Ong, Strategic Cost Analysis, Business Expert Press, 2012

3.10   HSS18R010: Product Design and Development

HSS18R010	Product Design and Development	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To understand the principles and basic concepts of product design and development.

- To study about product's mechanical architecture, selection of materials and production processes and engineering the various components necessary to make the product work.

- To make students to identify market opportunity, creation of product to appeal to the identified market, and finally, testing, modifying and optimizing the product until it is ready for production.

Course Outcomes:

CO1 Understand about the basic concepts related to design and development of New product

CO2 Understand the structured approach towards incorporating quality, safety, and reliability into design.s

CO3 Analyze concepts relating to simulating product performance and manufacturing processes.

CO4 Discover the technologies related to computer aided group technology

CO5 Correlate implications of changes related to Economic analysis.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S	M	L	M		M	L		M	L	S
CO2						S	S		S	M		M		M	L	S
CO3						S	M					S		M	L	S
CO4							M					M		M	L	S
CO5							M	S		L		M		M	L	S

UNIT I: NEW PRODUCT IDEA Definition Design by Evolution and by Innovation - factors to be considered for product design Production-Consumption cycle The morphology of design Primary design Phases and flowcharting. Role of Allowance, Process Capability, and Tolerance in Detailed Design and Assembly Product strategies, Market research identifying customer needs Analysis of product locating ideas for new products, Selecting the right product, creative thinking, curiosity, imagination and brain storming - product specification.

UNIT II: NEW PRODUCT DESIGNING Task - Structured approaches clarification search external and internal systematic exploration conception, selection - methodology benefits. The value of appearance - principles and laws of appearance incorporating quality, safety, and reliability into design. Man-machine considerations Designing for ease of maintenance.

UNIT III: ROLE OF TECHNOLOGY IN DESIGNING Integrating CAE, CAD, CAM tools Simulating product performance and manufacturing process Needs for industrial design-impact Industrial design process Technology driven products - user driven products assessing the quality of the product.

UNIT IV: METHODS AND PRINCIPLES OF DESIGNING Methodologies and tools - Design axioms - Design for assembly and evaluation - Minimum part assessment - Taguchi Method - Robustness assessment - Manufacturing process rules - Designers tool kit - Computer aided group process rules - Designers tool kit - Computer aided group technology - Failure Mode Effective Analysis Design for minimum number of parts Development of modular design Minimising part variations Design of parts to be multifunctional, multi-use, ease of fabrication Poka Yoka principles. (12 hours)

UNIT V: FEASIBILITY ANALYSIS Estimation of manufacturing cost cost procedures Value Engineering - reducing the component cost and assembly cost minimizing the system complexity Basics and Principals of prototyping Economic Analysis: Break

even analysis. Classes of exclusive rights Patents Combination versus aggregation Novelty and Utility Design patents Paten disclosure Patent application steps - Patent Office prosecution - Sales of paten rights - Trade marks copy rights. (12 hours)

TEXT BOOK(S):

1. Karl.T.Ulrich, Steven D.Eppinger, Product Design and Development, McGraw Hill International, 6th Edition, 2016.

2. A.K.Chitale and R.C.Gupta, Product Design and Manufacturing, 3rd edition, Prentice Hall of India Private Limited, New Delhi, 2005.

REFERENCE BOOK(S):

1. Richard Crowson, Product Design and Factory Development, 2nd Edition, crc Press, 2005.

2. Thomke, Stefan, and Ashok Nimgade. "IDEO Product Development." Boston, MA: Harvard Business School Case 9-600-143, June 22, 2000.

3. George E.Dieter, Linda C.Schmidt, Engineering Design, McGraw-Hill Higher Education, 4th Edition, 2012.

4. Kevin Otto, Kristin Wood, Product Design, Indian Reprint 2004, Pearson Education

3.11 HSS18R011: Business Process Reengineering

HSS18R011	Business Process Reengineering	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To clarify the principles and basic concepts of Business Process Engineering by focusing on both quantitative and qualitative analytical skills and models essential to operations process design, management, and improvement in both service and manufacturing oriented companies.

- To prepare the students to play a significant role in the management of a world class company which serves satisfied customers through empowered employees, leading to increased revenues and decreased costs.

Course Outcomes:

CO1 Explain the basic concepts related to Business Process Reengineering.

CO2 Apply the methodologies and tools used for Business Process Reengineering.

CO3 Analyze the concepts relating to benefit/cost analysis and its impact on the business organizations.

CO4 Understand the need for assessment of business re-engineering and the factors contributing to its success.

CO5 Identify the best practices used in Business Process Reengineering with illustrations from corporate world.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S	M		L	M	L	M		M	L	S
CO2						L		L	M	M	S	S		M	L	S
CO3							S	L	L	L				M	L	S
CO4						S	L			M				M	L	S
CO5						S	M	L	M	M	M	L		M	L	S

UNIT I: BASIC CONCEPTS   Introduction to BPR Definition; the paradigm shifts in production; the positioning concept; the re-engineering visions; the benefits of business re-engineering.

UNIT II: METHODOLOGIES FOR BPR   Methodologies and Tools for BPR, Process management; dynamic business re-engineering change framework; steps to reengineer the process.

UNIT III: MODELLING THE BUSINESS   Tools used in Modelling the Business: flow-charting, business activity maps, relational diagrams, benefit/cost analysis. The enabling role of information technology in business re-engineering.

UNIT IV: CHANGE MANAGEMENT   Change Management, Planned changes in business re-engineering projects; challenges of business change; business change development. Success factors in re-engineering. The assessment of business re-engineering.

UNIT V: BEST PRACTICES IN BPR   Best Practices in BPR, Case studies: Bell Atlantic, Nissan, Chrysler, Xerox, and Hewlett Packard etc.

TEXT BOOK(S):

1. Ali K. Kamrani, Maryam Azimi (2011). New Methods in Product Design: New Strategies in Reengineering (Engineering and Management Innovation). CRC Press. 1st ed.

2. Bassam Hussein (2008). PRISM: Process Reengineering Integrated Spiral Model. VDM Verlag Dr. Mueller e.K

REFERENCE BOOK(S):

1. Harmon, P. (2007), Business Process Change : A Guide for Business Managers and BPM and Six Sigma Professionals, Elsevier/Morgan Kaufmann Publishers.

2. R. Anupindi et al. (2006), Managing Business Process Flows: Principles of Operations Management, Pearson Education Inc.

3.12 HSS18R012: Political Economy

HSS18R012	Political Economy	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To provide an introduction to the political economy of India.

- To examine the interplay of politics and economics and explore the key themes such as globalization, economic reform, poverty, redistribution, federalism, political protest, public goods delivery, gender, and ethnic politics.

- To discuss a number of the themes likes functions of institutions, rights, Party Systems and challenges.

Course Outcomes:

CO1 Explain the key concepts of political economy analyze the significant developments in the political ideologies.

CO2 Describe the salient features of the constitution of India and its functions and also interpret, integrate and critically analyze the fundamental rights duties and responsibilities.

CO3 Understand the Political party system their evolution and role in the economy

CO4 Understand the various ideological of Indian Political Thoughts

CO5 Understand and appreciate situations of India undergoing major economic and social transformation

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S	S		L	M	M	L		L	L	S
CO2						S				S				L	L	S
CO3						L	S	S	L	S	M	L		L	L	S
CO4						S	S		L	M	M	L		L	L	S
CO5						S				S				L	L	S

UNIT I: INTRODUCTION TO POLITICAL ECONOMY   Political Economy as a Method, perspectives, Politics as Reproduction of Social Relations, State and Social Opportunity, Politics of Rent Seeking -Evolution of State in India: Historical Roots of planning, Redistribution.

UNIT II: INDIAN CONSTITUTION   The Pre-ample- Fundamental rights and duties, Directive Principles- Offices of the President, Prime Minister, Cabinet Government, Chief Election Commissioner, and Governor Parliamentary system and Procedures - The Judiciary system.

UNIT III: PARTY SYSTEM   National and regional political parties, ideological and social bases of parties; patterns of coalition politics; Pressure groups, trends in electoral behaviour; changing socio- economic profile of Legislators.

UNIT IV: INDIAN POLITICAL THOUGHT   Political Ideologies: Liberalism, Socialism, Marxism, Fascism, Gandhism and Feminism - Dharamshastra, Arthashastra and Buddhist traditions; Sir Syed Ahmed Khan, Sri Aurobindo, M.K. Gandhi, B.R. Ambedkar, M.N. Roy.

UNIT V: CHALLENGES TO INDIAN DEMOCRACY   Uneven Development of Regions in India Communalism Regionalism Violence Corruption environmental degradation- illiteracy Population.

TEXT BOOK(S):

1. Charles Sackrey, Geoffrey Schneider, Janet Knoedler, Introduction to Political Economy, Dollars & Sense, 8th Edition, 2016.

2. Robert.S.Dimand, Review of Political Economy: An Introductory Text, 1st Edition, Routledge, 2008.

REFERENCE BOOK(S):

1. Barry R. weingast and Donald a.Wittman, Handbook of Political Economy, 1st Edition, Oxford University Press, New York, 2006.

2. Ed. Sanjay Ruparelia; Sanjay Reddy; John Harriss & Stuart Corbridge, Understanding Indias New Political Economy: A Great Tranformation, Routledge 1st Edition edition 2011.

3. M.Laxmikanth, Indian Polity, 4th Edition, McGraw Hill Education, New Delhi,2017.

4. Niraja Gopal Jayal, Pratap Bhanu Mehra, The Oxford Companion to Politics in India: Student Edition, Oxford Press, 2011.

3.13 HSS18R013: Professional Ethics

HSS18R013	Professional Ethics	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To have an understanding of the ethical problems and principles through theory, historical case studies and research and presentation.

- To allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers.

Course Outcomes:

CO1 Identify the multiple ethical interests at stake in a real-world situation or practice

CO2 Assess their own ethical values and the social context of problems

CO3 Develop critical thinking skills and professional judgment and understand practical difficulties of bringing about change

CO4 Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work

CO5 Manage differing opinions on complex ethical scenarios. It's important for those confronted with ethical challenges to be able to hold multiple conflicting points of view, without necessarily adhering to any of them

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						L		S	M	M		L		M	S	M
CO2									S	M	M	L		M	S	M
CO3						M		L		L				M	S	M
CO4							S			M				M	S	M
CO5								M		M				M	S	M

UNIT I: ENGINEERING ETHICS Functions of Being a Manager Stock holder and stakeholder management Ethical treatment of employees - ethical treatment of customers- supply chain management and other issues.

UNIT II: ENGINEERING AS SOCIAL EXPERIMENTATION Senses of Ethics Variety of moral issues Types of inquiry Moral dilemmas Moral Autonomy Kohlbergs theory Gilligans theory Consensus and Controversy Professions and Professionalism Professional ideals and virtues Theories about right action Self-interest Customs and religion Use of Ethical Theories.

UNIT III: ENGINEER RESPONSIBILTY FOR SAFETY Corporate social responsibility - Collegiality and loyalty Respect for Authority Collective Bargaining Confidentiality Conflicts of Interest Occupational Crime Professional Rights Employee Rights Discrimination.

UNIT IV: RESPONSIBILITY AND RIGHTS Moral imagination, stake holder theory and systems thinking - One approach to management Decision making Leadership.

UNIT V: GLOBAL ISSUES Multinational Corporations Environmental Ethics Computer Ethics Weapons Development Engineers as Managers Consulting Engineers Engineers as Expert Witnesses and Advisors Moral Leadership Sample code of conduct.

TEXT BOOK(S):

1. Mike Martin and Roland Schinzinger, Introduction to Engineering Ethics, 2nd Edition, McGraw Hill Higher Education, New Delhi, 2010.

2. Charles D Fledderman, Engineering Ethics, 4th Edition, Pearson Education, Delhi, 2011.

REFERENCE BOOK(S):

1. R.S.Naagarazan, Text book on Professional Ethics and Human Values, New Age International, 2007.

2. Gail Baura, Engineering Ethics- An Industrial Perspective, 1st Edition, Academic Press, 2006.

3. Charles e. Harris , Michael s. Pritchard and Michael J. Rabins Texas , Engineering Ethics- Conecpts and Cases, 4th Edition, Cengage Learning, 2009.

4. Charles Byms Fleddermann, Engineering Ethics, 3rd Edition, Pearson Prentice Hall, 2008.

5. Govindarajan M, Natarajan S, Senthil Kumar V. S, Engineering Ethics, Prentice Hall of India, New Delhi, 2013.

6. Dr.V.Jeyakumar, Professional Ethics in Engineering, Lakshmi Publication, Chennai, 2014.

3.14 HSS18R014: Operations Research

HSS18R014	Operations Research	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To provide students with ability to understand and analyze managerial problems in industry so that they are able to use resources like capitals, materials, staffing, and machines more effectively.

- To provide the knowledge of formulating mathematical models for quantitative analysis of managerial problems in industry.

- To enhance the skills in the use of operations research approaches and computer tools in solving real problems in industry.

Course Outcomes:

CO1 Identify and develop operational research models from the verbal description of the real System.

CO2 Build and solve Transportation Models and Assignment Models

CO3 Evolve mathematical software to solve the proposed models.

CO4 Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision making processes in Management Engineering.

CO5 Design new simple models, like: CPM, MSPT to improve decision making and develop critical thinking and objective analysis of decision problems.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1						S	M		S			S	S			
CO2						L		L		S		L	S			
CO3					M	M				S		L	S			
CO4						S	M		S	S		M	S			
CO5						S	M		S			S	S			

UNIT I: INTRODUCTION TO LINEAR PROGRAMMING Introduction to applications of operations research in functional areas of management - Linear Programming - formulation, solution by graphical and simplex methods (Primal - Penalty, Two Phase), Special cases - Dual simplex method.

UNIT II: TRANSPORTATION MODELS AND ASSIGNMENT Transportation Models (Minimising and Maximising Cases) Balanced and unbalanced cases Initial Basic feasible solution by N-W Corner Rule, Least cost and Vogels approximation ethods - Check for optimality - Solution by MODI / Stepping Stone method - Cases of degeneracy - Transshipment Models - Assignment Models (Minimising and Maximising Cases) Balanced and Unbalanced Cases - Solution by Hungarian and Branch and Bound Algorithms - Travelling Salesman problem - Crew Assignment Models.

UNIT III: INTEGER LINEAR PROGRAMMING AND GAME Solution to pure and mixed integer programming problem by Branch and Bound and cutting plane algorithms - Game Theory - Two person Zero sum games - Saddle point, Dominance Rule, graphical and LP solutions.

UNIT IV: REPLACEMENT MODELS AND DECISION THEORY Replacement Models-Individuals replacement Models (With and without time value of money) Group Replacement Models - Decision making under risk Decision trees Decision making under uncertainty.

UNIT V: PROJECT MANAGEMENT METHOD AND SIMULATION PERT / CPM Drawing the network, computation of processing time, floats and critical path. Resource leveling techniques - Application of simulation techniques for decision making.

TEXT BOOK(S):

1. Kalavathy S, Operations Research, Vikas Publishing House, 4TH Edition, 2013.

2. Paneerselvam R., Operations Research, Prentice Hall of India, 2ND Edition, 2006.

3. Tulsian P.C, Vishal Pandey, Quantitative Techniques (Theory and Problems), Pearson Education, Asia, First Indian Reprint 2002.

REFERENCE BOOK(S):

1. D.S.Hira, Problems in Operations Research, Kindle Edition, S.Chand, 2010.

2. Prem Kumar Gupta and D.S. Hira, Operations Research,S.Chand, 2016.

3. R.C.Mishra,Principles of Operations Research, 1st Edition, New Age International 2011.

4. Kanti Swarup, P.K.Gupta and Man Mohan, Operations Research, 15th Edition, Sultan Chand and Sons 2010.

3.15 HSS18R015: Total Quality Management

HSS18R015	Total Quality Management	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

Course Objectives:

- To provide students with the knowledge to understand the philosophy and core values of Total Quality Management (TQM).

- To determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization; apply and evaluate best practices for the attainment of total quality.

- To make students to critically appraise management techniques, choose appropriate statistical techniques for improving processes and write reports to management describing processes and recommending ways to improve them.

Course Outcomes:

CO1 Understand the role and nature of quality in evolving international economic conditions

CO2 Apply the Principles of Quality Management for real time problems.

CO3 Analyze the quality encounter process, including supporting facilities and customer requirements/characteristics

CO4 Classify quality measurement methods and continuous improvement process

CO5 Design Management strategy methods, including identification, development, implementation and feedback processes

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	L					S				L	L			S		
CO2	M						L			L		M		S		
CO3						M	M	L	L	L	L			S		
CO4	S	L							S	L	M	S		S		
CO5							M	L	L	L	L	L		S		

UNIT I: INTRODUCTION TO QUALITY MANAGEMENT

Definitions TOM framework, benefits, awareness and obstacles - Quality vision, mission and policy statements - Customer Focus customer perception of quality, Translating needs into requirements, customer retention. Dimensions of product and service quality. Cost of quality.

UNIT II: PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi, Shingeo and Walter Shewhart - Concepts of Quality circle, Japanese 5S principles and 8D methodology.

UNIT III: STATISTICAL PROCESS CONTROL AND PROCESS CAPABILITY

Meaning and significance of statistical process control (SPC) construction of control charts for variables and attributed - Process capability meaning, significance and measurement Six sigma concepts of process capability - Reliability concepts definitions, reliability in series and parallel, product life characteristics curve - Business process re-engineering (BPR) principles, applications, reengineering process, benefits and limitations.

UNIT IV: TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT

Quality functions development (QFD) Benefits, Voice of customer, information organization, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) requirements of reliability, failure rate, FMEA stages, design, process and documentation.

UNIT V: TAGUCHI TECHNIQUES

Taguchi techniques introduction, loss function, parameter and tolerance design, signal to noise ratio - Seven old (statistical) tools - Seven new management tools - Bench marking and POKA YOKE.

TEXT BOOK(S):

1. Poornima M.Charantimath., Total quality management, Pearson Education, 2ND Edition, 2011.

2. Dale H.Besterfield et al, Total Quality Management, Perarson Education, Thrid edition, (First Indian Reprints 2004).

REFERENCE BOOK(S):

1. Shridhara Bhat K, Total Quality Management Text and Cases, Himalaya Publishing House, First Edition, 2002.

2. Jams R. Evans, Total Quality: Management, Organisation and strategy, 4th Edition, South- Western College, 2004.

3. Vincent K.Omachonu, Joel E.Ross, Principles of Total Quality, 3rd Edition, CRC Press, 2004.

4. S.Rajaram, M.Sivakumar, Total Quality Management, Wiley Publishers, 1st Edition, 2008.

3.16 HSS18R016: Advanced Softskills

HSS18R016	Advanced Softskills	L	T	P	C
		3	0	0	3
Course Category:	Humanities Electives				
Course Type:	Theory				
Pre-requisite:	NILL				

UNIT I: EFFECTIVE COMMUNICATION Comprehending Ability, Business Vocabulary, Speed Reading, Non-Verbal Communication, Cross Cultural Communication, Meeting Management, Technology trend awareness

UNIT II: QUANTITATIVE ABILITY Time & Work, Time-Speed-Distance, Permutation & Combination Probability, Geometry & Mensuration, Number Properties, Ratio & Proportion, Mixtures & Alligation, Percentages, Profit-Loss-Discount, Averages, Progression, Higher Mathematics

UNIT III: LOGICAL ABILITY Non-Verbal Reasoning, Deductive & Inductive Reasoning, Binary Logic, Number Series, Clocks, Calendars

UNIT IV: VERBAL ABILITY Reading Comprehension, Parajumbles, Critical Reasoning, Subject-Verb Agreement, Synonyms & Antonyms, Grammar Reading Comprehension & Logic Miscellaneous Verbal questions

UNIT V: DATA INTERPRETATION Line Charts, Bar Charts, Pie Charts, Venn diagrams, Caselets, Data tables.

4 Basic Engineering

4.1 CSE18R108: IT Infrastructure Landscape Overview

CSE18R108	IT Infrastructure Landscape Overview	L	T	P	C
		3	0	0	3
Course Category:	Basic Engineering				
Course Type:	Theory				
Pre-requisite:	NILL				

UNIT I: DATABASE OVERVIEW   Understanding Database types, Database Terminology, Characteristics Of Databases, Introduction To Database Management Systems, Types Of Database Management Systems, Database Security And Recovery, Data Mining, Data Warehousing, And Data Marts, Data Mining (DM), Data Warehousing and Data Marts, SQL Overview , Introduction to SQL, History of SQL, Relational database schema, Data Types, Dates and Times, Creating a table, Default Values, NULL values, Constraints, Referential integrity, Creating a schema, Creating a view, Creating other database objects, Modifying database objects, Renaming database objects, Data manipulation with SQL, Selecting data, Ordering the result set, Cursors, Inserting data, Deleting data, Updating data, Table joins, Inner joins , Equi-join, Natural join, Cross join, Outer joins, Left outer join, Right outer join, Full outer join, Union, intersection, and difference operations, Union, Intersection, Difference (Except), Relational operators, Grouping operators, Aggregation operators, HAVING Clause, Sub-queries, Sub-queries returning a scalar value, Sub-queries returning vector values, Correlated sub-query, Sub-query in FROM Clauses, Mapping of object-oriented concepts to relational concepts, JDBC, What is JDBC?, JDBC Architecture:, Common JDBC Components: Database APIs, ODBC and the IBM Data Server CLI driver, Indexes , Clustered And Non-clustered Indexes, Failure Management With Db2 Cluster Services.

UNIT II: STORAGE OVERVIEW   Storage Networking Technology, Types Of Storage System, FC-AL (Fibre Channel Arbitrated Loop), Fabric, Storage Area Network, Zoning, Storage Virtualization.

UNIT III: SYSTEMS & DIRECTORY SERVICES OVERVIEW   Server Technology, Operating System, Virtualization, Hypervisor, I/O Virtualization, Partitioning, Server Deployment, Server Management Console, Server Availability Concepts And Techniques, Server Workload. Directory Server Concepts, Directory, LDAP PROTOCOL, Overview of LDAP, LDAP Architecture, LDAP Models, LDAP Replication Topologies, LDAP Data Interchange Format (LDIF).

UNIT IV: NETWORK SECURITY AND OVERVIEW   Network Overview, Network Topologies, Tree Topology, Firewalls, Switching Concepts , What Is Routing?

, Virtual Lans, Security Basics, Loss Of Privacy, Loss Of Integrity, Security Technology, Active Audit , Secure Messaging, Data Security, Network Security.

UNIT V: APPLICATION AND MIDDLEWARE OVERVIEW Introduction To Common Messaging System (MQ SERIES), Application Integration Business Need, Middleware, Message Oriented Middleware, Synchronous interaction, Asynchronous interaction, Coupling, Reliability, Scalability, Availability, IBM Websphere MQ, Websphere MQ Objects, Web Tier Deployment, Application Servers And Clustered Deployment, EMAIL, Lotus Architecture, Lotus Domino Server Types, Lotus Notes Clients, Types of Certificates, DATA WAREHOUSING, Warehouse Modeling Approaches , Basic Concepts, Dimension, Basic OLAP Operations.

TEXT BOOK(S):

1. IT Infrastructure Landscape Overview (IBM ICE Publication)

4.2   CSE18R153: Programming in C

CSE18R153	Programming in C	L	T	P	C
		2	0	2	3
Course Category:	Basic Engineering				
Course Type:	Theory With Practical				
Pre-requisite:	NIL				

Course Objectives:

- To make the students to understand the basic concepts of programming language, rules to be followed while writing a program and how to compile and execute C programs.

Course Outcomes:

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

CO1 Interpret the basic programming concepts and syntax of C language

CO2 Solve simple problems using C arrays and strings.

CO3 Apply modular programming concept of C to solve given problem.

CO4 Develop efficient code using memory allocation techniques.

CO5 Create user defined data types and files to solve real world problems.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S	S	S										S	S		S
CO2	S	S	S										S	S		S
CO3	S	S	S	S	S		S				S	S	S	S		S
CO4	S	S	S										S	S		S
CO5	S	S	S	S	S		S				S	S	S	S		S

UNIT I: INTRODUCTION TO PROGRAMMING Introduction to component of a Computer System(disks, memory, processor, where a program is stored and executed, operating system, compiler etc.,) - Representation of Algorithm: Flowchart/ Pseudocode with example - Syntax and Logical error in Compilation.-Structure of C program - variable-Data type in C - Tokens - Operators and expressions - Input and output - Control statements : Selection - Iteration - Goto statement - Nested loops.

UNIT II: ARRAYS AND STRINGS Introduction - One dimensional and two dimensional arrays Declaration of arrays - Initializing and Accessing array elements Strings: One dimensional character arrays - Declaration and String Initialization - String Manipulation - Multidimensional Arrays - Arrays of Strings

UNIT III: FUNCTIONS AND RECURSION Introduction - Function Prototypes - Passing Arrays to Functions - Scope and Extend - Storage Classes - Inline Functions-Parameter passing in functions -call by value- idea of call by reference- Recursion- Recursion, as a different way of solving problems.(Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

UNIT IV: POINTERS Introduction - Address of operands Pointer: Declaration and Initialization - Arrays and Pointers - Pointers and Strings - Pointer Arithmetic - Pointers to Pointers - Array of Pointers - Pointer to Array - Dynamic Memory Allocation (DMA).

UNIT V: USER DEFINED DATA TYPES AND FILES Introduction Structures - Declaration and Initialization of Structures - Arrays within Structure - Structure and Pointers - Structures and Functions Union - Enumeration types - Using Files in C - Working with Text Files - Working with binary files.

TEXT BOOK(S):

1. Pradip Dey and Manas Ghosh,Programming in C,Oxford University Press, Third Edition 2018.

2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill, Third Edition, 2010.

REFERENCE BOOK(S):

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India, Second Edition 1988.

2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill, Seventh Edition 2017.

List of Experiments:

1. Program for Simple computational problems using arithmetic expressions

2. Programs using Branching and logical expressions

3. Programs using Loops, while and for loops(Iterative problems) e.g., sum of series

4. Programs using 1-D and 2-D arrays.

5. Programs using string handling functions.

6. Programs using functions with various parameter passing mechanisms.

7. Programs using recursive functions.

8. Programs using pointers and dynamic memory allocation functions for 1-D and 2-D arrays.

9. Programs to create user defined data like structures and unions to represent real world problems

10. Programs for creating text files to store and manipulate data.

4.3 EEE18R171: Basic Electrical and Electronics Engineering

EEE18R171	Basic Electrical and Electronics Engineering	L	T	P	C
		3	1	2	5
Course Category:	Basic Engineering				
Course Type:	Integrated Course				
Pre-requisite:	NILL				

Course Objectives:

- To focus the fundamental ideas of the Electrical and Electronics Engineering by providing wide exposure to the basic concepts of Electrical and Electronics Engineering such as DC Circuits, AC Circuits, electrical machines, measuring instruments, electrical installation, Basic Electronic Devices and various electronic circuits such as rectifiers, amplifiers, oscillators, etc.

Course Outcomes:

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

CO1 Apply the basic laws of electricity in DC and AC circuits

CO2 Describe the construction and operation of static and rotating electrical machines

CO3 Explain the functioning of measuring instruments and Low Voltage Electrical Installations

CO4 Describe the constructional features and operation of fundamental electronic devices

CO5 Explain the characteristics of electronic circuits

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	M	M		M	M	L		L	M	L			M			
CO2	M	M		M	M	L		M	L	M			M			
CO3	M			M	M	L		L	M	L			S			
CO4	S	M											M			
CO5	S	S	L	M	M	L	M	M	L	M			M			

UNIT I: DC CIRCUITS AND AC CIRCUITS Electrical quantities - resistors - inductors - capacitors - Ohms Law - Kirchhoffs Laws - series and parallel circuits - analysis of DC circuits - mesh, nodal - simple problems- Sinusoidal functions - phasor representation - RMS and Average values - form and peak factors - RLC series circuits - power and power factor-concept of three phase system.

UNIT II: ELECTRICAL MACHINES Construction and principle of operation of DC machines DC generator EMF equation Types DC motor Types - single phase transformer Construction and operation EMF equation - Alternator - three phase induction motor Construction Types - single phase induction motor Construction Working - types.

UNIT III: MEASURING INSTRUMENTS AND ELECTRICAL INSTALLATION Measuring Instruments: Moving coil and moving iron instruments - dynamometer type wattmeter - Induction type energy meter Electrical Installation: Components of LT Switchgear - Switch Fuse Unit (SFU) MCB ELCB MCCB - Domestic wiring - accessories - types - staircase wiring - fluorescent tube circuits Earthing

UNIT IV: ELECTRONIC DEVICES Basic concepts of PN junction diodes - Zener diode - bipolar junction transistor - Unipolar devices - FET, MOSFET, UJT - ThyristorSCR and Triac, Photoelectric Devices-Photo diode and Photo transistor

UNIT V: ELECTRONIC CIRCUITS Half wave and full wave rectifier Transistor as an amplifier RC- phase shift oscillator - RC integrator and differentiator circuits - diode clampers and clippers - multivibrators - Schmitt trigger

TEXT BOOK(S):

1. V.K. Mehta, Principles of Electrical Engineering and Electronics, S. Chand & Company Ltd, 2012

2. Kothari D P and Nagrath I J, "Basic Electrical Engineering", McGraw Hill, 2009.

3. Mithal G K, Electronic Devices & Circuits, Khanna Publications, 1997

REFERENCE BOOK(S):

1. T. Thyagarajan, Fundamentals of Electrical and Electronics Engineering, SciTech publications (Ind.) Pvt. Ltd., 3rd Edition, 2015.

2. Muraleedharan K.A, Muthususbramanian R and Salivahanan S, "Basic Electrical, Electronics and Computer Engineering" Tata McGraw Hill,2006

3. Shanthakumar S.R.J, Basic Mechanical Engineering, Third Revised Edition (Reprint 2009), Anuradha Publications, Kumbakonam, 1999.

4. Rajput R. K., Basic Mechanical Engineering, Fourth edition, Tata McGraw Hill Publishing Co., New Delhi, 2007.

List of Experiments:

1. Verification of Kirchoffs Laws.

2. Verification of Mesh and Nodal analysis

3. Measurement of electrical quantities-voltage current, power & power factor in RLC circuit

4. Open circuit characteristics of Separately excited DC Generator

5. Draw the characteristic between output power versus efficiency of DC shunt motor

6. Verification of turns ratio on single phase transformer

7. Study of basic electrical installation components for LT switchgear

8. Residential house wiring using fuse, two way switches and lamp

9. Wiring layout for Fluorescent lamp

10. VI characteristics of PN junction diode

11. VI Characteristics of Zener diode

12. Construct and demonstrate the Light sensor using Photo Transistor

13. Design a diode based Half wave and Full wave rectifier

14. Study of Zener diode as voltage regulator

15. Study of Clipping & Clamping circuit

4.4 CSE18R172: Data Structure and Algorithms

CSE18R172	Data Structure and Algorithms	L	T	P	C
		3	0	2	4

Course Category:	Basic Engineering
Course Type:	Integrated Course
Pre-requisite:	CSE18R171/Programming For Problem Solving

Course Objectives:

- To make the students to follow the systematic way of solving real world problems by selecting an appropriate data structures.

Course Outcomes:

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

CO1 Perceive the role of algorithms and programming constructs as a systematic and efficient way of solving problems.

CO2 Evaluate and create Abstract Data Types and linear data structures

CO3 Design and implement non-linear data structures such as trees

CO4 Interpret and analyze efficiency of various searching and sorting techniques.

CO5 Construct solutions to various real life applications using graphs.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S			
CO2	S			S	S								S			
CO3	S	S		S	S						M		S	S		
CO4	S	S		S	S								S	S		
CO5	S	S	S	S	S	M	M				M	M	S	S		S

UNIT I: INTRODUCTION   Basic Terminologies: Elementary Data Organizations, Data Structure, Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques, and their complexity analysis.

UNIT II: STACKS AND QUEUES   ADT Stack and its operations: Algorithms and their complexity, analysis, Applications of Stacks: Expression Conversion and evaluation corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT III: LINKED LISTS   Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis. Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

UNIT IV: SORTING AND HASHING   Objective and properties of different sorting algorithms, Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort ,Performance and Comparison among all the methods, Hashing.

UNIT V: GRAPH AND TREE ALGORITHMS   Basic Terminologies and Representations Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms Floyds, Warshall, Transitive closure, Minimum Spanning Tree, Prims, Kruskals, Topological sorting.

TEXT BOOK(S):

1. Fundamentals of Data Structures, Third Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press,2010

REFERENCE BOOK(S):

1. Algorithms, Data Structures, and Problem Solving with C++, Third Edition by Mark Allen Weiss, Addison-Wesley Publishing Company ,2011.

2. How to Solve it by Computer, 2nd Impression by R. G. Dromey, Pearson press,2010.

List of Experiments:

1. Programs using structures, arrays, pointers to structures and passing them as parameters to functions.

2. Programs for various types of recursion.

3. Program for linked list and its operations.

4. Program for array implementation of stack and queue.

5. Program for various applications of stack.

6. Program for linked list implementation of stack and queue.

7. Program for binary search tree and its operations.

8. Program for various sorting and searching techniques.

9. Program for Dijikstras shortest path algorithms in graphs.

10. Program for finding minimum spanning tree in using Kruskal and Prim algorithms

4.5 CSE18R174: Computer Architecture and Organization

CSE18R174	Computer Architecture and Organization	L	T	P	C
		3	0	2	4
Course Category:	Basic Engineering				
Course Type:	Integrated Course				
Pre-requisite:	NIL				

Course Objectives:

- To make acquainted the students about the functional units of computer and how each unit works along with the architectural and performance issues.

Course Outcomes:

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

CO1 Examine functional units of computer, bus structure and addressing mode

CO2 Apply the knowledge of algorithms to solve arithmetic unit problems.

CO3 Demonstrate single bus, multiple bus organization and pipelining concepts

CO4 Analyze RAM, ROM, Cache memory and virtual memory concepts

CO5 Evaluate the various I/O interfaces

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S			
CO2	S			S	S								S			S
CO3	S	S		S	S						M		S	S		
CO4	S	S		S	S								S	S		
CO5	S	S	S	S	S	M	M				M	M	S	S		S

UNIT I: BASIC STRUCTURE OF COMPUTERS Functional Units - Basic Operational Concepts - Bus Structures - Software Performance Memory Locations and Addresses Memory Operations Instruction and Instruction Sequencing Addressing Modes Assembly Language Basic I/O Operations Stacks and Queues.

UNIT II: ARITHMETIC UNIT Addition and Subtraction of Signed Numbers Design of Fast Adders Multiplication of Positive Numbers - Signed Operand Multiplication and Fast Multiplication Integer Division Floating Point Numbers and Operations.

UNIT III: BASIC PROCESSING UNIT Fundamental Concepts Execution of a Complete Instruction Multiple Bus Organization Hardwired Control Micro Programmed Control - Pipelining Basic Concepts Data Hazards Instruction Hazards Influence on Instruction Sets Data Path and Control Consideration Superscalar Operation.

UNIT IV: MEMORY SYSTEM Basic Concepts Semiconductor Rams - Roms Speed - Size and Cost Cache Memories - Performance Consideration Virtual Memory - Memory Management Requirements Secondary Storage.

UNIT V: I/O ORGANIZATION Accessing I/O devices Interrupts Direct Memory Access Buses Interface Circuits Standard I/O Interfaces (PCI, SCSI, USB).

TEXT BOOK(S):

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, McGraw-Hill, 5th Edition 2016.

REFERENCE BOOK(S):

1. William Stallings, Computer Organization and Architecture Designing for Performance, PHI pvt Ltd, 10th Edition, 2016.

2. J L Hennessy,David A Patterson,Computer Architecture A quantitative approach, Elsevier,4th Edition 2010.

3. David A.Patterson and John L.Hennessy, Computer Organization and Design: The hardware software interface, Morgan Kaufmann, 4th Edition, , 2009.

4. John P.Hayes, Computer Architecture and Organization, McGraw Hill, 3rd Edition, 2017.

List of Experiments:

1. Implementation of booth algorithm

2. Implementation of sequential circuit binary multiplier

3. Implementation of bit pair recording

4. Implementation of carry save addition

5. Implementation of Integer restoring division

6. Implementation of Integer Non restoring division

7. Implementation of twos complement addition

8. Implementation of twos complement subtraction

9. Design of half adder circuit using basic gates

10. Design of full adder circuit using basic gates

11. Design of ripple carry adder

12. Design of carry look ahead adder

4.6 ECE18R277: Digital Electronics

ECE18R277	Digital Electronics	L	T	P	C
		3	0	2	4
Course Category:	Basic Engineering				
Course Type:	Integrated Course				
Pre-requisite:	NIL				

Course Objectives:

- Digital Electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by two discreet voltages or logic levels. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world electronics. Digital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, etc.

Course Outcomes:

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

CO1 Recall the different number systems and demonstrate the simplification of Boolean expressions using Boolean algebra & K-Map method.

CO2 Demonstrate the working of logic families with its characteristics.

CO3 Design combinational digital circuits to meet a given specification and to represent logic functions in multiple forms.

CO4 Illustrate the concept of sequential circuits with its characteristic equation and excitation Table.

CO5 Explain the role of memory in computer and the different types of memory.

Mapping of Course Outcomes with PO.PSO:

	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	S											
CO2	S	S	M	M								
CO3	S	S	M						M			M
CO4							M					
CO5									M			M

UNIT I: NUMBER SYSTEMS AND BOOLEAN ALGEBRA   Number Systems, Arithmetic and Codes: Positional number system, Base conversions, signed numbers, Fixed and floating-point numbers, Basic Arithmetic Operations, Error Detection and Correction Codes, Alphanumeric Codes, Boolean algebra and Switching Functions: Boolean functions, Logic gates, Simplification of switching functions: 4-variable K-map.

UNIT II: LOGIC FAMILIES   Logic Families and Characteristics, MOS inverter, RTL, DTL, TTL, ECL, I2C, CMOS, BiCMOS Logic, TTL to CMOS interface, CMOS to TTL interface, IEEE/ANSI representation of Logic families.

UNIT III: COMBINATIONAL LOGIC   Combinational Logic: Analysis Procedure and Synthesis Procedure, Combinational Circuits: Arithmetic circuits, Binary adders: Half adder, Full adder, Half Substractor, Full Substractor, Magnitude Comparator, Encoders and Decoders, Multiplexer and Demultiplexer, Code Converters, Parity Bit Generators and Checkers.

UNIT IV: SEQUENTIAL LOGIC   Basic Bistable Element, Latches, Pulse-Triggered Flip-Flops, Edge-Triggered Flip-Flops, Asynchronous inputs, Applications of Flip-flops, States, State Diagram, Characteristic equation and Excitation Table of Flip-flops, Shift Registers Ripple Counters, Synchronous Counters, Counter Applications.

UNIT V: MEMORIES   Role of Memory in a computer, Memory types, Semiconductor RAMs, Memory Expansion, Non-Volatile RAMs, Sequential Memories, Magnetic Memories, Charge-coupled devices.

TEXT BOOK(S):

1. S. SALIVAHANAN, S. ARIVAZHAGAN, DIGITAL CIRCUITS AND DESIGN, OXFORD UNIVERSITY PRESS, INDIA, 2018(5TH EDITION), ISBN: 978019948868.

2. ANAND KUMAR A., FUNDAMENTALS OF DIGITAL CIRCUITS, PHI, 2016 (4TH EDITION), ISBN: 9788120352681.

REFERENCE BOOK(S):

1. Donald P Leach, Albert Paul Malvino And Goutam Saha, Digital Principles And Applications, Mcgraw Hill, 2014(8th Edition, Sie), Isbn: 9789339203405.

2. M. Rafiquzzaman, Fundamentals Of Digital Logic And Microcomputer Design, Wiley, 2005(5th Edition), Isbn: 9788126522590.

3. Morris M. Mano, Digital Logic And Computer Design, Pearson Education, 2016, Isbn: 9789332542525.

4. A. Saha, N. Manna, Digital Principles And Logic Design: Fundamentals And Modern Applications, Jones And Bartlett Publishers, 2010, Isbn: 9780763773731.

5. Thomas L. Floyd, Digital Fundamentals, Pearson Education, 2011(10th Edition), Isbn: 9788131734483

List of Experiments:

1. Implementation of Logic Gates

2. Design of Half-adder/ Full-adder

3. Design of Comparator

4. Design of Multiplexer / De-multiplexer

5. Design of Decoders and Encoders

6. Design of Parity Checkers/Generators

7. Design of Code Converter

8. Design of Flip-Flop

9. Study of Shift register

10. Study of Counters

5 Program Core

Core Courses:

5.1 CSE18R111: Information Security Fundamentals

CSE18R111	Information Security Fundamentals	L	T	P	Credit
		3	0	0	3
Course Category:	Program Core				
Course Type:	Theory				
Pre-requisite:	NIL				

UNIT I: CIA TRIAD Confidentiality, Integrity Availability, what is Information Security? Identification and Authentication, Authorization and Access Control, Auditing and Accountability

UNIT II: CRYPTOGRAPHY AND OPERATIONS SECURITY Modern Cryptography Tools, Protecting Data at rest, In motion, and in Use, Origins of Operations Security, The Operations Security Process, Laws of Operations Security, Operations Security in our Personal Lives

UNIT III: PHYSICAL SECURITY AND NETWORK SECURITY Introduction, Physical Security Controls, Protecting People, Data and Equipment. Protecting Networks, Protecting Network Traffic. Network Security Tools

UNIT IV: OPERATING SYSTEM AND APPLICATION SECURITY Operating System Hardening, Protecting Against Malware, Software Firewalls and Host Intrusion Detection, Operating System Security Tools, Software Development Vulnerabilities, Web Security, Database Security, Application Security Tools.

UNIT V: INFORMATION SECURITY -AUDIT AND MONITORING, INTELLIGENCE, COMPLIANCE, MANAGEMENT AND GOVERNANCE Change and Security Implications, System Models, Targets and Methods, Log Management, Data Aggregation and Reduction, Notifications and Reporting, Monitoring and Control Challenges, Auditing Standards, SAS 70 Audits, Sarbanes-Oxley, Addressing Multiple Regulations for Information Security Technical Frameworks for IT Audits, Intelligence and Compliance, Management and Governance.

TEXT BOOK(S):

1. Information Security Fundamentals (IBM ICE Publications)

5.2 CSE18R173: Design and Analysis of Algorithms

CSE18R173	Design and Analysis of Algorithms	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Integrated Course				
Pre-requisite:	CSE18R172/Data Structure and Algorithms				

Course Objectives:

- Analyze the asymptotic performance of algorithms

- Write rigorous correctness proofs for algorithms.

- Demonstrate a familiarity with major algorithms and data structures

- Apply important algorithmic design paradigms and methods of analysis.

- Synthesize efficient algorithms in common engineering design situations

Course Outcomes:

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

CO1 Apply the fundamentals of algorithms and design techniques

CO2 Analyze algorithms and express their complexity using asymptotic notations

CO3 Propose algorithm for given problem using design techniques

CO4 Evaluate the complexity of different techniques and problem solving methods

CO5 Formulate any problem as a class of NP problems and propose approximation algorithms

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S											M	S			
CO2	S			S	S								S	S		
CO3	S	S		S	S						M	S	S	S		
CO4	S	S		S	S				M		S	S	S	S		
CO5	S	S	S	S	S	M	M				M	S	S	S		S

UNIT I: INTRODUCTION TO ALGORITHMS AND ANALYSIS Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters theorem.

UNIT II: FUNDAMENTAL ALGORITHMIC STRATEGIES Brute-Force, Greedy Techniques Elements of greedy strategy - Theoretical foundation of greedy methods - Single source shortest path - Huffman tree Task Scheduling problem- Dynamic programming Principal of optimality - Longest common subsequence Optimal binary tree

UNIT III: BACKTRACKING AND BRANCH AND BOUND Backtracking n-Queens Problem Hamiltonian Circuit problem Subset-Sum problem -Branch and Bound Assignment Problem Knapsack Problem Traveling Salesman Problem- Illustrations of these techniques for Problem-Solving , Bin Packing, Heuristics characteristics and their application domains.

UNIT IV: TRACTABLE Tractable and Intractable Problems: Computability of Algorithms, Computability classes P, NP, NP-complete and NP-hard. Cooks theorem, Standard NP-complete problems and Reduction techniques.

UNIT V: ADVANCED TOPICS Approximation algorithms, Randomized algorithms Matching in Graphs, Perfect Matching Polynomial Time Verification Randomized Quick Sort Algorithm Approximation Algorithms Approximation Algorithms To Vertex-Cover And Traveling Salesman Problems

TEXT BOOK(S):

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, Introduction to Algorithms, Fourth Edition , PHI Pvt. Ltd., 2012

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2. Anany Levitin, Introduction to the Design and Analysis of Algorithm, Third Edition , Pearson Education Asia, 2012.

REFERENCE BOOK(S):

1. A.V.Aho, J.E. Hopcroft and J.D.Ullman, The Design and Analysis Of Computer Algorithms, Third Edition , Pearson Education Asia, 2011.

2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Fourth Edition, Universities Press, Hyderabad, 2010.

3. Kenneth A. Berman and Jerome L. Paul, Algorithms, Third Edition, Cengage learning India, New Delhi, 2010.

4. Sara Baase and Allen Van Gelder, Computer Algorithms Introduction to Design & Analysis, Third Edition, Pearson Education, New Delhi, 2000.

List of Experiments:

Implement in C/Python/Matlab Code

1. Matrix Chain Multiplication and analyze its time complexity

2. Longest Common Subsequence problem and analyze its time complexity

3. Prisoners Escape using greedy Approach

4. Huffman coding and analyze its time complexity

5. Subset sum problem using Branch and Bound technique

6. String matching algorithms using randomized technique

7. TSP problem for approximation algorithm

5.3 CSE18R211: IT Physical Security & System Security

CSE18R211	IT PHYSICAL SECURITY & SYSTEM SECURITY	L	T	P	C
		2	0	2	3
Course Category:	Program Core				
Course Type:	Theory with Practical				
Pre-requisite:	NIL				

UNIT I: Physical Security Overview and Vulnerability Assessment Importance of Physical Security, Relationship Between Physical and Cyber Security, Guard Against Disgruntled Employees and Angry Former Employees, How Activists and Corporate Foes Can Hurt You, Vandals Who Damage for Fun, Saboteurs Who Work for Profit, Thieves and Spies Are Everywhere, Domestic Terrorists Are Still a Threat, International Terrorist Are a Growing Threat, Physical Security for Natural Disasters, Security for Random Incidents, Steps to Improve Physical IT Security, Influence of Physical Design - Defensible Space, Crime Prevention Through Environmental Design, Risk Management and the Vulnerability Assessment, Risk Assessment and the Vulnerability Assessment Process, Statistics and Quantitative Analysis, Vulnerability Process Overview, Reporting and Using of Vulnerability Assessment, System Engg and Vulnerability Assessment.

UNIT II: Security Surveys and the Audit Overview, The best time to conduct the survey, Why conduct a security review, classification of survey recommendations, developing security points, nine points of security concern, personality of the complex, positive and negative aspects of making recommendations, crime analysis, key control, digital closed-circuit television, intrusion alarms, lighting and security, other security aspects, security survey follow-up, residential security, home security checklist, top ten security threats, the audit. Site survey and risk assessment, physical security survey - exterior physical characteristics: perimeter grounds, plant security checklist , security officers checklist , office security checklist , home security checklist - exterior, doors, windows, general home security, miscellaneous, fire safety inspection - administrative and planning phase , bullet-resistant glazing for a secure workplace, bullet-resistant fiberglass wall panels, bullet-resistant doors, bullet-resistant windows, window film

UNIT III: Approaches to Physical Security, Security Lighting, AlarmsIntrusion Detection Systems Overview, levels of physical security, the value of planning, physical barriers, the security plan. Protective physical barriers - perimeter entrances, barrier planning, fence standards, types of security fences, doors, roofs, floors, fences, walls and moats, topography, use of locks in physical crime prevention - lock terminology and components, key-operated mechanisms, combination locks, lock bodies, door lock types, strikes, attacks and countermeasures, locks and the systems approach to security , safes, vaults, and accessories - choose the right container, ul-rated combination locks, re-locking devices, locking dials, lockable handles, time locks, time-delay combination locks, alarmed combination locks, vision-restricting and shielded dials, combination changing,

safe burglaries, hidden combinations, overcoming safe-opening problems , rating files, safes, and vaults. Illumination, types of lamps, things needed to know about lighting, energy management, lighting definitions, lighting description, components of alarm systems, application, alarm equipment overhaul, a smoke detectors, alarm certificate services - definitions, standards, fire classifications, use of fire extinguishers

UNIT IV: Video Technology Overview, Biometrics Characteristics, Access Control and Badges, Fence Standards Video system, camera function, scene illumination, scene characteristics, lenses, cameras, transmission, switchers, quads and multiplexers, monitors, recorders, hard-copy video printers, ancillary equipment, cctv biometrics characteristics access control, designated restricted areas, degree of security, considerations, employee screening, identification system, id methods, mechanized/automated systems, card/badge specifications, visitor identification and control, visitors, enforcement measures, sign/countersign and code word, duress code, access control rosters, control methods, security controls of packages, personal property, and vehicles, tactical-environment considerations fence standards - recommendations, security planning, material specifications, design features and considerations, typical design example

UNIT V: Fire and Fire Safety Inspection, Standards, Regulations, and GuidelinesCompliance and Your Security Program How fire spreads? Four ways to put out a fire, classifying fire, ul standard 217, water supply for sprinklers and tanks. Fire safety inspection - administrative and planning phase, general physical inspection phase, extinguisher inspection phase, stand pipe, fire hose, and control valve inspection phase, sprinkler system inspection phase, hazardous materials inspection phase, alarm system inspection phase. Introduction, standards, regulations, guidelines, managing compliance, resources, Number and function of guards, uniform, firearms, vehicles, guardhouses, communication, rounds, logbooks, hazard assessment, command structure, emergency drills crisis management. Including Global Resources Security personnel - Introduction - Network security, Hardware/Downloadable devices/Data storage, Physical security. Information Technology (IT) Security - Software updates to reduces vulnerabilities, Firewall Account Management - Authentication, One Time passwords. Host security and Host security (System threats and Denial of Service attack) - System Threats - Antivirus software, Worms, Trojan horse, Root kits, Port Scanning, Denial of service attack, Distributed Denial of Service attack.

TEXT BOOK(S):

1. IT System Security Physical Security (IBM ICE Publications).

Lab tools:

Microsoft baseline security analyzer (MBSA), tripwire

List of Experiments:

1. Installation steps of microsoft baseline security analyzer

2. How to use (scan a computer by name)

3. How to scan a computer by ip address

4. How to scan multiple computers by ip address

5. How to scan multiple computers by domain

6. How to view existing security scan reports

7. Installation steps of tripwire

8. How to start the secure check scanning

9. About the tool window

10. Securecheq summary report

11. How system aspects covered in scan

12. Securecheq test report

5.4 CSE18R252: Formal Language and Automata

CSE18R252	Formal Language and Automata	L	T	P	C
		3	0	1	4
Course Category:	Program Core				
Course Type:	Theory with Practical				
Pre-requisite:	NIL				

Course Objectives:

- To introduce students about the mathematical foundations of computation including automata theory, the theory of formal languages and grammars, the notions of algorithm, decidability, complexity, and computability.

- To enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.

Course Outcomes:

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

CO1 Distinguish Finite Automata, Deterministic Finite Automata and Non Deterministic Finite Automata

CO2 Derive regular languages and expressions to a given problem.

CO3 Formulate context free grammar (CFG) to describe programming languages and evaluate the equivalence of push down automata and CFG.

CO4 Evaluate the operations of Turing machine for different languages and simple computations

CO5 Prove undecidable problem in regular expression and Turing machine

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S			
CO2	S			S	S								S			
CO3	S	S		S	S						M		S	S		
CO4	S	S		S	S								S	S		
CO5	S	S	S	S	S	M	M				M	M	S	S		S

UNIT I: AUTOMATA Introduction to formal proof Additional Forms of Proof Inductive Proofs Finite Automata (FA) Deterministic Finite Automata (DFA) Non-deterministic Finite Automata (NFA) Finite Automata with Epsilon Transitions.

UNIT II: REGULAR EXPRESSIONS AND LANGUAGES Regular Expression Finite Automata and Regular Expressions Properties of Regular languages: Pumping Lemma for Regular Languages and Applications Closure Properties of Regular Languages- Equivalence and Minimization of Automata

UNIT III: CONTEXT-FREE GRAMMAR AND PUSH DOWN AUTOMATA Context-Free Grammar (CFG) Application- Parse Trees Ambiguity in Grammars and Languages Pushdown Automata Languages of a Pushdown Automata Equivalence of Pushdown Automata and CFG - Deterministic Pushdown Automata

UNIT IV: PROPERTIES OF CFL AND TURING MACHINE Normal Forms for CFG Pumping Lemma for CFL Applications Properties of CFL Turing Machines Programming Techniques for TM: Multiple Stacks, Subroutines-Extensions to the Basic Turing Machine

UNIT V: UNDECIDABILITY IA language that is not Recursively Enumerable (RE) An Undecidable problem that is RE Undecidable Problems about Turing Machine Posts Correspondence Problem - The classes P and NP - NP complete-Complements of Languages in NP

TEXT BOOK(S):

1. Hopcroft J.E,Motwani R and Ullman J.D, Introduction to Automata Theory, Languages and Computations, Third Edition, 2006.

REFERENCE BOOK(S):

1. Martin J, Introduction to Languages and the Theory of Computation, Third Edition, TMH, 2003.

2. Lewis H. R and Papadimitriou C.H , Elements of The theory of Computation, United States Edition, 1997.

List of Experiments:

Implement in C/Python/Matlab Code

1. Create the Deterministic Finite Automata using JFLAP simulator

2. Create the Non-Deterministic Finite Automata using JFLAP simulator

3. Construct a regular expression using JFLAP. Use Convert -¿ Convert FA to RE.

4. Construct a Grammar using JFLAP.

5. Convert regular expressions to FA

6. Create Regular Grammar and convert to Finite Automaton.

7. Create a PDA that accepts strings that contains the language $L = \{a^x cb^{2x} | where x >= 0\}$ using the alphabet $\sum = \{a, b, c\}$

8. Create each PDA with at least five test results with the following languages over alphabet: = { a,b }

   (a) L = $\{a^n b^n$ — where n > 0$\}$
   (b) L = $\{a^n b^n c^n$ — where n > 0 $\}$

9. Construct PDA for any given grammar

5.5 CSE18R254: Introduction to Python Programming

CSE18R254	Introduction to Python Programming	L	T	P	C
		2	0	2	3
Course Category:	Program Core				
Course Type:	Theory with Practical				
Pre-requisite:	NIL				

UNIT I:

AN INTRODUCTION TO PYTHON Introduction, A Brief History of Python, Python Versions, Installing Python, Environment Variables, Executing Python from the Command Line, IDLE, Editing Python Files, Python Documentation, Getting Help, Dynamic Types, Python Reserved Words, Naming Conventions

Basic Python Syntax Basic Syntax, Comments, String Values, String Methods, The format Method, String Operators, Numeric Data Types, Conversion Functions, Simple Output, Simple Input, The % Method, The print Function

Language Components Indenting Requirements, the if Statement, Relational and Logical Operators, Bit Wise Operators, the while Loop, break and continue, The for Loop.

Collections Introduction, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, Summary

UNIT II:

Functions Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, map, filter, Mapping Functions in a Dictionary, Lambda, Inner Functions, Closures

Modules Modules, Standard Modules sys, math, time, The dir Function

Exceptions Errors, Runtime Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, raise, assert.

UNIT III:

Input and Output   Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, The pickle Module

Regular Expressions   Introduction, Simple Character Matches, Special Characters, Character Classes, Quantifiers, The Dot Character, Greedy Matches, Grouping, Matching at Beginning or End, Match Objects, Substituting, splitting a String, Compiling Regular Expressions, Flags.

UNIT IV:

DATA STRUCTURES   List Comprehensions, Nested List Comprehensions, Dictionary Comprehensions, Dictionaries with Compound Values, Processing Lists in Parallel, Specialized Sorts, Time Functionality, Generators

Writing GUIs in Python   Introduction, Components and Events, An Example GUI, The Tk Widget, Button Widgets, Entry Widgets, Text Widgets, Checkbutton Widgets, Radiobutton Widgets, Listbox Widgets, Frame Widgets, Menu Widgets, Toplevel Widgets, Dialogs.

Python and CGI Scripts   What is CGI, HTML, HTML Forms, A Guestbook Application, What Can Go Wrong! HTML Tables, The CGI Script, Rendering of the Script.

UNIT V:

THE OS MODULE   The Environment, creating a Process, Listing Files, Other Process Methods, File Information (Metadata), Working with Directories.

Network Programming   Networking Fundamentals, The Client/Server Model, The socket Module, A Client Program, A Server Program, An Evaluation Client and Server, A Threaded Server.

Numerical Analysis & Plotting   Numpy Overview, Setup, Datatypes, Basic Operators, Indexing, Broadcasting, Matrix Operators. Matplotlib-Overview, Setup, Basic plots, Customizing plots, Subplots, 3D plots.

Data Processing with Pandas   Pandas Overview, Setup, Data Structures, Indexing & Selecting Data, groupby Operations, Reshaping data.

TEXT BOOK(S):

1. Programming with Python (IBM ICE Publications 2018 Edition). Lab Tools Python

LAB EXERCISES:

1. Python Program to Reverse a Given Number

2. Python Program to Read a Number n and Print the Natural Numbers Summation Pattern

3. Python Program to Determine all Pythagorean Triplets in the Range

4. Python Program to Form a New String where the First Character and the Last Character have been Exchanged

5. Python Program to Check if a Substring is Present in a Given String

6. Python Program to Map Two Lists into a Dictionary

7. Python Program to Form a Dictionary from an Object of a Class

8. Python Program to Count the Number of Vowels Present in a String using Sets

9. Python Program that Displays which Letters are in the First String but not in the Second

10. Python Program to Determine How Many Times a Given Letter Occurs in a String Recursively

11. Python Program to Find the Total Sum of a Nested List Using Recursion

12. Python Program to find the factorial of a number without recursion

13. Python Program to Find the Binary Equivalent of a Number without Using Recursion

14. Python Program to Read the Contents of a File

15. Python Program to Read a File and Capitalize the First Letter of Every Word in the File

16. Python Program to Append, Delete and Display Elements of a List Using Classes

17. Python Program to Create a Class which Performs Basic Calculator Operations

18. Python Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File

19. Python Program to Find All Numbers which are Odd and Palindromes Between a Range of Numbers without using Recursion

5.6 CSE18R272: Java Programming

CSE18R272	Java Programming	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Integrated Course				
Pre-requisite:	NIL				

Course Objectives:

- To enhance knowledge on object-oriented programming using JAVA language with more emphasis on event-driven and network programming.

Course Outcomes:

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

CO1 Develop Java programs using OOP principles

CO2 Develop Java programs with the concepts inheritance and interfaces.

CO3 Build Java applications using exceptions and I/O streams.

CO4 Develop Java applications with threads and generics classes.

CO5 Develop interactive Java programs using swings.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S			
CO2	S	S	S	S	S	S	S				M		S	M		L
CO3	S	S	S	S	S	S	S				M	M	S	M		L
CO4	S	S	S	S	S	S	S				M	M	S	M		L
CO5	S	S	S	S	S	S	S				M	M	S	M		L

UNIT I: INTRODUCTION TO OOP AND JAVA FUNDAMENTALS   Object Oriented Programming - Abstraction   objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java   Characteristics of Java   The Java Environment - Java Source File -Structure   Compilation. Fundamental Programming Structures in Java   Defining classes inJava   constructors, methods -access specifiers - static members - Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II: INHERITANCE AND INTERFACES   Inheritance Super classes- sub classes Protected members constructors in sub classes- the Object class abstract classes and methods- final methods and classes Interfaces defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III: EXCEPTION HANDLING AND I/O Exceptions - exception hierarchy - throwing and catching exceptions built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics Streams Byte streams and Character streams Reading and Writing Console Reading and Writing Files

UNIT IV: MULTITHREADING AND GENERIC PROGRAMMING   Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming Generic classes generic methods Bounded Types Restrictions and Limitations.

UNIT V: EVENT DRIVEN PROGRAMMING   Graphics programming - Frame Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy - Introduction to Swing   layout management - Swing Components Text Fields , Text Areas Buttons- Check Boxes Radio Buttons Lists- choices- Scrollbars Windows Menus Dialog Boxes.

TEXT BOOK(S):

1. Herbert Schildt, Java The complete reference, 8 th Edition, McGraw Hill Education, 2011.

2. Cay S. Horstmann, Gary cornell, Core Java Volume I Fundamentals, 9 th Edition, Prentice Hall, 2013.

REFERENCE BOOK(S):

1. Cay S. Horstmann, Gary cornell, Core Java Volume I Fundamentals, 9 th Edition, Prentice Hall, 2013.

2. Steven Holzner, Java 2 Black book, Dreamtech press, 2011

3. Timothy Budd, Understanding Object-oriented programming with Java, Updated Edition, Pearson Education, 2000.

5.7 CSE18R273: Operating Systems

CSE18R273	Operating Systems	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Integrated Course				
Pre-requisite:	CSE18R174/Computer Architecture and Organization				

Course Objectives:

- To learn the mechanisms of OS to handle processes and threads and their Communication

- To learn the mechanisms involved in memory management in contemporary OS

- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols

- To know the components and management aspects of concurrency management

Course Outcomes:

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

CO1 Interpret Operating System Structure, Operations, Services and Process

CO2 Elaborate Multithreaded Programming, Process Scheduling and Synchronization

CO3 Evaluate different memory management schemes

CO4 Design and implement File system functionalities.

CO5 Experiment with various disk management schemes.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S				S								S			
CO2	S	M			S								S			
CO3	S	M	M		S		M				M	M	S			
CO4	S	M	M		S							M	S			
CO5	S	M	M		S		M				M	M	S			

UNIT I: INTRODUCTION TO OPERATING SYSTEMS   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. Case study on UNIX and WINDOWS Operating System

UNIT II: PROCESS SCHEDULING   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 multi threads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

UNIT III: PROCESS SYNCHRONIZATION AND DEADLOCK   Operations on Processes , Cooperating Processes , Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Petersons Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Readers & Writer's Problem, Dining Philosopher Problem etc. Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Bankers algorithm, Deadlock detection and Recovery.

UNIT IV: MEMORY MANAGEMENT   Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation Fixed and variable partitionInternal and External fragmentation and Compaction; Paging: Principle of operation Page allocation Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory Hardware and control structures Locality of reference, Page fault , Working Set , Dirty page/Dirty

bit Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT V: FILE AND SECONDARY STORAGE MANAGEMENT   I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

   File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

   Protection & Security: Protection- Goals of Protection, Domain of protection, Access Matrix, Access control, Implementation of Access Matrix, Revocation of Access Rights. Security -The security problems, authentication, program threats, system and network threats, encryption, computer security classification.

TEXT BOOK(S):

1. Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin,Greg Gagne, Wiley Asia Student Edition,2012.

2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India,2007

REFERENCE BOOK(S):

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing.

2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley.

3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India

4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati,O'Reilly and Associates

List of Experiments:

1. Windows and UNIX Commands

2. Simulation of System calls

3. Implementation of CPU Scheduling algorithms

4. Simulation of IPC in UNIX

5. Implementation of deadlock avoidance algorithms

6. Implementation of Page replacement algorithms

7. Implementation of memory management functions

8. Implementation of disk scheduling algorithms

9. Implementation of access control mechanisms

10. Implementation of encryption algorithms

5.8 CSE18R274: Compiler Design

CSE18R274	Compiler Design	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Integrated Course				
Pre-requisite:	CSE18R252/Formal Language and automata				

Course Objectives:

- To understand the theory and practice of compiler implementation.

- To learn finite state machines and lexical scanning.

- To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation

Course Outcomes:

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

CO1 Understand the different phases of compilation.

CO2 Apply context free grammars to parsing and compare different parsing technique

CO3 Develop skills on lexical analysis and parsing which are helpful to a broad range of computer science application areas.

CO4 Design the various code generation schemes.

CO5 Analyze optimization techniques to reduce the code size.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S	M											S			
CO2	S	M	S	M	M	L	L	L			M	M	S	L		L
CO3	S	M	S	M	M	L	L	L			M	M	S	L		L
CO4	S	M	S	M	M								S			
CO5	S	M	S	M	M	L	L	L			M	M	S	L		L

UNIT I: INTRODUCTION   Introduction to Compiler The structure of a compiler- Compiler- Lexical Analysis Role of the lexical analysis Input Buffering Specification of tokens- Recognition of tokens Lexical analyzer generator

UNIT II: LEXICAL ANALYSIS   Finite Automata Regular Expression to an NFA - Optimization of DFA based pattern matchers- The Role of the Parser - Context-Free Grammars - Writing a Grammar -Top-Down Parsing - Recursive Descent Parsing Predictive Parsing - Bottom-Up Parsing - Shift Reduce Parsing - Operator-Precedence Parsing

UNIT III: SYNTAX ANALYSIS   Introduction to LR parsing - SLR Parser Canonical LR Parser LALR Parser Generators - Intermediate Languages Declarations Control Flow -Boolean Expressions Switch Statements - Back patching .

UNIT IV: INTERMEDIATE CODE GENERATION   Issues in the Design of a Code Generator - The Target Language - Addresses in the target code - Basic Blocks and Flow Graphs - A Simple Code Generator - DAG Representation of Basic Blocks.

UNIT V: CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS
The Principal Sources of Optimization - Optimization of Basic Blocks - Peephole optimization- Loops in Flow Graphs Runtime environments Storage organizations-stack allocation of space Access to nonlocal data on the stack.

TEXT BOOK(S):

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Monica S. Lam, Compilers: Principles, Techniques, and Tools, Second Edition , 2014

REFERENCE BOOK(S):

1. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2003

2. Bennet J.P., Introduction to Compiler Techniques, Tata McGraw-Hill, 2nd Edition, 2003

3. Henk Alblas and Albert Nymeyer,, Practice and Principles of Compiler Building with C, PHI, 2001.

List of Experiments:

1. Implementation of Lexical Analyzer

2. Construction of Symbol Table

3. Construction of a NFA from a regular expression

4. Computation of FIRST and FOLLOW for a given grammar

5. Im+plementation of operator precedence parsing Algorithm

6. Implementation of shift reduce parsing Algorithm

7. Generation of a code for a given intermediate code

8. Use LEX tool to implement a lexical analyzer

9. Use YACC tool to implement a desktop calculator

10. Use YACC tool to implement a parser

5.9 CSE18R371: Computer Networks

CSE18R371	Computer Networks	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Integrated Course				
Pre-requisite:	CSE18R272/Operating System				

Course Objectives:

- To provide students with an overview of the concepts and fundamentals of data communication and computer networks.

- To introduce students to local, metropolitan and wide area networks using the standard OSI reference model as a framework and to the Internet protocol suite and network tools and programming using various networking technologies.

Course Outcomes:

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

CO1 Inspect the basics of data communication and various categories of networks.

CO2 Identify the technologies for error free transmission of data over internet

CO3 Apply various routing protocols to select optimal path and relate addressing entities in Network Layer

CO4 Analyze the various security protocols at different layers of OSI architecture.

CO5 Analyze the various protocols in application layer.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S	M		M
CO2	S												S	M		M
CO3	S	S	S	S	S	M	L				S	M	S	M		M
CO4	S	S	S	S	S	M	L				S	M	S	M		M
CO5	S	S	S	S	S	M	L				S	M	S	M		M

UNIT I: INTRODUCTION TO NETWORKS AND PHYSICAL LAYER Introduction: Networks, Uses of Networks, Network Topology, Transmission Modes - Network Hardware - Transmission technology - Categories of Networks - Network Software - Protocol Hierarchy - Design issues for the layers Services - Reference Model: TCP/IP and OSI - Internet: Architecture of Internet - Physical Layer: Need and Issues, Data Communication, Guided transmission media, Wireless Transmission, Communication Satellites, Multiplexing and Switching, Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security.

UNIT II: DATA LINK LAYER DLL: Need and Issues - Error Detection and Correction - Protocol Verification and Data Link Layer protocols - MAC Sub layer - Channel Allocation Problem - Multiple Access Protocols Ethernet - Wireless LANs and VLAN - Data Link Layer Switching - Connectivity Devices - Configuration of Switches, Wireless Network Security - Wireless Security, IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security.

UNIT III: NETWORK LAYER Network Layer - Need and Issues - Routing algorithms - Congestion Control Algorithms QOS - Network Layer in Internet - Network Addressing - Configuration of Router - ARP and RARP, Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control.

UNIT IV: TRANSPORT LAYER Transport Layer - Need and Issues - Transport service - Elements of Transport Protocols - Simple Transport Protocol - TCP and UDP, Transport-Level Security - Secure Sockets Layer, Transport Layer Security, Secure Shell (SSH).

UNIT V:APPLICATION LAYER Application Layer - Need and Issues DNS - Electronic Mail FTP HTTP WWW, HTTPS, DHCP Security, Web Security.

TEXT BOOK(S):

1. Andrew S Tanenbaum, David J. Wetherall, Computer Networks, Fifth Edition Pearson Education, 2011.

2. Behrouz A. Forouzan, Data Communications and Networking,Seventh Edition,, McGraw-Hill, 2017

REFERENCE BOOK(S):

1. Larry Peterson Bruce Davie , Computer Networks - A Systems Approach, Fifth Edition by, Morgan Kaufmann , 2011

2. Todd Lammle, CCNA Cisco Certified Network Associate Study Guide, 7th Edition, 2011

3. B. S. Manoj, C. Siva Ram Murthy, Ad Hoc Wireless Networks Architectures and Protocols, Prentice Hall, 2004

4. Behrouz A. Forouzan, Data Communications and Networking Fourth Edition,, McGraw-Hill, 2006

5. William Stallings, Cryptography and Network Security: Principles and Practice, Sixth Edition, 2014.

List of Experiments:

1. Layer 1 Functions: Study of different types of Network cables and practically implement the cross wired and Straight through cable using Clamping Tool.

2. Study of Network Devices in detail.

3. Study of Basic Network commands and Network Configuration Commands

4. Checking Layer 2 functionality using packet tracer

    Configure Network Topology using packet Tracer-Bus, Star and Mesh Topology.

    Connect a PC to the port and checking the MAC address in port and check MAC learning in the Switch.

    Configure Spanning Tree Protocol.

5. Checking the Layer 3 functionality

    Study of IP Address Sub-netting and CIDR.

    Connect a PC to the port and assign an IP address. Check the ARP table and MAC table.

    Use another PC and assign the IP address as the old PC already connected. Now check the MAC learning in the switch.

6. Checking the Layer 3 functionality

    Configure Layer 3 Switch using VLAN

    Configuring DHCP for IP distribution to 3 VLANS using Cisco Packet Tracer.

7. Network Protocol analysis:

    Capture and Analyze TCP Segment.

    Capture and Analyze UDP Datagram.

    Capture and Analyze IP Packets.

8. Network Protocol analysis:

    Capture and Analyze ICMP Packets.

    Capture and Analyze ARP frame.

9. Analyze OSPF packets using wire shark for Hello, dead timer and MTU. Change the MTU and check the neighbor connectivity.

10. Domain Name Service

11. HTTP Download

12. Network Security and Cryptography

    Implement the following SUBSTITUTION TRANSPOSITION TECHNIQUES concepts:

        Caesar Cipher

        Playfair Cipher

        Hill Cipher

        Vigenere Cipher

13. Implement the following algorithms

    DES

    RSA Algorithm

14. Perform an experiment for port scanning with Nmap, Superscan or any other Software.

15. Using Nmap 1) Find open ports on a system 2) Find the machines which are active 3) Find the version of remote OS on other systems 4) Find the version of S/W installed on other system.

16. Securing Layer 2 Switches.

17. Securing the Router for Administrative Access.

5.10 INT18R371: Database Management Systems

INT18R371	Database Management Systems	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Integrated Course				
Pre-requisite:	NIL				

Course Objectives:

- To make students to understand the different issues involved in the design and implementation of a database system.

- To make students to understand the different issues involved in the design and implementation of a database system. .

Course Outcomes:

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

CO1 Apply the database management system concepts.

CO2 Design relational and ER model for database design

CO3 Examine issues in data storage and query processing and frame appropriate solutions

CO4 Analyze the role and issues like efficiency, privacy, security, ethical responsibility and strategic advantage in data management.

CO5 Build applications to schedule concurrent executions with recovery mechanisms.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S			S							M	M	S			
CO2	S	S	S	S	S								S	S		M
CO3	S				S								S			
CO4	S	S	S	S	S	S	S	S			M	M	S	S		M
CO5	S	S	S	S	S						M	M	S	S		M

UNIT I: INTRODUCTION Introduction to File Systems - Introduction to Database Systems - Database System Structure Views of Data - Data Models - Types of Data Models Database Languages - Database Users and Administrator ER Model - E-R Diagrams.

UNIT II: RELATIONAL MODEL Relational Model Catalog Types Keys - Relational Algebra- Domain - Tuple Relational Calculus - SQL Data Definition - Queries In SQL Updates - Views Integrity and Security Sub Queries - Correlated Sub Queries - Relational Database Design Functional Dependences And Normalization For Relational Databases (up to BCNF).

UNIT III: DATA STORAGE AND QUERY PROCESSING Record Storage and Primary File Organization - Secondary Storage Devices- Operations on Files - Heap File - Sorted Files - Hashing Techniques Index Structure for Files Different Types Of Indexes B-Tree - B+Tree Database Tuning - Query Processing.

UNIT IV: TRANSACTION MANAGEMENT Transaction Concepts Transaction Recovery ACID Properties Need for Concurrency Control - Schedule and Recoverability- Serializability and Schedules Concurrency Control Types of Locks- Two Phases locking-Deadlock- Time Stamp based Concurrency Control Recovery Techniques Concepts - Immediate Update - Deferred Update - Shadow Paging.

UNIT V: DATABASE SECURITY Introduction Administration of Users Privileges, passwords, roles Security Models Database auditing models Application and Data Auditing Database Application Security Models Statistical Database Protection & Intrusion Detection Systems Types of Attack, Threats Security plan Security and Auditing Project Cases.

TEXT BOOK(S):

1. Abraham Silberschatz, Henry F., Korth and Sudarshan S, Database System Concepts, McGraw-Hill, Sixth Edition, 2010.

REFERENCE BOOK(S):

1. Ramez Elmasri and Shamkant B. Navathe, Fundamental Database Systems, Pearson Education, Fifth Edition 2008.

2. Raghu Ramakrishnan, Database Management System, Tata McGraw-Hill Publishing Company, 2003.

3. Hector GarciaMolina, Jeffrey D.Ullman and Jennifer Widom, Database System Implementation, Pearson Education, Second Edition, 2009.

4. C.J.Date, A.Kannan and S.Swamynathan, An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.

5. Atul Kahate, Introduction to Database Management Systems, Pearson Education, New Delhi, 2006.

6. Alexis Leon and Mathews Leon, Database Management Systems, Vikas Publishing House Private Limited, New Delhi, 2003.

List of Experiments:

Implementation of DDL commands in RDBMS.

1. Implementation of DML and DCL commands in RDBMS.

2. Implementation of Date and Built in Functions of SQL.

3. Implementation of Simple Programs.

4. Implementation of High-level language extension with Cursors.

5. Implementation of High level language extension with Triggers

6. Implementation of stored Procedures and Functions.

7. Embedded SQL.

8. Database design using E-R model and Normalization.

9. Database Connectivity using ADO

10. Database Connectivity using ODBC

11. Database Connectivity using JDBC

5.11 CSE18R375: Digital Forensics

CSE18R375	Digital Forensics	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Integrated Course				
Pre-requisite:	NIL				

UNIT I: Computer Forensics Standard Procedure, Incident Verification, System identification, Recovery of Erased and damaged data, Disk imaging and preservation, Data encryption and compression, Automated search techniques, Forensic software

UNIT II: Network Internet Forensics   Tracking network traffic, Reviewing Network Logs, Tools, Performing Live Acquisitions, Order of volatility, Standard Procedure, Internet World wide web threats (Email, Chat-rooms, Search Engines, Hacking illegal access, Obscene and indecent transmission, Extortion threats), Domain Name Ownership Investigation, Reconstructing Past Internet Activities and Events, Email Forensics: E-mail Analysis, Email Headers and Spoofing, Laws Against Email Crime. Messenger Forensics: AOL, Yahoo, MSN, and Chats, Browser Forensics: Analyzing Cache and Temporary Internet Files, Cookie Storage and Analysis, Web Browsing Activity Reconstruction.

UNIT III: Forensic Investigation, Evidence Presentation and Legal aspects of Digital Forensics Authorization to collect the evidence, Acquisition of evidence, Authentication of the evidence, Analysis of the evidence, reporting on the findings, Testimony, Laws regulations - Information Technology Act, Giving evidence in court

UNIT IV: Mobile Memory Forensics, Steganography   Collecting and Analyzing Cell Phone, PDA, Blackberry, iPhone, iPod, iPad and MP3 Evidence, Analyzing CD, DVD, Tape Drives, USB, Flash Memory, and other Storage Devices, Digital Camera Forensics, Reconstructing Users Activities, Recovering and Reconstructing Deleted Data, Steganography Tools and Tricks, Data Hiding, Data Recovery, Memory Data Collection and Examination Extracting and Examining Processes.

UNIT V:Malware Analysis   Analyzing Live Windows System for Malware, Analyzing Live Linux System for Malware, Analyzing Physical and Process Memory Dumps for Malware, Discovering and Extracting Malware from Windows Systems, Discovering and Extracting Malware from Linux Systems, Rootkits and Rootkit Detection and Recovery, Reverse Engineering Tools and Techniques

TEXT BOOK(S):

1. Digital Forensics(IBM ICE Publications).

5.12 CSE18R393: IT Network Security

CSE18R393	IT Network Security	L	T	P	C
		3	0	2	4
Course Category:	Program Core				
Course Type:	Theory with practical				
Pre-requisite:	NIL				

UNIT I: Securing Communications and LAN/WAN Networks-I   International Organization for Standardization/Open Systems Interconnection (ISO/OSI) Layers and Characteristics, LANs vs. WANs, Network Cabling, Wireless, LAN Technologies (Ethernet, Token Ring, and FDDI), Network Topologies, Network Protocols

UNIT II: Securing Communications and LAN/WAN Networks-II   Lan Manager / Microsoft Network / NT Domains, TCP/IP, Weaknesses, Routing Protocols, PPP (Point to Point Protocol), DNS (Domain Name Service), NIS, NIS + (Network Information Service), DHCP (Dynamic Host Configuration Protocol), NFS (Network File System), Appletalk, SNA, IPX/SPX, OSI protocols, X.25, DECNET, Telephone/Fax Network.

UNIT III: Physical network types & Internet/Intranet/Extranet components   Ethernet, Leased lines, FDDI, ATM, Hubs, Bridges, Routers, Modems, Gateways, Firewalls, Internet Email Gateway, Permission for external connections, Remote Access Security Management, Network and Protocol Security Mechanisms (VPN, Secure Communications Protocols, E-Mail Security Solutions, Dial-Up Protocols, Authentication Protocols)

UNIT IV: Network Services   Remote Access and Telecommuting Techniques (Frame Relay), Other WAN Technologies (SMDS, X.25, ATM, HSSI, SDLC, HDLC, ISDN), Avoiding Single Points of Failure (Redundant Servers, Failover, RAID)

UNIT V: Network Management / Monitoring and Penetration Testing   IBM Netview, HP Openview, Sun NetManager. Introduction to Penetration Testing

TEXT BOOK(S):

  1. IT Network Security (IBM ICE Publications).

5.13 CSE18R395: Information Security Governance, Management Practices, Security Audit & Monitoring

CSE18R395	INFORMATION SECURITY GOVERNANCE, MANAGEMENT PRACTICES, SECURITY AUDIT & MONITORING	L	T	P	C
		3	0	0	3
Course Category:	Program Core				
Course Type:	Theory				
Pre-requisite:	NIL				

UNIT I: Getting Information Security Right: Top to Bottom   Overview, Information Security Governance, Tone at the Top, Tone at the Bottom, Governance, Risk, and Compliance (GRC), The Compliance Dilemma, Overview, Evolution of Information Security, Organization Historical Perspective, Understand the External Environment, The Internal Company Culture, Prior Security Incidents, Audits , Security Strategy Development Techniques, Security Planning, History of the Security Leadership Role Is Relevant, The New Security Officer, Mandate, Security Leader Titles, Techie versus Leader, The Security Leaders Library, Security Leadership Defined, Security Leader Soft Skills, Seven Competencies for Effective Security Leadership, Security Functions, Reporting Model, Overview, Communication between the CEO, CIO, Other Executives, and CISO, Building Grassroots Support through an Information Security Council, Overview, Risk in Our Daily Lives, Accepting Organizational Risk, Just Another Set of Risks, Management Owns the Risk Decision, Qualitative versus Quantitative Risk Analysis, Risk Management Process, Risk Mitigation Options, Why Information Security Policies Are Important, Avoiding Shelfware, Electronic Policy Distribution, Canned Security Policies, Policies, Standards, Guidelines Definitions, An Approach for Developing Information Security, Policies, Utilizing the Security Council for Policies, The Policy Review Process.

UNIT II: Security Compliance Using Control Frameworks And Managerial Controls: Practical Security Considerations   Overview, Security Control Convergence, Security Control Methodology, Security Assessment and Authorization Controls, Planning Controls, Risk Assessment Controls, System and Services Acquisition Controls, Program Management Controls, Overview, Access Control Controls, Audit and Accountability, Controls, Identification and Authentication, System and Communications Protections, Overview, Awareness and Training Controls, Configuration Management Controls, Contingency Planning Controls, Incident Response Controls, Maintenance Controls, Media Protection Controls, Physical and Environmental Protection Controls, Personnel Security Controls, System and Information Integrity Controls, Overview, Anatomy of an Audit, Audit Planning Phase, On-Site Arrival Phase, Audit Execution Phase, Entrance, Exit, and Status Conferences, Report Issuance and Finding Remediation Phase, Why a Chapter Dedicated to Security Communications?, End User Security Awareness Training, Delivering the Message, Security Awareness Training Does Not Have to Be Boring, Security Officer Communication Skills, Applying Personality Type to Security Communications, Overview, Security Control Convergence, Security Control Methodology, Security

Assessment and Authorization Controls, Planning Controls, Risk Assessment Controls, System and Services Acquisition Controls, Program Management Controls. Recent Security Incidents, Who Will Be Next?, Every Control Could Result in an Incident. 17 Ways to Dismantle Information Security Governance Efforts

UNIT III: Introduction to Information Security Management, Concepts, Security Life Cycle and Security Plan Overview, Why Information Security Matters, Information Sensitivity Classification, Information Security Governance, The Computing Environment, Security of Various Components in the Computing Environment, Security Interdependence, CIA Triad, Security Goals versus Business Goals, The Security Star, Parker's View of Information Security, What Is Information Security Management?, Defense-In-Depth Security, Security Controls, The NSA Triad for Security Assessment Brief History of Management, Traditional Management Skills and Security Literacy, Managerial Skills, Redefining Mintzberg's Managerial Roles, Strategic Management Concepts, IS Security Management Activities, Do We Really Need an Independent Information Security Functional Unit?, The Information Security Management Cycle, IS Security Management versus Functional Management, Security Planning in the SLC, Security Analysis, Security Design, Security Implementation, Security Review, Continual Security, Overview, SP Development Guidelines, SP Methodology, Security Policy - Overview, Security Policy, Standards, and Guidelines, Security Policy Methodologies, Business Continuity Planning - Business Disruptions, Business Continuity, Disaster Recovery, Responding to Business Disruptions, Developing a BCP

UNIT IV: Security Analysis, Security Design and Security Risk Management Introduction, The Risk Management Life Cycle, The Preparation Effort for Risk Management, A Sustainable Security Culture, Information Needed to Manage Risks, Factors Affecting Security risk, The ALE Risk Methodology, Operational, Functional, and Strategic Risks, Operational Risk Management: Case of the Naval Safety Center, The ABLE methodology, Continual Security: Integrated Fault-Event Analysis and Response Framework (IFEAR)- Introduction, IFEAR Methodology, Fault Tree Analysis, Event Tree Analysis, FTA-ETA Integration, Risk Management, Simulation and Sensitivity Analysis, Active Security Assessment - Introduction, Standards for Active Security Assessment, Limits of Active Security Assessment, Can You Hack Your Own System?, Ethical Hacking of a Computing Environment, Ethics in Ethical Hacking, ASA through Penetration Testing, Strategies for Active Security Assessment, Guidelines and Terms between Testers and the Organization, The Active Security Assessment Project System Availability - Introduction, Computer Clustering, Review of Cluster Concepts, Types of Clusters, Web Site Availability, Application Centers No Longer the Only Sound Implementation, Computation of Availability in High-Availability Cluster, Related Availability Definitions, How to Obtain Higher Availability: The Cisco Process, Common Configurations for Clusters, Self-Healing and Availability. Nominal Security Enhancement Design Based on ISQ/IEC 27002 - Introduction, History of the ISO/IEC 27002, ISO/IEC 27002, How to Use the ISO/IEC 27002 to Enhance Security, Measurement and Implementations, Strategies to Enhance the ISO/IEC 27002-Based Security Posture, Comparing the ISO/IEC 27002-Based Security Posture Enhancement Strategies Technical Security Enhancement Based on ISO/IEC 27001 - Introduction, How Organizations Interact with the Standards, General ISMS Framework, The ISMS Model, The Process Approach Ensures the Continual Improvement of the ISMS, Development of the Information Security

Management System, Design of the ISMS, Security Inventory Needs, The Integration of ISMS Subsystems, Self-Assessment for Compliance, Revisiting ISMS Scoping.

UNIT V: Security Implementation, Security Review and Continual Security
Security Solutions - Introduction, Security Solutions, The NIST Security Solution Taxonomy, The ISO Security Solution Taxonomy The Common Criteria - The Birth of the Common Criteria, Common Uses of the CC, The CC Document, The CC Security Approach, Information Resource Evaluation Methodology, CC Security Evaluation Programs, The American Model of CC Evaluation Programs, A National Model, Some Other CC Evaluation Requirements. Security Review through Security Audit - Introduction, Security Audit Means Different Things to Different People, Some Security Audit Activities, Our Definition of Security Audit, Main Features in Security Audit, Application Audit, How Does Security Audit Relate to the Corporate Security Policy?, Structure of a Security Audit, Security Audit versus IT Auditing, Applicable Security-Related Standards, Security Audit Grades, Privacy Rights, Information Technology, and HIPAA - The Problem of Privacy, The Meaning of Privacy, HIPAA, Regulatory Standards: The Privacy Rule, The HIPAA Security Rule, Administrative Safeguards, NIST on HIPAA, Conducting Effective Risk Analysis

TEXT BOOK(S):

1. Information Security Governance, Management Practices, Information Security Audit Monitoring(IBM ICE Publications)

Community Service Project:

S.NO	Course Code	Course Name	Credits
1	CSE18R399	Community Service Project	3

Project Work

S.NO	Course Code	Course Name	Credits
1	CSE18R499	Project Work	10

6 Professional Elective Courses

6.1 CSE18R256: Software Engineering

CSE18R256	Software Engineering	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To make the students to read and understand the professional and technical literature on software engineering.

- To familiarize the students with software engineering concepts, principles, and essential processes of the software development and emphasize the need for developing reliable and quality software.

Course Outcomes:

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

CO1 Analyze and identify an appropriate process model for a given project.

CO2 Apply the principles at various phases of software development

CO3 Estimate the work to be done, resources required and the schedule for a software project using software project estimation models.

CO4 Translate specifications into design, and identify the components to build the architecture for a given problem, all using an appropriate software engineering methodology.

CO5 Define a Project Management Plan and tabulate appropriate Testing Plans at different levels during the development of the software.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S	S	S	S	S						M	S	S	S		
CO2	S	S	S	S	S			S			M	S	S	S		
CO3	S	S	S	S	S		S				M	S	S	S		
CO4	S	S	S	S	S	S					M	S	S	S		
CO5	S	S	S	S	S						M	S	S	S		

UNIT I: SOFTWARE ENGINEERING CONCEPTS   Software and Software Engineering - Project Management Concepts - Software Engineering Paradigms Generic Process Models, Assessment and Improvement - Water Fall Life Cycle Model - Prototype Model - RAD Model - Spiral Model - Incremental Model Requirements Engineering.

UNIT II: MANAGING SOFTWARE PROJECTS   Metrics : Metrics in Process and Project Domains - Software Measurement - Metrics for Software Quality - Integrating Metrics in a Software Engineering Process - Estimation , Scheduling Risk Management Review Techniques - Software Quality Assurance.

UNIT III: DESIGN CONCEPTS   Design Process - Design Principles - Design Concepts - Software Architecture Architectural Style, Design and Mapping - User Interface Design .

UNIT IV: SOFTWARE TESTING AND DEBUGGING   Testing Fundamentals and Strategies - White-box and Black-box testing - Basis Path Testing - Data Flow Testing - Testing for Special Environments - Unit Testing, - Integration Testing - Validation Testing - System Testing Debugging - Software Maintenance Software Configuration Management.

UNIT V: ADVANCED TOPICS   Computer Aided Software Engineering - Clean room software engineering Reengineering - Reverse Engineering.

TEXT BOOK(S):

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, seventh Edition, Mc-Graw Hill, 2014.

REFERENCE BOOK(S):

1. Steve McConnell, Code Complete, Second Edition, Microsoft Press.2004.

2. Ian Somerville, Software Engineering,, Addison-Wesley, Ninth edition, 2011.

3. Richard E. Fairley, Software Engineering Concepts, Second Edition McGraw- Hill, 1985.

6.2 CSE18R264: IT APPLICATION SECURITY

CSE18R264	IT Application Security	L	T	P	C
		3	0	2	4

Course Category:	Professional Elective
Course Type:	Theory with practical
Pre-requisite:	NIL

UNIT I: INTRODUCTION TO SOFTWARE DEVELOPMENT & APPLICATION SECURITY Introduction to software development & application, Basics of programming languages, Compiled versus interpreted, Program utilities, Programming concepts, Distributed programming, Threats and malware, Importance of software development life cycle, Software development methods, Adherence to secure software development principles, Web application security principles, Application design & development security, Environment and controls, Essence of secure software development, Auditing and assurance mechanisms.

UNIT II: INTRODUCTION TO INPUT VALIDATION & SENSITIVE DATA Introduction to input validation & sensitive data, Implementation of input validation, Practical solutions Input validation vulnerability, Buffer overflow, Cross-site scripting, SQL injection, Canonicalization, Sensitive data, Sensitive data access, Sensitive data in storage, Information disclosure, Data tampering.

UNIT III: INTRODUCTION TO AUTHENTICATION & AUTHORIZATION Introduction to authentication & authorization, Network eavesdropping, Brute force attack, Dictionary attack, Cookie replay attack, Credential theft, Elevation of privilege, Basics of authorization, Data tampering, Luring attack, Phishing attack

UNIT IV: INTRODUCTION TO CONFIGURATION MANAGEMENT & SESSION MANAGEMENT Introduction to configuration management & session management, Unauthorized access to administration interfaces, Unauthorized access to configuration stores, Retrieval of clear text configuration data, Lack of individual accountability, Over-privileged process and service accounts, Basics of Session Management, Hijacking attack, Session replay attack, Man in the middle attack

UNIT V: INTRODUCTION TO CRYPTOGRAPHY, PARAMETER MANIPULATION & EXCEPTION MANAGEMENT Introduction, Poor Key Generation or Key Management, Weak or Custom Encryption, Basics of Parameter Manipulation, Cookie Manipulation, HTTP Header Manipulation, Basics of Exception Management, Denial of Service. Auditing Logging, Countermeasures - Introduction to Auditing Logging, Countermeasures, Basic Countermeasures.

TEXT BOOK(S):

1. IT Application Security (IBM ICE Publications)

Lab tools:

IBM AppScan, OpenVAS / NESUS, OWTF, Visual Code, Grepper

6.3 CSE18R291: IT DATA SECURITY

CSE18R291	IT Data Security	L	T	P	C
		3	0	2	4
Course Category:	Professional Elective				
Course Type:	Theory with Practical				
Pre-requisite:	NIL				

UNIT I: Data Security Threats-I Data security background, Data security a need, Data security its importance, Factors for implementing a robust data security, Data security processes, Data security threats, Network Driven Threats to Data Security, Phishing, Identity Theft.

UNIT II: Data Security Threats-II More Network based Threat types, Cryptographic Threats, Threats to database security, Banking frauds, Threats to web- application, Physical security threats, Hacking and social engineering, Threats wireless network, Threats bluetooth devices, Threats in Current technological environment, Data security - benefits.

UNIT III: Data Security Threat techniques-I Threat techniques - an introduction, Malware threat techniques, Network based threat techniques - botnet, Network Based Threat Techniques - PHISHING, Network Based Threat Techniques - SNIFFING, Network Based Threat Techniques PASSWORD ATTACK, Transmission interception.

UNIT IV: Data Security Threat techniques-II Cryptographic Threat Techniques, Database Threat Techniques, Threat technique - sqlinsjection, More Database Threat Techniques, Banking Fraud Techniques, Web-application Threat Techniques, Web-application Threat Techniques More, Cross-site Scripting Forgery - XSS, Physical security threat techniques, Wireless network threat techniques, DoS attack, Bluetooth device threat techniques.

UNIT V: Countermeasures Introduction to Countermeasures, Importance of data protection, Evolution of mitigation techniques, Countermeasures, Malware counter measures, Network threats - counter measures, Cryptography threats - counter measures, Database threats - countermeasures, Banking frauds - countermeasures, Web application - countermeasures, Physical barrier: - a countermeasure for Physical Threat, Mantrap and perimeter security, Hardware security, Security zone, Partitioning, Biometric and power system, Emi shielding, Hot and cold aisles, Fire suppression, Natural and man-made countermeasures, Insider threat countermeasures, Hacking and social networking - countermeasures, Wireless Network Security Countermeasures, Bluetooth Device Countermeasures.

TEXT BOOK(S):

1. IT Data Security (IBM ICE Publications).

REFERENCE BOOK(S):

1. Law of Data Security and Investigations - SANS

2. Security Data Visualization: Graphical Techniques for Network Analysis - Greg Conti

3. Web Security, Privacy Commerce - Simson Garfinkel, Gene Spafford

4. SANS GIAC Certification: Security Essentials Toolkit (GSEC) - Eric Cole, Mathew Newfield, John M. Millican

5. Information Security Resources - SANS

6. Designing Storage Area Networks Second Edition Tom Clark

REFERENCE URL(S):

1. http://ptac.ed.gov/sites/default/files/issue-brief-threats-to-your-data.pdf

2. https://www.cs.purdue.edu/homes/bertino/sdm13.pdf

3. https://ico.org.uk/media/for-organisations/documents/1575/it$_security_practical_guide.pdf https://www.ncsc.gov.uk/content/files/protected_files/guidance_files/Cloud-computing-and-data-security.pdf$

4. https://www-03.ibm.com/software/sla/sladb.nsf/pdf/KUP12494/$file/KUP12494USEN.pdf

6.4 CSE18R356: Software Testing

CSE18R356	Software Testing	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R256/ Software Engineering				

Course Objectives:

- To enable a clear understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.

Course Outcomes:

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

CO1 Apply the knowledge of software testing and engineering methods.

CO2 Design and conduct a software test process for a software testing project.

CO3 Learn the needs of software test automation, and define and develop a test tool to support test automation

CO4 Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.

CO5 Analyze various communication methods and skills to communicate with their team-mates to conduct their practice-oriented software testing projects.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1		M		S		L		S	S				M		S	
CO2	M		L				S			M	M		S		M	S
CO3	M	L	S		M	M		L				L	S			M
CO4				M			M		M				S	S	S		S
CO5	S				L	S		M		S	L	M			S	M

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UNIT I: INTRODUCTION Testing as an Engineering Activity Role of Process in Software Quality Testing as a Process Basic Definitions Software Testing Principles The Testers Role in a Software development Organization Origins of Defects Defect Classes The Defect Repository and Test Design Defect Examples Developer/Tester Support for Developing a Defect Repository.

UNIT II: TEST CASE DESIGN Introduction to Testing Design Strategies The Smarter Tester Test Case Design Strategies Using Black Box Approach to Test Case Design Random Testing Requirements based testing positive and negative testing - Boundary Value Analysis decision tables - Equivalence Class Partitioning state-based testing cause-effect graphing error guessing - compatibility testing user documentation testing domain testing Using WhiteBox Approach to Test design Test Adequacy Criteria static testing vs. structural testing code functional testing - Coverage and Control Flow Graphs Covering Code Logic Paths Their Role in Whitebox Based Test Design code complexity testing Evaluating Test Adequacy Criteria.

UNIT III: LEVELS OF TESTING The Need for Levels of Testing Unit Test Unit Test Planning Designing the Unit Tests. The Test Harness Running the Unit tests and Recording results Integration tests Designing Integration Tests Integration Test Planning scenario testing defect bash elimination -System Testing types of system testing - Acceptance testing performance testing Regression Testing internationalization testing ad-hoc testing - Alpha Beta Tests testing OO systems usability and accessibility testing

UNIT IV: TEST MANAGEMENT People and organizational issues in testing organization structures for testing teams testing services - Test Planning Test Plan Components Test Plan Attachments Locating Test Items test management test process - Reporting Test Results The role of three groups in Test Planning and Policy Development Introducing the test specialist Skills needed by a test specialist Building a Testing Group.

UNIT V: CONTROLLING AND MONITORING Software test automation skills needed for automation scope of automation design and architecture for automation requirements for a test tool challenges in automation - Test metrics and measurements project, progress and productivity metrics Status Meetings Reports and Control Issues Criteria for Test Completion SCM Types of reviews Developing a review program Components of Review Plans Reporting Review Results.   evaluating software quality defect prevention testing maturity model.

TEXT BOOK(S):

1. Ilene Burnstein,Practical Software Testing,6th Edition,Springer International EditionAditya P.Mathur, Foundations of Software Testing, Pearson Education,2012.

2. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing Principles and Practices, Pearson education, 2010

REFERENCE BOOK(S):

1. Boris Beizer, Software Testing Techniques, Second Edition, Dreamtech, 2011.

2. Elfriede Dustin, Effective Software Testing, First Edition, Pearson Education, 2008.

3. Renu Rajani, Pradeep Oak, Software Testing Effective Methods, Tools and Techniques, Tata McGraw Hill, 2010.

List of Experiments:

1. Study of Selenium web testing tool

2. Using Selenium IDE, Write a test suite containing minimum 4 test cases.

3. Write and test a program to login a specific web page.

4. Write and test a program to select the number of students who have scored more than 60 in any one subject

5. Write the test cases for banking application

6. Create a test plan document for Library Management System application

6.5 CSE18R358: Free and Open Source Software

CSE18R358	Free and Open Source Software	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To provide a basic idea of Open source technology, their software development process so as to understand the role and future of open source software in the industry along with the impact of legal, economic and social issues for such software.

Course Outcomes:

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

CO1 Explore the fundamentals of open source and the basic concepts of LINUX.

CO2 Create a query to work with open source database.

CO3 Examine the fundamentals concepts of RUBY ON RAILS.

CO4 Build web application on IBM BLUMIX

CO5 Evaluate web services and open source tool by using case study

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	M		L		S	M			S	M				S		
CO2	S	M	S	M			M	L					M		L	
CO3	L			S	L	L	S	S	M	L				M		M
CO4		L	M	L	S	M	L		M		S	M		S		M
CO5		S			M	S			S	M	M	S	S		M	

UNIT I: INTRODUCTION   Introduction to open sources- Need of Open Sources- Advantages of Open Sources- Applications of Open Sources- commercial aspects of Open source movement- LINUX: Introduction- General overview- Kernel mode and user mode- Process-Advanced Concepts-Scheduling-Personalities- Cloning- Signals-Development with LINUX.

UNIT II: OPEN SOURCE DATABASE   MySQL: Introduction- Setting up account- Starting, terminating and writing your own SQL programs Record selection technology- Working with strings-Date and Time- Sorting Query Results- Generating Summary- Working with meta data- Using sequences- MySQL and Web.

UNIT III: RUBY ON RAILS   Introduction- The Structure and Execution of Ruby Programs- Datatypes and Objects - Expressions and Operators - Statements and Control Structures - Methods, Procs, Lambdas, and Closures - Classes and Modules The Ruby Platform - The Ruby Environment.

UNIT IV: IBM BLUMIX   BLUMIX: Introduction-Evolution of BlueMix how does work-infrastructure storage network security Paas on the BlueMix - DBaas on the BlueMix - Web application on BlueMix mobile application on BlueMix - javasript and java application on BlueMix.

UNIT V: OPEN SOURCE TOOLS AND CASE STUDIES   WEB SERVER: Apache Web server Working with Web server Configuring and using Apache Web services Open Source Software tools and processors Eclipse IDE platform Compilers Model Driven Architecture tools.CASE STUDY: Government Policy toward Open Source (E-Governance) Wikipedia as an Open source project.

TEXT BOOK(S):

1. Introduction to Linux: Installation and Programming NRCFOSS Series, edited by N.B.Venkateswarlu, 2010.

2. Robert Sheldon and Geoff Moes, Beginning MySQL , Wiley India, 2009.

3. David Flanagan, Yukihiro Matsumoto The Ruby Programming Language O'Reilly Media, 2010.

4. Christopher Negus, Linux Bible,Wiley Publishing Inc, Indianapolis, 2011.

5. IBM Bluemix Architecture Series: Web Application Hosting on IBM Containers, IBM Redbooks.

REFERENCE BOOK(S):

1. Sreetha sankaranarayanan Learning IBM BluMix, October 2016.

2. Adam McDaniel, Perl and Apache: Your visual blueprint for developing dynamic Web content, Wiley Publishing Inc, Indianapolis, 2010.

3. Dave.W.Mercer, Allan Kent, Steve D Nowicki, Dan squire and Wankyu choi, Beginning PHP 5 , Wiley India,2010.

List of Experiments:

1. Installation of software packages

2. Ruby on Rails: File uploading and send mails

3. Version Control system setup and usage

4. Working with Eclipse IDE

5. Mini Project using IBM Blumix

6.6 CSE18R360: Internet of Things

CSE18R360	Internet of Things	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To make the students explore the interconnection and integration of the physical world and understand the IOT Market perspective and acquire a deep knowledge on how to design and develop IOT architectures and connect the same to cloud environments.s

Course Outcomes:

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

CO1 Understand the Functional blocks and Architecture of IoT

CO2 Analyze the Market perspective of IoT.

CO3 Examine Devices, Gateways and Application Framework in IoT.

CO4 Analyze the services offered cloud environment and Data Analytic tools

CO5 Apply IoT in Home and Industrial Automation and Real World Design Constraints.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S												M			
CO3	S	S	S								S	M	M	L		L
CO4	S	S	S								S	M	M	L		L
CO5	S	S	S	S	S	M	L				S	M	M	L		L

UNIT I: FUNDAMENTALS OF IOT Genesis of IoT - IoT and Digitization IoT impact IoT challenges - Enabling Techniques- IoT Architecture: One M2M - IoT World Forum (IoTWF) - Additional IoT Reference Models Simplified IoT Architecture - Core IoT functional Stack Fog, Edge and Cloud Computing in IoT- Functional Blocks of an IoT Ecosystem: Sensors, Actuators, MEMS and Smart Objects.

UNIT II: IOT PROTOCOLS IoT Access Technologies: Physical Layer , MAC Layer and Topology of IEEE 802.15.4, 802.15.4c, 1901.2a, 802.11ah and LoRaWAN - Network Layers : IP versions, Constrained Nodes and Constrained Networks - Optimizing IP for IoT: From 6LoWPAN to 6Lo RPL - Application Transport Methods : Supervisory Control and Data Acquisition (SCADA) - Application Layer Protocols : CoAP and MQTT

UNIT III: IOT DESIGN AND DEVELOPMENT Design Methodology Embedded Computing Basics Microcontrollers Systems on Chips - IoT system Building Blocks - Arduino Board Details, IDE Programming Raspberry Pi Interfaces - Raspberry Pi with Python Programming.

UNIT IV: DATA ANALYTICS FOR IOT Data Analytics Overview and Challenges - Structured vs Unstructured Data - Data in Motion vs Data at Rest Role of Machine Learning: Supervised Learning Unsupervised Learning Data Analytics Tools and Technology: NoSQL Databases Hadoop - Apache Kafka, Apache Spark - Edge Streaming Analytics - Network Analytics Chef - NETCONF-YANG

UNIT V: CASE STUDIES / INDUSTRIAL APPLICATIONS Home Automation: Smart Lighting Home Intrusion Detection Smart Cities: Smart Parking - Smart Traffic Control Environment: Weather Monitoring System Air Pollution Monitoring Forest Fire Detection Agriculture: Smart Irrigation Manufacturing: Converged Plantwide Ethernet (CPwE) Reference Model - Power Utility Industry: Field Area Network (FAN) GridBlock

TEXT BOOK(S):

1. David Hanes, Ganzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry IoT Fundamentals: Networking Technologies, Protocols and Use cases for Internet of Things, Cisco press,2017

2. Adrain McEwen & Hakim Cassimally Designing the Internet of Things- Wiley 2014.

3. Arshdeep Bahga, Vijay Madisetti Internet of Things A hands on approach, University press 2015.

REFERENCE BOOK(S):

1. Olivier Hersent, David Boswarthick, Omar Elloumi The Internet of Things key applications and protocols, Wiley 2012.

List of Experiments:

1. Home Automation Using IOT

2. IOT Gas Pipe Leakage Detector

3. IOT Electronic Door Opener

4. IOT Garbage Monitoring System

5. Smart Dustbin with IOT Indicator

6. IOT based Streetlight Controller

7. Smart Helmet

8. Alcohol Detection System Using IOT

9. IOT Based Heart Rate Monitoring System

10. Weather Monitoring Using IoT

6.7 CSE18R365: Artificial Intelligence

CSE18R365	Artificial Intelligence	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To introduce the basic principles in artificial intelligence research by covering simple representation schemes, problem solving paradigms, constraint propagation and search strategies.

- To explore the students with the areas of AI application such as knowledge representation, natural Language processing, expert systems, vision and robotics.

Course Outcomes:

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

CO1 Explain the foundations and history of Artificial Intelligence, as well as the science of agent design

CO2 Illustrate the use of problem-solving techniques, such as the various search methods, games, and constraint satisfaction problems.

CO3 Demonstrate AIs use of knowledge representation, through logic agents and first-order logic to address AI problems.

CO4 Design simple software to experiment with various AI learning concepts and analyze results.

CO5 Build self-learning and research skills to be able to tackle a topic of interest on his/her own or as part of a team .

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	L	S												M		S
CO2		S			L								S			M
CO3	L	S	M		S								S	S	M	S
CO4		S	S	L			S					L	M	S		M
CO5		M	S	S	M							L	S	S		S

UNIT I: INTRODUCTION Intelligent Agents Agents and environments - Good behavior - The nature of environments- Structure of agents- Problem Solving - Problem solving agents- Example problems- Searching for solutions- Uniformed search strategies- Avoiding repeated states.

UNIT II: SEARCHING TECHNIQUES Informed search strategies- Heuristic function- Local search algorithms and optimistic problems- Local search in continuous spaces- On-line search agents and unknown environments- Constraint satisfaction problems (CSP)- Backtracking search and Local search for CSP Structure of problems- Adversarial Search Games- Optimal decisions in games Alpha Beta Pruning-

UNIT III: KNOWLEDGE REPRESENTATION First order logic Representation revisited- Syntax and semantics for first order logic- Using first order logic-Knowledge engineering in first order logic- Inference in First order logic prepositional versus first order logic- Unification and lifting- Forward chaining backward chaining- Resolution.

UNIT IV: KNOWLEDGE IN LEARNING Learning from observations - Forms of learning - Inductive learning-Learning decision trees - Ensemble learning- Knowledge in learning Logical formulation of learning Explanation based learning Learning using relevant information Inductive logic programming- Statistical learning methods- Learning with complete data- Learning with hidden variable - EM algorithm

UNIT V: ROBOT INTELLIGENCE Introduction Robot Hardware Robotic Perception Planning to Move Planning Uncertain Movements Moving Robotic Software Architectures - Application Domains Case Study

TEXT BOOK(S):

1. Artificial Intelligence A Modern Approach, Stuart Russell, Peter Norvig, 3rd Edition, Pearson Education, 2015.

REFERENCE BOOK(S):

1. Artificial Intelligence, Elaine Rich and Kevin Knight, 2nd Edition, Tata McGraw-Hill, 2003.

2. Artificial Intelligence-Structures and Strategies for Complex Problem Solving, George F. Luger, Pearson Education / PHI, 2002.

3. Artificial Intelligence, Neeta Deshpande, Nanda Yadav, Technical Publications, Pune, 2008.

6.8 CSE18R366: Game Theory

CSE18R366	Game Theory	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To provide an introduction to mathematical framework required for game theory which makes possible the analysis of the decision making process of interdependent subjects.

- To make students to identify strategic situations and represent them as games and solve simple games using various techniques.

Course Outcomes:

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

CO1 Model competitive real world phenomena using concepts from game theory.

CO2 Discuss the theory which underlies games..

CO3 Review and critically assess literature which deals with game theory and related materials.

CO4 Elucidate the potential or proven relevance of game theory and its impact in many fields of human endeavor which involve conflict of interest between two or more participants.

CO5 Communicate game-theoretic ideas and concepts to non-specialist audiences in a language which is accessible and comprehensible.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S	M		L
CO2	S	S	S	S									S			
CO3	S	M	M	M									S			
CO4	S												S			
CO5	S	S	S	S	S	S	S	M	M	M	M	M	S		M	

UNIT I: INTRODUCTION   Game theory: theory of rational choice - interactions of decision makers - Nash Equilibrium: Theory - Strategic games - examples - Best response functions - Dominated actions - Symmetric games and symmetric equillibria. - Cournot's model - Bertrand's model - Electoral competition - Mixed strategy Equilibrium.

UNIT II: IMPERFECT INFORMATION IN GAMES   Baysian Games - Extensive Games with Imperfect Information: Motivational examples - Cournot's duopoly game with imperfect information - Extensive Games with Imperfect Information: Strategies - Nash equilibrium - Beliefs and sequential equilibrium - Signaling games.

UNIT III: VARIANTS AND EXTENSIONS   Strictly Competitive Games and Maxminimization - Rationalizability - Evolutionary Equilibrium - Case study: The Prisoner's Dilemma - Bargaining as an extensive game.

UNIT IV: ANALYZING BEHAVIOR IN STATIC AND DYNAMIC SETTINGS   Dominance and Best Response - Rationalizability and Iterated Dominance - Location, Partnership, and Social Unrest - Strictly Competitive Games and Security Strategies - Contract, Law, and Enforcement in Static Settings - Analyzing Behavior In Dynamic Settings: Details of the Extensive Form - Sequential Rationality and Solution Concepts - Topics in Industrial Organization - Parlor Games - Games with Joint Decisions; Negotiation Equilibrium - Unverifiable Investment, Hold Up, Options, And Ownership - Repeated Games and Reputation Collusion

UNIT V: INFORMATION   Random Events and Incomplete Information - Risk and Incentives in Contracting - Lemons, Auctions, and Information Aggregation - Perfect Bayesian Equilibrium - Job-Market Signaling and Reputation.

TEXT BOOK(S):

1. Martin J. Osborne, An introduction to game theory, Oxford University Press, 2014

2. Joel Watson, Strategy: An Introduction to Game Theory, Third edition, W. W. Norton & Company, 2013.

REFERENCE BOOK(S):

1. Ian Millington and John Funge, Artificial Intelligence for Games, Second Edition - ISBN: 0123747317

2. Mailath, George J., and Larry Samuelson. Repeated Games and Reputations. New York, NY: Oxford University Press, 2006.

3. Leyton-Brown, K., Shoham, Y., Essentials of Game Theory: A Concise, Multidisciplinary Introduction, Morgan & Claypool Publishers. 2008.

4. Steven Tadelis, Game Theory An Introduction, Princeton University Press, 2013.

5. William Spaniel, Game Theory 101: The Complete Text book, 2011.

6. William Spaniel, Game Theory 101: Bargaining, 2014.

7. Presh Talwalka, The Joy of Game Theory: An Introduction to Strategic Thinking, 2014.

8. Roger A McCain Game Theory: A Nontechnical Introduction to the Analysis of Strategy: 3rd Edition, World Scientific Publishing Co. Pte. Ltd, 2014

List of Experiments:

1. Study of tools used for game designing

2. To calculate payoffs, strict dominance, weak dominance using equilibrium.

3. To calculate the elimination of strictly dominated strategies and weakly dominated strategies.

4. To Implement the Zero Sum games in the mixed strategies.

5. To implement the Assurance game/Stag Hunt in the following situation. Two hunters can either jointly hunt a stag (an adult deer and rather large meal) or individually hunt a rabbit (tasty, but substantially less filling). Hunting stags is quite challenging and requires mutual cooperation. If either hunts a stag alone, the chance of success is minimal. Hunting stags is most beneficial for society but requires a lot of trust among its members.

6. To implement the game of Chicken (Chicken game) in the equilibrium is preferred by each player.

7. To implement the dead lock gaming in the following strategy (dominant and equilibrium strategies).

8. To Implement the Prisoner's Dilemma game.

9. To implement the Parlor Games.

6.9 CSE18R367: Virtual Reality

CSE18R367	Virtual Reality	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To understand the fundamentals of virtual reality

- To understand geometric modeling and Virtual environment

- To study about Virtual Hardware and Software

- To develop Virtual Reality applications.

Course Outcomes:

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

CO1 Understand the basic concept and framework of virtual reality.

CO2 Elucidate the concept of principles and multidisciplinary features of virtual reality.

CO3 Compare the different technology for user interaction and perception in virtual reality.

CO4 Analyze how to managing large scale VR environment in real time.

CO5 Apply VR system framework and development tools.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S		M	
CO2	S	S	S	S									M			
CO3	S	M	M	M									M		L	
CO4	S												S			L
CO5	S	S	S	S	S	S	S						M		L	

UNIT I: INTRODUCTION TO VIRTUAL REALITY Virtual Reality & Virtual Environment : Introduction Computer graphics Real time computer graphics Flight Simulation Virtual environments requirement benefits of virtual reality- Historical development of VR : Introduction Scientific Landmark -3D Computer Graphics :Introduction The Virtual world space positioning the virtual observer the perspective projection human vision stereo perspective projection 3D clipping Colour theory Simple 3D modeling 176 CS-Engg & Tech-SRM-2013 Illumination models Reflection models Shading algorithms- Radiosity Hidden Surface Removal Realism-Stereographic image.

UNIT II: GEOMETRIC MODELLING Geometric Modeling: Introduction From 2D to 3D 3D space curves 3D boundary representation - Geometrical Transformations: Introduction Frames of reference Modeling transformations Instances Picking Flying Scaling the VE Collision detection - A Generic VR system: Introduction The virtual environment the Computer environment VR Technology Model of interaction VR Systems.

UNIT III: VIRTUAL ENVIRONMENT Animating the Virtual Environment: Introduction The dynamics of numbers Linear and Non-linear interpolation - The animation of objects linear and nonlinear translation - shape & object free from deformation particle system- Physical Simulation : Introduction Objects falling in a gravitational field Rotating wheels Elastic collisions projectiles simple pendulum springs Flight dynamics of an aircraf.

UNIT IV: VR HARDWARES & SOFTWARES Human factors : Introduction the eye - the ear- the somatic senses - VR Hardware : Introduction sensor hardware Head-coupled displays Acoustic hardware Integrated VR systems-VR Software: Introduction Modeling virtual world Physical simulation- VR toolkits Introduction to VRML.

UNIT V: VR APPLICATION Virtual Reality Applications: Introduction Engineering Entertainment Science Training The Future: Introduction Virtual environments modes of interaction.

TEXT BOOK(S):

1. John Vince, Virtual Reality Systems , Pearson Education Asia, 2007.

REFERENCE BOOK(S):

1. Adams, Visualizations of Virtual Reality, Tata McGraw Hill, 2000.

2. Grigore C. Burdea, Philippe Coiffet , Virtual Reality Technology, Wiley Interscience, 2nd Edition, 2006.

3. William R. Sherman, Alan B. Craig, Understanding Virtual Reality: Interface, Application, and Design, Morgan Kaufmann, 2008.

6.10 CSE18R369: Computational Intelligence

CSE18R369	Computational Intelligence	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.

- To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.

- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems

Course Outcomes:

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

CO1 Examine the role of Soft computing techniques and their applications.

CO2 Examine the role of Soft computing techniques and their applications.

CO3 Analyze the various Neural Network Architectures.

CO4 Apply genetic algorithm to engineering Optimization problem

CO5 Analyze Neural Network, Fuzzy logic and Genetic Algorithm in Hybrid Intelligent Systems techiques.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	S	S	S	S								M	L		L
CO3	S	M	M	M	M						M	M	M	L		L
CO4	S	M	M	M	M						M	M	M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: INTRODUCTION   Conventional Artificial Intelligent system-symbolic processing-expert systems-pitfalls-Hard Vs Soft computing techniques-Constituents of soft computing-Special features-Hybrid system.

UNIT II: FUZZY SETS AND LOGIC   Fuzzy sets-Operation on fuzzy sets-fuzzy relation-Fuzzy rules and fuzzy reasoning-Fuzzy Inference systems-Defuzzification-Fuzzy Logic Control-Fuzzy clustering-Fuzzy Decision Making-Applications of Fuzzy logic.

UNIT III: ARTIFICIAL NEURAL NETWORKS   Overview of Biological neuro system-Mathematical Model of Neurons-Learning rules-Learning paradigms-Supervised, unsupervised and reinforcement learning-Perceptron networks-Training rules-multilayer perception back propagation algorithms-associative memories-Hop field networks-Boltzmann machine-Self Organising Map-Adaptive Resonance theory.

UNIT IV: EVOLUTIONARY COMPUTATION   Robustness of traditional optimization and search techniques-The goals of optimization-Introduction to evolutionary programming-Evolutionary strategy-Comparison Genetic Algorithm- binary and real representation schemes, selection methods, crossover and mutation operators for binary and real coding - constraint handling methods Applications.

UNIT V: HYBRID INTELLIGENT SYSTEMS   Adaptive Neuro Fuzzy Inference Systems(ANFIS)-Architecture-Hybrid Learning Algorithm-Parameter Identification-Rule Based Structure identification-Input Selection-Input Space partition-Neuro fuzzy control-Genetic algorithm for fuzzy system design-Neural network training using GA

TEXT BOOK(S):

1. J.S.R.Jang,C.T.Sun and E.Mizutani,Neuro Fuzzy and Soft Computing,PHI Learning private Limited,2010.

2. S.N.Sivanandam and S.N.Deepa, Principles of Soft computing, Wiley India Edition, 2nd Edition, 2013.

REFERENCE BOOK(S):

1. Timothy J.Ross,Fuzzy Logic with Engineering Applications,McGraw-Hill,2004

2. Goldberg,Genetic Algorithm in search,Optimization and Machine learning,Addison Wesley,1998.

List of Experiments:

1. Implementation of simple program using MATLAB

   (a) Find out the factorial of a given number
   (b) Find the Fibonacci series of a given number
   (c) Find out the sum and average of the given number
   (d) Implementation of matrix operation

2. Implementation of Fuzzy Arithmetic operation.

3. Implementation of Fuzzy Operations.

4. Implementation of Defuzzification

5. Implementation of Fuzzy Inference System.

6. Implementation of Perceptron Network

7. Implementation of BPN

8. Build A Hopfield Network

6.11 CSE18R394: ETHICAL HACKING & PENETRATION TESTING

CSE18R394	ETHICAL HACKING & PENETRATION TESTING	L	T	P	C
		3	0	2	4
Course Category:	Professional Elective				
Course Type:	Theory with Practicals				
Pre-requisite:	NIL				

UNIT I: Introduction to Hacking Introduction, Hacking, Motives, Types of Hackers, Sources of Interest Internet, Mobile, Cloud, ATM, Types of Online Crimes , Brief introduction to National and International Laws specific to hacking and accessing third party asset, Information Technology Act.

UNIT II: Understanding Security and Risk Management Introduction, Identifying Threats, Worms, Virus, Trojans, Operating System Threats, Web Applications and Databases threats, Network Threats, Social Engineering, Understanding Environment gathering information, Installing and Setting up your System and tools.

UNIT III: Vulnerability Assessment and Penetration Testing (VAPT) Understanding Vulnerability, Consequences of Vulnerabilities, Web Application attack and Audit Frameworks, Executing tools to attack the defence, (List of tools related to Attack will be compiled into the material to cover) Manual Attacks and Automated Attacks.

UNIT IV: Open source resources for Attacks Penetration Testing Tools Package Management on VM Instance for Penetration testing, installing tools and additional components for hacking remote systems, Wi-Fi, Stress Testing, sniffing and spoofing, password and miscellaneous tools, Tools alone cannot make am attacker a Hacker.

UNIT V: Setting up a web application with exploits Introduction to Web Application with security issues, identifying attack surface, planning the tools and attacking the site, Hacking demonstration and Reporting attacks and vulnerability, Reporting the Vulnerability and recommendation for fixing.

TEXT BOOK(S):

1. Ethical Hacking and Penetration Testing (IBM ICE Publications).

6.12 CSE18R452: Cloud Computing Techniques

CSE18R452	Cloud Computing Techniques	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R371/Computer Networks				

Course Objectives:

- To provide students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.

Course Outcomes:

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

CO1 Elaborate the layers and types of Cloud Computing.

CO2 Choose and use various software services from cloud.

CO3 Compare various models in cloud infrastructure.

CO4 Build applications using Mapreduce and GridBatch.

CO5 Experiment with resource allocation concept.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S	M		M
CO2	S												S	M		M
CO3	S	S	S	S	S	M	L				S	M	S	M		M
CO4	S	S	S	S	S	M	L				S	M	S	M		M
CO5	S	S	S	S	S	M	L				S	M	S	M		M

UNIT I: INTRODUCTION TO CLOUD COMPUTING LANDSCAPE Introduction - Cloud Systems Classifications - SPI Cloud Classification: Cloud Software Systems - Cloud Platform Systems - Cloud Infrastructure Systems UCSB -IBM Cloud Ontology: Applications (SaaS) - Cloud Software Environment (PaaS) -Cloud Software Infrastructure - Software Kernel Layer - Cloud Hardware /Firmware - Jacksons Expansion on the UCSB - IBM Ontology - Hoffs Cloud Model.

UNIT II: HARNESSING CLOUDS AND SOFTWARE SERVICES FOR SCIENCE Science GatewaysBackground and Motivation - Clouds and Software Services - Science Clouds, Public and Private - Cloud Computing for Science - Architecture of an SaaS Science Gateway - Dynamic Provisioning of Large-Scale Scientific Datasets.

UNIT III: ENTERPRISE KNOWLEDGE CLOUDS Introduction - Enterprise Knowledge Management: Architecture and Technologies - Enterprise Knowledge - Cloud Computing: IT as a Service - Cloud Computing Model Application Methodology - Cloud Computing in Development/Test - Cloud-Based High Performance Computing Clusters - Use Cases of Cloud Computing -Case Studies: Cloud as Infrastructure for an Internet Data Center, Cloud Computing for Software Parks, An Enterprise with Multiple Data Centers, Cloud Computing Supporting SaaS.

UNIT IV: LARGE-SCALE DATAPROCESSING Introduction MapReduce - Programming Model - Implementation Sketch - Failure Handling Optimizations Grid-Batch - DFS Extension - GridBatch Operators - Sample Application: Computing Median - Traditional Enterprise Approach - Algorithm for Finding Medians - MapReduce Approach - GridBatch Approach -Comparing MapReduce and GridBatch Approaches - MapReduce Implementation on a Cloud OS - HigherLevel Programming Languages.

UNIT V: HIGH-PERFORMANCE PARALLEL COMPUTING WITH CLOUD AND CLOUD TECHNOLOGIES AND RELIABLE CLOUD SERVICE Introduction - Modeling the Service Load of a Cloud Computing System: Measuring the Workload - Framework for Requesting and Allocation Resources - Modeling the Availability and Reliability of a Cloud Computing Service - Modeling the Reliability of a Cloud Computing Service - High-Performance Parallel Computing with Cloud and Cloud Technologies - Cloud Technologies - Programming Models - Data Analyses Applications-Evaluations: Case studies - Kmeans and Matrix Multiplication - Alu Sequence Analysis - Performance of MPI on Clouds.

TEXT BOOK(S):

1. Syed A. Ahson , Mohammad Ilyas, "Cloud Computing and Software Services Theory and Techniques", CRC Press, first edition,2011.

REFERENCE BOOK(S):

1. Gautam Shroff, "Enterprise Cloud Computing: Technology, Architecture, Applications", Cambridge University Press, first edition, 2010

2. Shrief Sakr, Mohamed Gaber,"Large Scale and Big data processing and management",CRC press,first edition 2014

3. Marijana Despotovi Zrakic, "Handbook of Research on High Performance and Cloud Computing in Scientific research and education", Information Science Reference-IGI Global, first edition, 2014.

4. San Murugesan, Irena Bojanova, "Encyclopedia of Cloud Computing", Wiley publication, Second edition, 2016.

5. Borko Furht, Armando Escalante, "Handbook of Cloud Computing", Springer 2010.

List of Experiments:

1. Installation of Oracle Virtual box and creating virtual machine

2. Creating datacenter in Cloudsim

3. Installation of Map reduce.

4. Installation of Grid Batch

5. Program to find medians using Map reduce and Grid batch

6. Find procedure to install storage controller and interact with it.

7. Find procedure to set up the one node Hadoop cluster.

8. Mount the one node Hadoop cluster using FUSE.

9. Write a word count program to demonstrate the use of Map and Reduce tasks

6.13 CSE18R453: Applied Crytography and its Applications

CSE18R453	APPLIED CRYPTOGRAPHY AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To understand basic principles of secure communication, know principles and problems of basic cryptosystems for encryption, digital signing and authentication.

- To make the students to know methods to create core cryptographic protocols primitives, practically use simple cryptosystems; know how the real protocols enabling secure communication over internet, various tools and techniques to protect as well as attack a computer network.

COURSE OUTCOMES:

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

CO1: Analyze and model the mathematical foundations to modern cryptographic techniques.

CO2 : Critically evaluate modern symmetric and asymmetric cryptographic techniques and attacks.

CO3 : Employ modern cryptographic techniques to enhance overall system security.

CO4 : Evaluate modern cryptographic techniques, such as Digital Signatures and Hashing.

CO5 : Examine how cryptography is deployed in practice, with an emphasis on its application in network security.

MAPPING OF COURSE OUTCOMES WITH PO, PSO:

	PO'S												PSO'S			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S	M		M
CO2	S	S		S	S	M	L						S	M		M
CO3	S	S	S	S	S	M	L				S	M	S	M		M
CO4	S	S	S	S	S	M	L				S	M	S	M		M
CO5	S	S	S	S	S	M	L				S	M	S	M		M

UNIT I: OVERVIEW

Overview of cryptography - Probability theory, Information theory, Complexity theory, Number theory, Abstract algebra, Finite fields

UNIT II: NUMBER THEORY

Number - Theoretic Problems Public Key Parameter - Pseudorandom Bits and Sequences.

UNIT III: ATTACKS

Attacks - Services - Mechanisms - Conventional Encryption - Classical and Modern Techniques Encryption - Algorithms - Confidentiality.

UNIT IV:CIPHER TECHNIQUES

Stream Ciphers Block Ciphers (including AES) Public key Encryption Hash Function and Data Integrity Identification and Entity Authentication Digital Signature Key Establishment Protocols

UNIT V: APPLICATIONS

Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

TEXT BOOK(S):

1. Alfred Menezes J, Paul van Oorschot C and Scott Vanstone A, Hand Book of Applied Cryptography.

2. William Stallings, Cryptography and Network Security, Pearson Education India, 7th Edition,2017

6.14   CSE18R456: Web Technology

CSE18R456	Web Technology	L	T	P	C
		3	0	0	3
Course Category:	Professional Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To make students to familiar with client server architecture and able to develop a web application using java technologies.

- To assist students to gain skills and project-based experience needed for entry into web application development careers .

Course Outcomes:

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

CO1 Interpret the technologies in web development.

CO2 Develop programs using various scripting languages.

CO3 Build an internet application

CO4 Experiment with web servers and databases .

CO5 Create web applications using various web technologies.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S			
CO2	S	S	S	S	S	M	L	M			S	M	S	M		M
CO3	S	S	S	S	S	M	L	M	L	L	S	M	S	M	L	M
CO4	S	S	S	S	S	M	L	M			S	M	S	M		M
CO5	S	S	S	S	S	M	L	M			S	M	S	M		M

UNIT I: INTRODUCTION TO WEB TECHNOLOGIES Evolution of the Internet and World Wide Web–Web Basics -Client-Side Scripting versus Server-Side Scripting-World Wide Web Consortium (W3C) -Web 2.0-Introduction to HTML5- Editing HTML5-Validation Service- Headings - Linking - Images -alt Attribute- Void Elements-Using Images as Hyperlinks - Special Characters and Horizontal Rules - Lists - Tables - Forms-Internal Linking - meta Elements - New HTML5 Form input Types- Page-Structure Elements.

UNIT II: CSS AND SCRIPTING LANGUAGES Introduction to Cascading Style Sheets- Inline Styles - Embedded Style Sheets - Conflicting Styles - Linking External Style Sheets - Positioning Elements-Backgrounds Element Dimensions -Box Model and Text Flow Media Types and Media Queries - Drop-Down Menus -User Style Sheets-JavaScript: Introduction to Scripting- Displaying a Line of Text with JavaScript in a Web Page -Modifying Your First Script -Obtaining User Input with prompt Dialogs-Dynamic Welcome Page - Adding Integers-Memory Concepts-Arithmetic -Decision Making: Equality and Relational Operators, Control Statements ,functions, arrays.

UNIT III: XML AND INTERNET APPLICATION XML -Introduction -XML Basics - Structuring Data -XML Namespaces-Document Type Definitions (DTDs)-W3C XML Schema Documents-XML Vocabularies-Ajax-Enabled Rich Internet Applications with XML and JSON-Introduction History of Ajax- Raw Ajax Example Using the XML-HttpRequest Object - Asynchronous Requests-Exception Handling -Callback Functions -XMLHttpRequest Object Event, Properties and Methods- Using XML and the DOM-Creating a Full-Scale Ajax-Enabled Application- Using JSON- Rich Functionality - Interacting with a Web Service on the Server- Parsing JSON Data.

UNIT IV: WEB SERVERS & WEB DATABASES Introduction -HTTP Transactions-Multitier Application -architecture - Client-Side Scripting versus Server-Side Scripting Accessing Web Servers - Apache, MySQL and PHP Installation XAMPP Installation ,running ,testing procedures, Microsoft IIS Express and WebMatrix - Installing, running ,client side, PHP examples-Introduction to Relational Databases-MySQL -Microsoft Language Integrate Query - Java DB/Apache Derby.

UNIT V: WEB APPLICATION DEVELOPMENT Introduction -Your First ASP.NET Application in C# and Visual basic-Building the WebTime Application-Standard Web Controls: Designing a Form Validation Controls- Session Tracking-Web Services-Case Study: Database-Driven ASP.NET Guestbook,Case Study: Password-Protected Books Database Application.

TEXT BOOK(S):

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, 5/e, Pearson Education Asia, 2009.

REFERENCE BOOK(S):

1. Eric Ladd, Jim O Donnel, Java, XHTML, HTML, XML: magnum, Prentice Hall of India, QUE, 2000.

2. Rajkamal, Web Technology, Tata McGraw-Hill, 2007, 7thedition.

3. Jon Duckett,Web Design with HTML, CSS, JavaScript and jQuery Set Wiley, First edition, 2014.

List of Experiments:

1. Using HTML5 canvas with JavaScript to draw lines, rectangles, arcs, and circles.

2. Using HTML5 canvas with JavaScript to draw gradients and shadows.

3. Write an XML file and DTD file which will display the Book information

4. Installation & Configuration of APACHE,WAMP stack

5. Procedure to use and configure PhpMyAdmin to manage mySQL databases.

6. Create a Ajax-Enabled Rich Application with PHP and mySQL

7. Usage of JavaScript function JSON.parse(text) which converts a JSON text into a JavaScript object.

8. Procedure to use JSON to read data from a web server, and display it in a web page using XMLHttp

6.15 CSE18R457: Mobile Application Development

CSE18R457	Mobile Application Development	L	T	P	C
		3	0	0	3

Course Category:	Professional Elective
Course Type:	Theory
Pre-requisite:	CSE18R272/ Java Programming

Course Objectives:

- To make students to learn application development and develop mobile app on various mobile platform like ANDROID and IOS..

Course Outcomes:

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

CO1 Understand about the mobile application market and web services for various mobile devices.

CO2 Understand about the various Mobile Information Design, design Tools, Mobile Platforms and Mobile Web Option.

CO3 Design the User interface with various features of Android SDK like displaying pictures, menus etc.

CO4 Utilize the messaging, networking and location based service in Android application.

CO5 Create, Debug and build the apps for the latest Windows and IOS.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												S			
CO2	S												S			M
CO3				S	S	M	L				S				M	
CO4	S	S				M	L							S		
CO5			S								S	M	L			M

UNIT I: INTRODUCTION Preliminary Considerations - Cost of Development - Importance of Mobile Strategies in Business World - Mobile Web Presence - Mobile Applications - Marketing – Web Services for Mobile Devices – Creating Example Web Service - Debugging Web Service.

UNIT II: MOBILE USER INTERFACE DESIGN Effective Use of Screen Real Estate Understanding Mobile Application Users Understanding Mobile Information Design Understanding Mobile Platforms Using the Tools for Mobile Interface Design Choosing a Mobile Web Option Adaptive Mobile Website Dedicated mobile website Mobile Web Applications with HTML 5.

UNIT III: ANDROID APPLICATION DEVELOPMENT Getting started with Android Designing Your User interface using Views Displaying Pictures and Menus with Views Using Image views to Display pictures Using menus with views Data Persistence Saving and loading user performances - Persisting data to files Creating and using Data bases Content Providers.

UNIT IV: ANDROID MESSAGING, NETWORKING, LOCATION BASED SERVICES SMS Messaging, Sending E-mail Networking Downloading Binary Data, Text Files- Accessing Web Services Performing Asynchronous Calls Location Based Services Displaying Maps Getting Location Data Creating your own services Communicating between a service and an activity Binding activities to Services.

UNIT V: IOS, WINDOWS PHONE, PHONEGAP AND TITANIUM IOS Tools, iOS Project, Debugging iOS Apps, Building the derby app in iOS, Objective C Basics - Windows Phone 7: Tools, Windows Phone 7 Project Building Derby App in Windows Phone 7 - Appcelerator titanium: tools, Developing application, Building derbyapp, connecting to market - Phonegap: tools, Developing application, Building Derbyapp, connecting to market.

TEXT BOOK(S):

1. Jeff McWherter and Scott Gowell, Professional Mobile Application Development, Wrox 2012.

2. Wei-Meng Lee Beginning Android 4 Application Development March 2012

REFERENCE BOOK(S):

1. Charlie Collins, Michael Galpin and Matthias Kappler, Android in Practice, Dream Tech. 2012.

2. James Dovey and Ash Furrow, Beginning Objective C, Apress, 2012.

3. David Mark, Jack Nutting, Jeff LaMouche, and Fredric Olsson, Beginning iOS6 Development: Exploring the iOS SDK, Apress, 2013.

List of Experiments:

1. ANDROID APPLICATION PROJECT:

   (a) Apply the view concept to design the tic-tac-toe game.

   (b) Create an Information System using database.

   (c) Create an application to perform the scientific calculation.

   (d) Develop the application for farmers in planting and irrigation.

   (e) Develop an application for smart city traveler.

   (f) Create an attendance application based on the Location Based Service

2. IOS PROJECT:

   (a) Create an application by accessing the camera feature.

   (b) Design the application to forecast the weather condition

3. WIndows Project:

   (a) Design a paint application

   (b) Design the simple word application.

   (c) Develop the application to track the vehicle

4. Phonegap/Titanium Project:

   (a) Develop a simple game by using graphics and animation.

   (b) Create an application to alert about fire accident through SMS.

   (c) Develop a simple mobile quiz for GATE exam

7 OPEN ELECTIVES:

Level 1:

7.1 CSE18R302–Fundamentals of Networking

CSE18R302	FUNDAMENTALS OF NETWORKING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES:

CO1: Understand the basic concepts of networking
CO2: Understand the networking Hardware components
CO3: Understand various types of transmission medias & topologies.
CO4: Identify the networks type of medium and topological techniques to construct a network.
CO5: Apply the applications of network in real time situations.

UNIT I: INTRODUCTION

Introduction to Networks and Networking - Protocol and Standards - Categories of Networks - Uses and Benefits of Network - Transmission Media - Network Components.

UNIT II: TYPES OF TOPOLOGIES

Simple Physical Topologies Bus Star - Ring and Mesh Topologies - Hybrid Physical Topologies Enterprise - Wide Topologies - Wan Topologies - Logical Topologies - Reference Model- OSI and TCP/IP

UNIT III: ERROR DETECTION TECHNIQUES

Error Detection and Correction - Connecting Devices in Data Link Layers - Switching techniques - Ethernet - CSMA/CD - Switched Ethernet - Gigabit Ethernet - Ethernet frame types - IEEE 802.3 -Token ring - FDDI

UNIT IV:NETWORK PROTOCOLS

The Network Layer Design Issues Internal Organization of Network Layer - Logical Addressing - Internet Protocols - IPV4 and IPV6 - Address Mapping - Error Reporting and Multicasting Delivery- Forwarding And Routing .

UNIT V: NETWORK LAYERS

Process to Process Delivery: UDP- TCP - SCTP Congestion Control and Quality of Service - Session Layer - Presentation Layer and Application Layer - DNS services - DHCP Services - Remote Logging - E-mail - File Transfer - www - http Multimedia.

TEXT BOOKS:

1. Forouzan b. A, Data communications and Networking, 4th Edition, Tata Mcgraw-Hill Publications, 2006.

2. Tamara dean, Network+ guide to networks, 7th Edition,2015

REFERENCE BOOKS:

1. Tanenbaum A. S., Computer Networks , 4th Edition, Pearson Education,2007

2. James f. Kurose, Computer Networking- a top-down approach featuring the internet , 5th Edition, Person Education, 2015

3. Comer D, Computer Networks And Internet, 2nd Edition, Pearson Education,2001

7.2 CSE18R303–OOPS using C++

CSE18R303	OOPS USING C++	L	T	P	C
		3	1		3

COURSE OUTCOMES:

CO1: Understand the basic concepts of OOPS and syntax in C++
CO2: Create C++ programs using classes, constructors
CO3: Create C++ programs for function overloading, operator overloading
CO4: Identify the inheritance type for given problem and create programs using virtual function concepts
CO5: Analyze the need for generic programming and fault tolerant programming using templates and exception handling

UNIT I: INTRODUCTION

Introduction to OOP Basic Concepts of OOP Applications of OOP- Introduction to C++ - Introduction to C++ - C++ Input and Output Declarations in C++ - Namespaces - Function Prototypes Inline Functions Default Arguments Unary Scope Resolution Operator

UNIT II: CLASSES, CONSTRUCTORS AND FRIEND CLASS

Introduction Comparing class with Structure Class Scope Accessing Members of a class Constructor Destructor Passing and Returning Objects From Functions- Friend Class Friend function

UNIT III: OVERLOADING & INHERITANCE

Operator Overloading Fundamentals Restrictions Overloading stream Insertion and Stream Extraction Operators Overloading Unary & Binary Operators Inheritance Introduction Types - Protected Members Public - Protocols and Private Inheritance Direct Base Classes and Indirect Base Classes

UNIT IV:VIRTUAL FUNCTIONS, STREAMS AND FILES

Introduction Virtual Functions Polymorphism C++ Stream I/O: Streams Stream Input Stream Output Unformatted I/O Stream Manipulators Stream Format States Stream Error States. Files: File Operations, File Pointers, Error Handling during File Operations.

UNIT V:TEMPLATES & EXCEPTION HANDLING

Templates Function Templates Class Templates Exception Handling - When Exception Handling, Basic of C++ Exception, Catching an Exception, Re throwing an Exception, Exception Specifications.

TEXT BOOKS:

1. E.Balagurusamy, Object-Oriented Programming Using C++ , Mcgraw Hill Education, 6th Edition, 2013.

REFERENCE BOOKS:

1. D.S.Malik, C++ Programming Language, CENGAGE Learning, 2009.

2. Bjarne Struoustrup, The C++ Programming Language , Addison Wesley, 2000.

3. John R.Hubbard, Programming with C++, Schaums Outline Series, TMH 2003.

4. Deitel H.M., and Deitel P.J., How to program C++, PHI 2003.

7.3 CSE18R304–OOPS using Java

CSE18R304	OOPS using Java	L	T	P	**C**
		3	1	0	3

COURSE OUTCOMES:

CO1: Understand the basic concepts of Object Oriented paradigm
CO2: Apply the programming concepts of JAVA to problem solutions.
CO3: Design error free code to real world problems.
CO4: Develop re-useable code for application development.
CO5: Implement user friendly applications.

UNIT I: OBJECT ORIENTED BASICS

Need for Oop Paradigm - A Way of Viewing World Agents, Responsibility- Messages, Methods - Classes and Instances- Class Hierarchies (Inheritance) - Method Binding, Overriding and Exceptions- Summary of Oop Concepts, Coping With Complexity - Abstraction Mechanisms.

UNIT II: JAVA BASICS

History of Java- Java Buzzwords - Data Types Variables - Scope and Life Time Of Variables - Arrays - Operators- Expressions - Control Statements - Type Conversion and Casting - Simple Java Program - Concepts of Classes Objects Constructors Methods - Access Control- This Keyword - Garbage Collection - Overloading Methods and Constructors - Parameter Passing- Recursion - Nested and Inner Classes- Exploring String Class.

UNIT III: INHERITANCE,PACKAGES AND INTERFACE

Forms of Inheritance- Class Hierarchy- Benefits of Inheritance - Member Access Rules - Super Uses - Using Final With Inheritance - Polymorphism- Method Overriding - Abstract Classes - Defining - Creating And Accessing A Package - Understanding CLASS-PATH - Importing Packages - Interfaces

UNIT IV:EXCEPTION HANDLING

Concepts of Exception Handling - Benefits of Exception Handling - Exception Hierarchy - Usage of Try - Catch - Throw - Throws and Finally - Built In Exceptions - Creating Own Exception Sub Classes

UNIT V: APPLETS

Applets: Fundamentals - Differences Between Applets and Applications- Type Of Applet - Applet Architecture - Creating Applets - Passing Parameters to Applet Frames: Working with Frame Windows - Creating Frame Windows In an Applet AWT Components: Lable - Buttons - Checkbox - Checkbox Group - List - Text Field Layout Management: Menubars & Menu

TEXT BOOK(S):

1. Herbert Schildt, Java The complete reference, 8 th Edition, McGraw Hill Education, 2011.

2. Cay S. Horstmann, Gary cornell, Core Java Volume I Fundamentals, 9 th Edition, Prentice Hall, 2013.

REFERENCE BOOK(S):

1. Cay S. Horstmann, Gary cornell, Core Java Volume I Fundamentals, 9 th Edition, Prentice Hall, 2013.

2. Steven Holzner, Java 2 Black book, Dreamtech press, 2011

3. Timothy Budd, Understanding Object-oriented programming with Java, Updated Edition, Pearson Education, 2000.

7.4 CSE18R305–Introduction to Data Analytics

CSE18R305	INTRODUCTION TO DATA ANALYT-ICS	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Understand the need for business analytics and phases of data analytics
CO2: Apply appropriate modulating and analytical methods to analyze data
CO3: Create statistical models and represent the predicted results
CO4: Implement machine learning algorithms to process data
CO5: Analyze and visualize the results of necessary datasets using 'R' tool

UNIT I: DATA ANALYTICS LIFE CYCLE

Introduction to Big Data Business Analytics - State of The Practice In Analytics Role of Data Scientists - Key Roles for Successful Analytic Project - Main Phases of Life Cycle - Developing Core Deliverables For Stakeholders.

UNIT II: MODELING METHODS

Choosing and Evaluating Models Mapping Problems to Machine Learning - Evaluating Clustering Models - Validating Models Cluster Analysis K-Means Algorithm - Nave Bayes Memorization Methods Linear and Logistic Regression Unsupervised Methods.

UNIT III: STATISTICS AND REGRESSION

Sampling Techniques - Data Classification - Tabulation - Frequency And Graphic Reporesentation - Measures of Central Value - Arithmetic Mean - Geometric Mean - Harmonic Mean - Mode - Median - Quartiles - Deciles - Percentile - Measures of Variation Range - IQR - Quartile Deviation - Mean Deviation - Standard Deviation - Coefficient Variance - Skewness - Moments & Kurtosis - Descriptive Statistics - Inferential Statistics - Regression & ANOVA

UNIT IV:MACHINE LEARNING TECHNIQUES

Introduction and Concepts - Supervised Learning with Regression and Classification Techniques - Supervised Learning with Regression and Classification Techniques - Unsupervised Learning and Challenges for Big Data Analytics.

UNIT V: NETWORK LAYERS

Reading and Getting Data Into R Ordered and Unordered Factors Arrays and Matrices Lists and Data Frames Reading Data From Files Probability Distributions Statistical Models In R - Manipulating Objects Data Distribution.

REFERENCE BOOKS:

1. Nina Zumel, John Mount, Practical Data Science With R, Manning Publications, 2014.

2. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, Mining Of Massive Datasets, Cambridge University Press, 2014.

3. Mark Gardener, Beginning R - The Statistical Programming Language, John Wiley & Sons, Inc., 2012.

4. W. N. Venables, D. M. Smith And The R Core Team, An Introduction To R, 2013.

5. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, Practical Data Science Cookbook, Packt Publishing Ltd., 2014.

6. Chris Eaton, Dirk Deroos, Tom Deutsch Et Al., Understanding Big Data, Mcgrawhill, 2012.

7. Alberto Cordoba, Understanding The Predictive Analytics Lifecycle, Wiley, 2014.

8. Eric Siegel, Thomas H. Davenport, Predictive Analytics: The Power To Predict Who Will Click, Buy, Lie, Or Die, Wiley, 2013.

9. James R Evans, Business Analytics Methods, Models And Decisions, Pearson 2013.

10. R. N. Prasad, Seema Acharya, Fundamentals Of Business Analytics, Wiley, 2015.

11. S M Ross, Introduction To Probability And Statistics For Engineers And Scientists, Academic Foundation, 2011.

7.5 CSE18R306–Introduction to Software Engineering

CSE18R306	INTRODUCTION TO SOFTWARE EN-GINEERING	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Identify and build an appropriate process model for a given project
CO2: Analyze the principles at various phases of software development
CO3: Translate specifications into design, and identify the components to build the architecture for a given problem.
CO4: Define a appropriate Testing Plans at different levels during the development of the software
CO5: Understand the software project estimation models and estimate the work to be done, resources required and the schedule for a software project

UNIT I: INTRODUCTION

Software and Software Engineering - Project Management Concepts - Software Engineering Paradigms Generic Process Models, - Water Fall Life Cycle Model - Prototype Model - RAD Model - Spiral Model - Incremental Model

UNIT II: SOFTWARE PROJECTS

Process and Project Domains Feasibility Study- Understanding Requirements- Estimation , Scheduling Risk Management Review Techniques - Software Quality Assurance

UNIT III: DESIGN CONCEPTS

Design Process - Design Principles - Design Concepts - Software Architecture Architectural Style- User Interface Design

UNIT IV:SOFTWARE TESTING

Testing Fundamentals and Strategies - White-box and Black box Testing - Testing for Special Environments - Unit Testing, - Integration Testing - Validation Testing - System Testing Debugging - Software Maintenance

UNIT V: CASE TOOLS

Computer Aided Software Engineering - Clean Room Software Engineering Reengineering - Reverse Engineering

TEXT BOOKS:

1. Ian Somerville, Software Engineering,, Addison-Wesley, 8th edition, 2006.

REFERENCE BOOKS:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Mc-Graw Hill, Seventh Edition, 2010.

2. Steve McConnell, Code Complete, Second Edition, Microsoft Press,2006

3. Richard E. Fairley, Software Engineering Concepts, McGraw- Hill, 1985.

7.6 CSE18R307–Fundamentals of Operating Systems

CSE18R307	FUNDAMENTALS OF OPERATING SYSTEMS	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Understand the Structure and functions of Operating Systems
CO2: Understand the principles of scheduling and design various scheduling algorithms
CO3: Analyze the various memory management schemes.
CO4: Apply the principles of Disk scheduling and file systems
CO5: Understand the administrative tasks of Linux servers

UNIT I:OPERATING SYSTEMS OVERVIEW

Computer System Overview-Basic Elements - Instruction Execution - Interrupts - Memory Hierarchy - Cache Memory - Direct Memory Access - Multiprocessor And Multicore Organization. Operating System Overview-Objectives And Functions - Evolution Of Operating System.- Computer System Organization - Operating System Structure And Operations- System Calls - System Programs - OS Generation And System Boot.

UNIT II: PROCESS MANAGEMENT

Processes - Process Concept - Process Scheduling - Operations on Processes - Interprocess Communication; Threads- Overview - Multicore Programming - Multithreading Models; Windows 7 - Thread And SMP Management. Process Synchronization - Critical Section Problem - Mutex Locks - Semophores - Monitors; CPU Scheduling And Deadlocks.

UNIT III: STORAGE MANAGEMENT

Main Memory-Contiguous Memory Allocation - Segmentation - Paging - 32 and 64 Bit Architecture Examples; Virtual Memory- Demand Paging - Page Replacement - Allocation - Thrashing; Allocating Kernel Memory - OS Examples.

UNIT IV:I/O SYSTEMS

Mass Storage Structure- Overview - Disk Scheduling and Management; File System Storage-File Concepts - Directory and Disk Structure - Sharing and Protection; File System Implementation- File System Structure - Directory Structure - Allocation Methods - Free Space Management - I/O Systems.

UNIT V: CASE STUDY

Linux System- Basic Concepts; System Administration-Requirements for Linux System Administrator - Setting up a LINUX Multifunction Server - Domain Name System - Setting up Local Network Services; Virtualization- Basic Concepts - Setting up Xen - Vmware on Linux Host and Adding Guest OS.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, 9 th Edition, John Wiley and Sons Inc., 2012.

REFERENCE BOOKS:

1. William Stallings, Operating Systems Internals and Design Principles, 7 th Edition, Prentice Hall, 2011.

2. Andrew S. Tanenbaum, Modern Operating Systems, Second Edition, Addison Wesley, 2001.

3. Charles Crowley, Operating Systems: A Design-Oriented Approach, Tata McGraw Hill Education, 1996.

4. D M Dhamdhere, Operating Systems: A Concept-Based Approach, Second Edition, Tata McGraw-Hill Education, 2007.

7.7 CSE18R308–Ethical Hacking

CSE18R308	ETHICAL HACKING	L	T	P	CREDIT
		3	1	0	4

COURSE OUTCOMES:

CO1: Understand the need of Ethical Hacking
CO2: Demonstrate the social engineering attacks
CO3: Implement the various attacks and vulnerabilities
CO4: Design the tools and techniques to prevent hacking
CO5: Analyze the various malwares

UNIT I: INTRODUCTION

Ethics Of Ethical Hacking: Why you need to Understand Your Enemy's Tactics?, Recognizing The Gray Areas in Security Vulnerability Assessment Penetration Testing. Ethical Hacking and the Legal System: Understanding Individual Cyberlaws 18 USC Section 1029, 1030, 2510 Digital Millennium Copyright Act (DMCA) Cyber Security Enhancement Act 2002. Proper and Ethical Disclosure: CERT's Current Process Full Disclosure Policy Organization for Internet Safety

UNIT II: SOCIAL ENGINEERING ATTACKS

Social Engineering Attacks: How A Social Engineering Attack Works?   Conducting A Social Engineering Attack Common Attacks used in Penetration Testing Defending Against Social Engineering Attacks. Physical Penetration Attacks: Why A Physical Penetration is important Conducting a Physical Penetration Common Ways into A Building. Insider Attacks: Why Simulating an Insider Attack is Important Conducting an Insider Attack Defending against Insider Attack.

UNIT III: CONTENT-TYPE ATTACKS

Understanding and Detecting Content-Type Attacks: How do Content-Type Attacks work? - Which File Formats are Being Exploited Today? - Tools to Detect Malicious PDF Files Tools to test your Protections against Content-Type Attacks How to protect your Environment from Content-Type Attacks. Web Application Security Vulnerabilities: Overview of Top Web Application Security Vulnerabilities SQL Injection Vulnerabilities Cross-Site Scripting Vulnerabilities. VoIP Attacks .

UNIT IV:PASSIVE ANALYSIS

Passive Analysis: Ethical Reverse Engineering Why Bother with Reverse Engineering?   Source Code Analysis. Advanced Reverse Engineering: Overview of Software

Development Process Instrumentation Tools Fuzzing Instrumented Fuzzying Tools and Techniques. Finding New Browser Based Vulnerabilities. Mitigation Alternatives

UNIT V: MALWARE ANALYSIS

Collecting Malware and Initial Analysis: Malware Latest Trends in Honeynet Technology Catching Malware Initial Analysis of Malware. Hacking Malware: Trends in Malware De-Obfuscating Malware Reverse Engineering Malware.

TEXT BOOKS:

1. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, Terron Williams, Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition, 2011.

REFERENCE BOOKS:

1. Sharma Pankaj, Hacking, APH Publishing, 2005. Rajat Khare, Network Security and Ethical Hacking, Luniver Press, 2006.

7.8 CSE18R309–Introduction to Python Programming

CSE18R309	INTRODUCTION TO PYTHON PRO-GRAMMING	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Develop basic programs using fundamental structures.
CO2: Create programs using various collection data types.
CO3: Apply appropriate Python control flow structure.
CO4: Implement user defined python functions
CO5: Understand the objected oriented concepts of Python

UNIT I: INTRODUCTION

Python Object Types Numeric Type Basics Numeric Literals Built In Numeric Tools Python Expression Operators Numbers In Action Other Numeric Types String Literals Strings in Action String Methods String Formatting Expressions String Formatting Method Calls General Type Categories

UNIT II: LISTS AND DICTIONARIES

Lists in Action Basic List Operations List Iteration and Comprehensions Indexing, Slicing and Matrixes Changing List in Place Dictionaries Dictionaries in Action Basic Dictionary Operations Changing Dictionaries in Place Dictionary Methods A Language Table Dictionary Usage Notes Other Ways to Make Dictionary Tuples Files Python Type Hierarchies

UNIT III:STATEMENT AND SYNTAX

Introducing Python Statements- A Tale of Two Ifs Assignment Statements Expression Statements Print Operations If Statements Python Syntax Rules While Loops For Loops Loop Coding Techniques Iterators List Comprehension

UNIT IV:FUNCTIONS

Coding Functions- Scope Basics Scope Rules Global Statement Scopes and Nested Functions Nonlocal Statement Argument Passing Basics Special Argument Matching Modes Function Design Concepts- Recursive Functions Function Objects Anonymous Functions Mapping Functions

UNIT V: CLASSES AND OOP

Class Coding Basics Class Statement Methods Inheritance Attribute Tree Construction Specializing Inherited Methods Class Interface Techniques Abstract Super Classes -Namespaces Simple Names Attribute Names Namespace Dictionaries Operator Overloading Designing With Classes

TEXT BOOKS:

1. 1. Mark Lutz , Learning Python , Fifth Edition, O,Reilly, 2013

7.9   CSE18R310–PC Hardware and Trouble Shooting

CSE18R310	PC HARDWARE AND TROUBLE SHOOTING	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Understand the basic organization of Computers
CO2: Understand the working mechanisms of peripheral devices
CO3: Understand the PF hardware overview
CO4: Apply system configuration setting for PC assembling and integration
CO5: Analyze computer troubles and apply troubleshooting techniques

UNIT I: INTRODUCTION

Introduction Computer Organization Number Systems and Codes ALU CU Instruction Fetch Interrupts I/O Techniques Device Controllers Error Detection Techniques Microprocessor Personal Computer Concepts Advanced System Concepts Microcomputer Concepts OS Multitasking and Multiprogramming Virtual Memory Cache Memory Modern PC

UNIT II: PERIPHERAL DEVICES

Introduction Keyboard CRT Display Monitor Printer Magnetic Storage Devices FDD HDD Special Types of Disk Drives Mouse and Trackball Modem Fax-Modem CD ROM Drive Scanner Digital Camera DVD Special Peripherals.

UNIT III: PC HARDWARE OVERVIEW

Introduction Hardware BIOS DOS Interaction The PC family PC hardware Inside the System Box Motherboard Logic Memory Space Peripheral Interfaces - and Controllers Keyboard Interface CRT Display interface FDC HDC.

UNIT IV:INSTALLATION AND PREVENTIVE MAINTENANCE

Introduction System Configuration Pre Installation Planning Installation Practice Routine Checks PC Assembling and Integration BIOS Setup Engineering Versions and Compatibility Preventive Maintenance DOS Virus Data Recovery.

UNIT V: TROUBLESHOOTING

Introduction Computer Faults Nature of Faults Types of Faults Diagnostic Programs And Tools Microprocessor and Firmware Programmable LSIs Bus Faults Faults Elim-

ination Process Systematic Troubleshooting Symptoms Observation Fault Diagnosis
Fault Rectification Troubleshooting Levels FDD,HDD,CD ROM problems.

TEXT BOOKS:

1. B. Govindarajalu, IBM PC Clones Hardware, Troubleshooting and Maintenance, 2rd Edition, TMH, 2002.

REFERENCE BOOKS:

1. Peter Abel, Niyaz Nizamuddin, IMB PC Assembly Language and Programming,Pearson Education, 2007

2. Scott Mueller, Repairing PC's, PHI, 1992

7.10 CSE18R311–Data and Word Processing

CSE18R311	DATA AND WORD PROCESSING	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Develop documents using word software by applying all document functions and Styles
CO2: Create reports with charts using spreadsheets software
CO3: Create and maintain a simple database
CO4: Create presentations with esthetic sense
CO5: Understand basic mechanisms for using internet and world wide web

UNIT I: INTRODUCTION TO MS OFFICE

Introduction To MS Office - MS Word And Open Office Writer: MS Word - Working With Documents -Opening & Saving Files, Editing Text Documents, To Different Formats, Importing & Exporting Documents, Sending Files To Others, Formatting Documents - Setting Font Styles, Font Selection- Style, Size, Colour Etc, Setting Page Style -, Web Page. Creating Tables- Table Settings, Borders, Alignments, Insertion, Deletion, Merging, Splitting, Sorting, And Formula, Drawing - Inserting Cliparts, Pictures/Files Etc., Tools Word Completion, Spell Checks, Mail Merge, Templates, Using Wizards, Tracking Changes, Security, Digital Signature. Printing Documents Shortcut Keys.

UNIT II:INTRODUCTION TO MS EXCEL

Introduction To MS Office MS Excel and Open Office Calc: MS Excel: Spread Sheet & Its Applications, Opening Spreadsheet, Menus - Main Menu, Formula Editing, Formatting, Toolbars, using Icons. Entering & Deleting Data-, Filling Continuous Rows, Columns, Highlighting Values, Find, Search & Replace, Inserting Data, Insert Cells, Column, Rows & Sheets, Symbols, Data From External Files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Working With Sheets Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts - Drawing. Printing. Using Tools Error Checking, Spell Checks, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.

UNIT III: INTRODUCTION TO MS ACCESS

Introduction to MS Office-MS Access and Open Office-Base: MS Access: Introduction, Planning a Database, Starting Access, Access Screen, Creating a New Database, Creating Tables, Working with Forms, Creating Queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview Importing Data From other Databases Viz. MS Excel Etc.

UNIT IV:INTRODUCTION TO MS POWER POINT

Introduction to MS Office-MS Power Point and Open Office-Impress: MS Power Point: Introduction to Presentation Opening New Presentation, Different Presentation Templates, Setting Backgrounds, Selecting Presentation Layouts. Creating a Presentation - Setting Presentation Style, Adding Text to The Presentation. Formatting a Presentation - Adding Style, Colour, Gradient Fills, Arranging Objects, Adding Header & Footer, Slide Background, Slide Layout. Adding Graphics to The Presentation- Inserting Pictures, Movies, Tables etc Into Presentation, Drawing Pictures Using Draw. Adding Effects to The Presentation- Setting Animation & Transition Effect. Printing Handouts, Generating Standalone Presentation Viewer.

UNIT V: INTERNET AND WEB BROWSERS

Internet and Web Browsers: Definition & History of Internet - Uses of Internet - Definition of Web Addressing-URL-Different Types of Internet Connections; Dial Up Connection, Broad Band (ISDN, DSL, Cable), Wireless (Wi-Fi, Wimax, Satellite, Mobile) Naming Convention, Browsers and Its Types, Internet Browsing, Searching - Search Engines - Portals - Social Networking Sites- Blogs - Viewing a Webpage, Downloading and Uploading the Website; Creating an Email-ID, E-Mail Reading, Saving, Printing, Forwarding and Deleting The Mails, Checking the Mails, Viewing and Running File Attachments, Addressing With Cc and Bcc.

TEXT BOOKS:

1. Jan Marrelli ,A Guide to Microsoft Office 2013, 1st Edition, EMC / Paradigm publications, 2013

2. David Beskeen, Microsoft Office 2013 Illustrated Introductory, Cengage Learning, 1st Edition , 2013

7.11   CSE18R312–Fundamentals of Computer Architecture

CSE18R312	FUNDAMENTALS TO COMPUTER ARCHITECTURE	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Understand the functional units of a computers, bus structures and addressing modes
CO2: Understand the knowledge of algorithms to solve arithmetic problems.
CO3: Understand about single bus, multiple bus organization and pipelining concepts
CO4: Analyze RAM, ROM, Cache memory and virtual memory concepts
CO5: Understand the various I/O Interface

UNIT I: BASIC STRUCTURE OF COMPUTERS

Describe about Computer and Its Requirement, Functional Units - Basic Operational Concepts - Bus Structures - Software Performance Memory Locations And Addresses Memory Operations Instruction and Instruction Sequencing Addressing Modes Assembly Language .

UNIT II:ARITHMETIC UNIT

Addition and Subtraction of Signed Numbers Design of Fast Adders Multiplication of Positive Numbers - Signed operand Multiplication and Fast Multiplication Integer Division Floating Point Numbers and Operations.

UNIT III: BASIC PROCESSING UNIT

Fundamental Concepts Execution of a Complete Instruction Multiple Bus Organization Hardwired Control Micro Programmed Control - Pipelining Basic Concepts Data Hazards Instruction Hazards.

UNIT IV:MEMORY SYSTEM

Basic Concepts Semiconductor RAMS - ROMs Speed - Size and Cost Cache Memories -Performance Consideration Virtual Memory - Memory Management Requirements Secondary Storage.

UNIT V: I/O ORGANISATION

Accessing I/O devices Interrupts Direct Memory Access Buses Interface Circuits Standard I/O Interfaces (PCI, SCSI, USB).

TEXT BOOKS:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization,McGraw-Hill, 5th Edition, 2008

REFERENCE BOOKS:

1. William Stallings, –Computer Organization and Architecture - Designing Performance,Pearson Education, 8th Edition, 2009.

2. David A.Patterson and John L.Hennessy, Computer Organization and Design: The hardware software interface, Morgan Kaufmann, 3rd Edition, , 2007.

3. John P.Hayes, Computer Architecture and Organization, McGraw Hill, 3rdEdition, 1998.

7.12   CSE18R313–Bio Inspired Algorithm

CSE18R313	BIO INSPIRED ALGORITHM	L	T	P	CREDIT
		3	0	0	3

COURSE OUTCOMES:

CO1: Explain how biological systems exploit natural processes.

CO2: Visualize how complex and functional high-level phenomena can emerge from low-level interactions

CO3: Compare and select the most appropriate method from: neural, deep learning, fuzzy, evolutionary or hybrid method for any application / data set.

CO4: Design and implement simple bio-inspired algorithms.

CO5: Conduct experiments to investigate empirically bio-inspired systems.

UNIT I: INTRODUCTION

From Nature to Nature Computing - Philosophy- Three Branches - A Brief Overview - Conceptualization: Natural Phenomena, Models and Metaphores- General Concepts- Individuals, Entities and agents - Parallelism and Distributivity- Interactivity- Adaptation- Feedback-Self-Organization-Complexity, Emergence and Reductionism- Bottom-up Vs Top-Down- Determination, Chaos and Fractals.

UNIT II:COMPUTING INSPIRED BY NATURE

Evolutionary Computing : Problem solving - Hill Climbing and Simulated Annealing- Evolutionary Biology- Darwin's Dangerous Idea- Genetics Principles- Classical Example- Standard Evolutionary Algorithm - Genetic Algorithms- Reproduction-Crossover -Mutation- Applications - Evolution Strategies- Evolutionary Programming- Genetic Programming

UNIT III: SWARM INTELLIGENCE

Introduction - Ant Colonies- Ant Foraging Behaviour - Ant Colony Optimization- SACO and scope of ACO algorithms- Clustering Dead bodies and Larval Sorting-Ant Colony Algorithm (ACA) - Swarm Robotics- Foraging for food - Clustering of objects - Collective Prey retrieval- Scope of Swarm Robotics- Social Adaptation of Knowledge- Particle Swarm- Particle Swarm Optimization (PSO)

UNIT IV:IMMUNOCOMPUTING

Introduction- Immune System- Physiology and Main Components Pattern Recognition And Binding- Adaptive Immune Respomse- Self/Nonself Discrimination - Immune Network Theory- Danger Theory- Artificial Immune Systems- Representation- Evaluation Interaction- Immune Algorithms- Bone Marrow Models- Negative Selection Algorithms-

Binary and Real Valued Negative Selection Algorithms- Clonal Selection and Affinity Maturation- Forest's Algorithm- CLONALG - Artificial Immune Networks- Continuous and Discrete Immune Networks.

UNIT V: COMPUTING WITH NEW NATURAL MATERIALS

DNA Computing: Motivation- DNA Molecule- Manipulating DNA - Filtering Models- Adleman's Experiment- Lipton's Solution To SAT Problem- Test Tube Programming Language- Formal Models- Sticker Systems- Splicing Systems- Insertion/Deletion Systems - PAM Model- Universal DNA Computers- Scope Of DNA Computing- From Classical To DNA Computing -Quantum Computing: Motivation- Basic Concepts From Quatum Theory From Classical To Quantum Mechanics- Wave- Particle Duality- Uncertainty Principle- Principles From Quantum Mechanics: DIRAC Notation- Quantum Superposition- Tensor Products- Entanglement- Evolution-Measurement- No-Cloning Theorem-Quatum Information: Bits And Qubits - Multiple Bits And Qubits- Gates Quantum Circuits- Quatum Parallelism- Quantum Algorithms

TEXT BOOKS:

1. Leandro Nunes de Castro, "Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007

REFERENCE BOOKS:

1. Floreano D. and Mattiussi C., "Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies", MIT Press, Cambridge, MA, 2008.

2. Albert Y.Zomaya, "Handbook of Nature-Inspired and Innovative Computing", Springer, 2006.

LEVEL II

7.13 CSE18R401–Bio Python

CSE18R401	BIO PYTHON	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

CSE18R309/ Introduction to Python Programming

COURSE OUTCOMES:

CO1: Understand the programming concepts in Python
CO2: Implement sequence algorithms.
CO3: Analyze large data sets using arrays and files.
CO4: Develope database applications using SQL.

UNIT I: INTRODUCTION TO PYTHON

Programming Principles Basic Data Types Program Flow Simple Data Types Collection Data Types Importing Modules Controlling Command Execution - Conditional Execution - Loops - Error Exceptions - Function Basics - Input Arguments - Variable Scope - Files - Computer Files - Reading Files - File Reading Examples - Writing Files

UNIT II:OBJECT ORIENTED PYTHON

Creating Classes - Data Models - Implementing A Data Model - Refined Implementation - Using Python For Mathematics - Linear Algebra - Numpy Package - Linear Algebra Examples

UNIT III: SEQUENCE ALGORITHMS

Biological Sequences: Bio-Molecules For Non-Biologists - Using Biological Sequences In Computing - Simple Sub-Sequence Properties - Obtaining Sequences With Biopython - Pair wise Sequence Alignments: Sequence Alignment - Calculating An Alignment Score - Optimising Pair wise Alignment - Quick Database Searches - Multiple-Sequence Alignments: Multiple Alignments - Alignment Consensus And Profiles - Generating Simple Multiple Alignments In Python - Interfacing Multiple-Alignment Programs - Sequence Variation And Evolution: A Basic Introduction To Sequence Variation - Similarity Measures - Phylogenetic Trees.

UNIT IV:WORKING WITH ARRAY DATA

Multiplexed Experiments - Reading Array Data - The Microarray Class - Array Analysis - High-Throughput Sequence Analyses: High-Throughput Sequencing - Mapping Sequences To A Genome - Using The Htseq Library

UNIT V: WORKING WITH IMAGES AND DATABASES

Images: Biological Images - Basic Image Operations - Adjustments And Filters - Feature Detection - Databases: A Brief Introduction To Relational Databases - Basic SQL - Designing A Molecular Structure Database Probability: The Basics Of Probability Theory - Restriction Enzyme Example - Random Variables - Markov Chains Statistics: Statistical Analyses - Simple Statistical Parameters - Statistical Tests - Correlation And Covariance -Clustering And Discrimination: Separating And Grouping Data - Clustering Methods - Data Discrimination.

TEXT BOOKS:

1. Stevens T. J., Boucher W,Python Programming for Biology: Bioinformatics and Beyond, Cambridge University Press,2015

7.14 CSE18R402–Internet Security and Computer Forensics

CSE18R402	INTERNET SECURITY AND COMPUTER FORENSICS	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

CSE18R302 / Fundamentals of Networking

COURSE OUTCOMES:

CO1: Understand the Computer Forensics and incident response.
CO2: Realize the Computer Investigation and collection of Evidence for Forensics
CO3: Analyze and validate the computer forensics data and Tools
CO4: Identify the various email Security and Firewalls
CO5: Understand the Indian Laws and Acts and to apply for the computer forensics

UNIT I: INTRODUCTION TO COMPUTER FORENSICS

Computer Forensics- Understanding Computer Forensics, Introduction To Traditional Computer Crime, Traditional Problems Associated With Computer Crime, Identity Theft & Identity Fraud. Types Of CF Techniques Incident And Incident Response Methodology Forensic Duplication And Investigation. Preparation For IR: Creating Response Tool Kit And IR Team. Forensics Technology And Systems.

UNIT II:INVESTIGATION

Understanding Computer Investigation, Introduction To Investigation Tools, Ediscovery, Evidence Collection, Evidence Preservation - Preparing For Computer Investigations-Systematic Approach-Procedures For Investigations-Conducting An Investigation-Physical Requirement, Data Acquisition.

UNIT III: ANALYSIS AND VALIDATION

Computer Forensics Analysis And Validation- Determining What Data To Collect And Analyze- Validating Forensic Data- Addressing Data-Hiding Techniques- Performing Remote Acquisitions- Computer Forensic Tools- Forensic Software Tools- Hardware Tools-Validating And Testing Forensics Software- Recovering Files.

UNIT IV:E-MAIL SECURITY & FIREWALLS

E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands On Case Studies. Encryption and Decryption Methods, Search and Seizure Of Computers, Recovering Deleted Evidences, Password Cracking, Internet Firewalls For Trusted System: Roles of Firewalls Firewall Related Terminology- Types of Firewalls Firewall Designs SET For E-Commerce Transactions.

UNIT V: LAWS AND ACTS

Laws and Ethics, Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and Crpc , Electronic Communication Privacy ACT, Legal Policies.

TEXT BOOKS:

1. Amelia Philips and Christopher Steuart, Bill Nelson, Guide to Computer Forensics and Investigations, Fourth Edition, Cengage learning.2007

2. Nelson Phillips and Enfinger Steuart, Computer Forensics and Investigations, Cengage Learning, New Delhi, 2009.

3. Kevin Mandia, Chris Prosise, Matt Pepe, Incident Response and Computer Forensics , Tata McGraw -Hill, New Delhi, 2006

REFERENCE BOOKS:

1. Robert M Slade, Software Forensics, Tata McGraw - Hill, New Delhi, 2005.

2. Bernadette H Schell, Clemens Martin, Cybercrime, ABC CLIO Inc, California, 2004.

3. Understanding Forensics in IT , NIIT Ltd, 2005.

4. John R.Vacca, Computer Forensics, Cengage Learning, 2005.

5. Marjie T.Britz, Computer Forensics and Cyber Crime: An Introduction, 3rd Edition, Prentice Hall, 2013.

7.15 CSE18R403–Introduction to Cloud Computing

CSE18R403	INTRODUCTION TO CLOUD COMPUTING	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

CSE18R302 / Fundamentals of Networking

COURSE OUTCOMES:

CO1: Understand the layers and types of Cloud Computing
CO2: Understand the IaaS, PaaS and SaaS
CO3: Analyze various scheduling techniques for virtual machines in cloud infrastructure
CO4: Implement private/public/hybrid Cloud infrastructure
CO5: Implement policy management system for Cloud Computing
CO6: Design of data security techniques in the Cloud Computing

UNIT I: FOUNDATIONS

Introduction to Cloud Computing - Definition - Characteristics - Components - Cloud Provider - SAAS - PAAS - IAAS And Others - Organizational Scenarios of Clouds - Administering & Monitoring Cloud Services - Benefits and Limitations - Deploy Application Over Cloud - Comparison among SAAS - PAAS - IAAS Cloud Computing Platforms: Infrastructure As Service: Amazon EC2 - Platform As Service: Google App Engine - Microsoft Azure - Utility Computing - Elastic Computing

UNIT II:INFRASTRUCTURE AS A SERVICE (IaaS)

Introduction to Cloud Technologies - Study of Hypervisors - Compare SOAP and REST Webservices - AJAX and Mashups-Web Services: SOAP and REST - SOAP Versus - REST - AJAX: Asynchronous 'Rich' Interfaces - Mashups: User Interface Services Virtualization Technology: Virtual Machine Technology - Virtualization Applications in Enterprises - Pitfalls of Virtualization Multitenant Software: Multi-Entity Support - Multi-Schema Approach - Multi-Tenance Using Cloud Data Stores - Data Access Control for Enterprise Applications

UNIT III: PLATFORM AND SOFTWARE AS A SERVICE

Data in the Cloud: Relational Databases - Cloud File Systems: GFS And HDFS - Bigtable - Hbase and Dynamo. Map-Reduce And Extensions: Parallel Computing - The Map-Reduce Model - Parallel Efficiency of Map-Reduce - Relational Operations Using

Map-Reduce - Enterprise Batch Processing Using Map-Reduce - Introduction to Cloud Development - Example/Application of Mapreduce - Features and Comparisons among GFS - HDFS Etc - Map-Reduce Model

UNIT IV:MONITORING AND MANAGEMENT

Cloud Security Fundamentals - Vulnerability Assessment Tool for Cloud - Privacy and Security in Cloud - Cloud Computing Security Architecture: Architectural Considerations-General Issues - Trusted Cloud Computing - Secure Execution Environments And Communications - Micro-Architectures; Identity Management and Access Control-Identity Management - Access Control - Autonomic Security Cloud Computing Security Challenges: Virtualization Security Management- Virtual Threats - VM Security Recommendations - VM-Specific Security Techniques - Secure Execution Environments and Communications In Cloud.

UNIT V: GOVERNANCE AND SECURITY

Issues in Cloud Computing - Implementing Real Time Application over Cloud Platform Issues in Intercloud Environments - QOS Issues in Cloud - Dependability - Data Migration - Streaming in Cloud. Quality Of Service (Qos) Monitoring in A Cloud Computing Environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud Issues. A Grid Of Clouds - Sky Computing - Load Balancing - Resource Optimization - Resource Dynamic Reconfiguration - Monitoring in Cloud

TEXT BOOKS:

1. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies , Wiley India Edition, 2012.

2. Gautam Shroff ,Enterprise Cloud Computing Cambridge,

3. Ronald Krutz and Russell Dean Vines ,Cloud Security, Wiley-India

REFERENCE BOOKS:

1. Scott Granneman ,Google Apps,Pearson Pub;lications,2008

2. Tim Malhar, S.Kumaraswammy, S.Latif ,Cloud Security & Privacy Auerbach Publications, 2007

3. Antohy T Velte ,Cloud Computing : A Practical Approach, McGraw Hill,2009

4. Barrie Sosinsky ,Cloud Computing Bible, John Wiley & Sons, 2011

7.16 CSE18R404–Programming in C# and .NET

CSE18R404	PROGRAMMING IN C# AND .NET	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

- CSE18R303/ OOPS using C++

- CSE18R304/ OOPS using Java

COURSE OUTCOMES:

CO1: Understand the programming concepts of C #
CO2: Apply the object oriented concepts of C # for application development.
CO3: Create distributed data driven applications using the .NET framework and C #.
CO4: Develop web-based distributed applications using C #, SQL Server and ADO.NET
CO5: Design and develop Web based applications on .NET with CLR.

UNIT I: INTRODUCTION TO C

Introducing C # - Understanding .NET - Overview Of C # - Literals - Program Structure And Simple Input And Output Operations Operators And Expressions Statements Arrays And Structures - String - String Builder - Enumerations - Boxing And Unboxing.

UNIT II:OBJECT ORIENTED ASPECTS OF C

Class, Objects, Constructors And Its Types, Inheritance - Namespace Polymorphism Interface And Overloading Multiple Inheritance Property Indexes Delegates Publish/Subscribe Design Patterns-Operator Overloading-Method Overloading, Delegates, Events, Errors And Exception, Threading.

UNIT III: APPLICATION DEVELOPMENT ON .NET

Building Windows Application - Creating Our Own Window Forms With Events And Controls - Menu Creation - Inheriting Window Forms - SDI And MDI Application - Dialog Box (Modal And Modeless) - Accessing Data With ADO.NET - Dataset - Typed Dataset - Data Adapter - Updating Database Using Stored Procedures - SQL Server With ADO.NET - Handling Exceptions - Validating Controls - Windows Application Configuration.

UNIT IV:WEB BASED APPLICATION DEVELOPMENT ON .NET

Working With XML and .NET Techniques For Reading and Writing XML Data - Using Xpath and Search XML - ADO.NET Architecture ADO.NET Connected And Disconnected Models XML And ADO.NET Creating Virtual Directory and Web Application, Session Management Techniques, Web. Config, Web Services, Passing Datasets, Returning Datasets From Web Services, Handling Transaction, Handling Exceptions, Returning Exceptions From SQL Server.

UNIT V: CLR AND .NET FRAMEWORK

Application Domains Remoting Leasing and Sponsorship - .NET Coding Design Guidelines Assemblies Security in .NET, Versioning, Attributes, Reflection, Viewing Meta Data, Type Discovery, Reflection On Type, Marshalling, Application Development.

TEXT BOOKS:

1. Herbert Schildt, The Complete Reference: C # 4.0, Tata Mc Graw Hill, 2012.

2. Christian Nagel , Professional C # 2012 with .NET 4.5, Wiley India, 2012.

3. S. Thamarai Selvi and R. Murugesan A Textbook on C # , Pearson Education,2003.

4. Stephen C. Perry Core C # and .NET, Pearson Education,2006.

REFERENCE BOOKS:

1. Andrew Troelsen , Pro C # 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.

2. Ian Griffiths, Matthew Adams, Jesse Liberty, Programming C# 4.0, Sixth Edition, OReilly, 2010.

3. Jesse Liberty, Programming C #, Second Edition, OReilly Press, 2002.

4. Robinson et al, Professional C #, Fifth Edition, Wrox Press, 2002.

5. Herbert Schildt, The Complete Reference: C#, Tata McGraw Hill, 2004.

7.17 CSE18R405–Android Programming

CSE18R405	ANDROID PROGRAMMING	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

CSE18R304/ OOPS using Java

COURSE OUTCOMES:

CO1: Study the basics of android application development environment
CO2: Know the basics about the android User Interface
CO3: Utilize the views concept in designing the activities of android User Interface.
CO4: Explains how to customize activities and intents and manage data that helps you work with APIs, the Android SDK
CO5: Understand on how to package and publish your applications to the Android Market

UNIT I: INTRODUCTION ANDROID PROGRAMMING

Features of Android, Architecture of Android, Android Devices in the Market, Android SDK, Installing the Android SDK Tools, Configuring the Android SDK Manager, Eclipse, Android Development Tools (ADT), Creating Android Virtual Devices (AVDs), Creating Your First Android Application, Anatomy of an Android Application.

UNIT II:ANDROID USER INTERFACE

Understanding the Components of a Screen, Views and ViewGroups, LinearLayout, AbsoluteLayout, TableLayout, RelativeLayout, FrameLayout, ScrollView, Adapting to Display Orientation, Anchoring Views, Resizing and Repositioning, Managing Changes to Screen Orientation, Persisting State Information during Changes in Configuration, Detecting Orientation Change, Controlling the Orientation of the Activity.

UNIT III: DESIGNING YOUR USER INTERFACE WITH VIEWS

Using Basic Views, TextView View, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views, ProgressBar View, , Using Picker Views, Using List Views to Display Long Lists, Using the Spinner View, Using Image Views to Display Pictures, Gallery and ImageView Views, ImageSwitcher, GridView, Using Menus with Views

UNIT IV:DATA PERSISTENCE

Saving and Loading User Preferences, Accessing Preferences Using an Activity, Programmatically Retrieving and Modifying the Preferences Values, Persisting Data to Files, Creating and Using Databases, Creating the DBAdapter Helper Class, Using the Database Programmatically , Pre-Creating the Database.

UNIT V: DEVELOPING ANDROID SERVICES AND PUBLISHING ANDROID APPLICATIONS

Creating Your Own Services, Performing Long-Running Tasks in a Service, Executing Asynchronous Tasks on Separate Threads Using Intent Service, Establishing Communication between a Service and an Activity, Binding Activities to Services, Preparing for Publishing, Publishing on the Android Market

TEXT BOOKS:

1. Wei-Meng Lee, Beginning Android 4 Application Development March 2012

REFERENCE BOOKS:

1. Jeff McWherter and Scott Gowell, Professional Mobile Application Development, Wrox 2012.

2. Charlie Collins, Michael Galpin and Matthias Kappler, Android in Practice, Dream Tech. 2012

3. James Dovey and Ash Furrow, Beginning Objective C, Apress, 2012

4. David Mark, Jack Nutting, Jeff LaMouche, and Fredric Olsson, Beginning iOS6 Development: Exploring the iOS SDK, Apress, 2013

7.18 CSE18R406–Introduction to IoT

CSE18R406	INTRODUCTION TO IOT	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

CSE18R302/ Fundamentals of Networking

COURSE OUTCOMES:

CO1: Understand the basic concepts ,architecture and protocol of Internet of Things.
CO2: Analyze the tools and design methods of Internet of Things
CO3: Identify the services offered by IoT physical servers and cloud environment.
CO4: Analyze the physical devices and apply analytic tool for IoT.
CO5: Design and develop an IOT solution for a real time problem.

UNIT I:INTRODUCTION TO INTERNET OF THINGS

Introduction - Physical Design of IoT - Logical Design of IoT - IoT Enabling Technologies - IoT Levels & Deployment Templates Applicationsof IOT

UNIT II:IOT ARCHITECTURE AND PROTOCOL

History of IOT,- Four Pillars of IoT -Machine to Machine- Difference between IoT and M2M - SDN and NFV for IoT - Protocols IEEE 802.15.4 BACNet Protocol Zigbee Architecture

UNIT III: DEVELOPING INTERNET OF THINGS

IoT Platforms Design Methodology - IoT Design Methodology- IoT Systems - Logical Design using Python Python Web Application Framework - Python Packages of Interest for IoT

UNIT IV:IOT PHYSICAL SERVERS & CLOUD OFFERINGS

Introduction to Cloud Storage Models & Communication APIs - WAMP - AutoBahn for IoT- Xively Cloud for IoT - Designing a RESTful Web API - Amazon Web Services for IoT - IoT Messaging Platform

UNIT V: IOT PHYSICAL DEVICES & ENDPOINTS

Basic building blocks of an IoT Device Sensors-actuators-Arduino -Raspberry Pi- Difference between Arduino -Raspberry -Interfacing Arduino & Raspberry- pcDuino -BeagleBone Black

TEXT BOOKS:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Academic Press, 2014.

2. Arshdeep Bahga and Vijay Madisetti, Internet of Things: A Hands-on Approach,Universities press,2015

REFERENCE BOOKS:

1. Honbo Zhou , The Internet of Things in the Cloud: A Middleware Perspective CRC Press ,2012

2. Dieter Uckelmann; Mark Harrison; Florian Michahelles, Architecting the Internet of Things, Springer , 2011

3. Olivier Hersent, Omar Elloumi and David Boswarthick, The Internet of Things: Applications to the Smart Grid and Building Automation Wiley ,2012

7.19 CSE18R407–Vehicular Adhoc Network

CSE18R407	VEHICULAR ADHOC NETWORK	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

CSE18R302/ Fundamentals of Networking

COURSE OUTCOMES:

CO1: Understand the basic Traffic modeling of VANET infrastructure.
CO2: Analyze the types of data dissemination in VANET.
CO3: Understand the concepts behind Communication and propagation models of VANET.
CO4: Analyze the message coding used in VANET application.
CO5: Apply the cryptographic protocols to secure Vehicular Communication

UNIT I: INTRODUCTION TO VANETS

Infrastructure in Vehicular Communications : Status, Challenges and Perspectives Architecture of Vehicular Ad Hoc Networks Traffic Engineering Traffic Monitoring Models for Traffic Flow and Vehicle Motion Co-operative Vehicular Safety Applications Enabling TechnologiesVANET enabled Active Safety Applications

UNIT II:INFORMATION DISSEMINATION AND MOBILITY MODELING IN VANETS

Introduction Obtaining Local Measurements Information Transport Protocols for Information Transport Improving Network Connectivity What to Transport Summarizing Measurements Geographical Data Aggregation Types of Vehicular Mobility Modeling for VANET

UNIT III: PHYSICAL LAYER AND MAC LAYER FOR VEHICULAR COMMUNICATIONS

Wireless Propagation Theory Channel Metrics Measurement Theory Empirical Channel Characterization at 5.9 GHz MAC Layer and Scalability Aspects of Vehicular Communication Networks Communication based on IEEE 802.11 p Performance Evaluation and Modeling Aspects of Congestion Control

UNIT IV:APPLICATION LEVEL MESSAGE CODING AND COMPOSITIONS

Introduction to Application Environment Safety Applications and data requirements
Desirable Architectural features Broadcast Characteristics Message Dispatcher Data
element dictionary Message Construction Example Applications Emergency brake
warning

UNIT V: DATA SECURITY AND STANDARDS IN VEHICU-LAR COMMUNICATION NETWORKS

Challenges of Data Security In Vehicular Networks Network, Applications, And Adver-sarial Model Network Model Application Model Attacker Model Security Infrastructure
Cryptographic Protocols Privacy Protection Mechanisms

REFERENCE BOOKS:

1. Hannes Hartenstein and Kenneth P Laberteaux, VANET Vehicular Applications
   and Inter-Networking Technologies, Wiley 2010

2. Mohamed Watfa, Advances in Vehicular Ad-Hoc Networks: Developments and
   Challenges, Information Science Reference , 2010

3. Stephan Olariu, Michele C. Weigle Vehicular Networks: From Theory to Practice,
   Chapman and Hall/CRC , 2009

7.20 CSE18R408–Wireless Sensor Network

CSE18R408	WIRELESS SENSOR NETWORK	L	T	P	CREDIT
		3	0	0	3

PREREQUISITE:

CSE18R302/ Fundamentals of Networking

COURSE OUTCOMES:

CO1: In-depth understanding the insight of wireless sensor networks and its technologies.
CO2: Understanding the architecture and the components associated to wireless sensor networks.
CO3: Identifying the networking sensors and protocols of wireless sensor networks
CO4: Analyzing the various routing protocols, routing and topologies associated with wireless sensor networks.
CO5: Applying the wireless sensor networking concepts in real world scenario.

UNIT I: OVERVIEW OF WIRELESS SENSOR NETWORK

Introduction, Brief Historical Survey Of Sensor Networks, And Background Of Sensor Network Technology, Ah-Hoc Networks, Challenges For Wireless Sensor Networks-Characteristics Requirements-Required Mechanisms, Difference Between Mobile Ad-Hoc And Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

UNIT II:ARCHITECTURES

Single-Node Architecture - Hardware Components, Energy Consumption Of Sensor Nodes, Operating Systems And Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals And Figures Of Merit, Gateway Concepts.

UNIT III: NETWORKING SENSORS

Physical Layer And Transceiver Design Considerations, MAC Protocols For Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, Zigbee: IEEE 802.15.4 MAC Layer, The Mediation Device Protocol, Wakeup Radio Concepts, Address And Name Management, Assignment Of MAC Addresses, Routing Protocols-Energy-Efficient Routing, Geographic Routing.

UNIT IV:INFRASTRUCTURE ESTABLISHMENT

Routing And Data Gathering Protocols Routing Challenges And Design Issues In Wireless Sensor Networks, Flooding And Gossiping Data Centric Routing SPIN Directed

Diffusion Energy Aware Routing - Gradient-Based Routing - Rumor- Routing COUGAR ACQUIRE Hierarchical Routing - LEACH, PEGASIS Location Based Routing GF, GAF, GEAR, GPSR. Topology Control, Clustering, Time Synchronization, Localization And Positioning, Sensor Tasking And Control.

UNIT V: APPLICATIONS OF WIRELESS SENSOR NETWORK

WSN Applications - Sensor And Robots, Home Control - Building Automation - Industrial Automation - Medical Applications - Reconfigurable Sensor Networks - Highway Monitoring - Military Applications - Civil And Environmental Engineering Applications - Wildfire Instrumentation - Habitat Monitoring - Nanoscopic Sensor Applications Case Study: IEEE 802.15.4 LR-Wpans Standard - Target Detection And Tracking Contour-Edge Detection - Field Sampling.

TEXT BOOKS:

1. Kazem Sohraby, Daniel Minoli and Taieb Znati, – Wireless Sensor Networks Technology, Protocols, and Applications–, John Wiley & Sons, 2007.

2. Holger Karl and Andreas Willig, –Protocols and Architectures for Wireless Sensor Networks, John Wiley & Sons, Ltd, 2005.

REFERENCE BOOKS:

1. KazemSohraby, Daniel Minoli, TaiebZnati ,Wireless Sensor Network Wiley,March 2007

2. Ananthram Swami, Qing Zhao, Yao-Win Hong, Lang Tong , Wireless SensorNetworks Signal Processing and Communications John Wiley & Sons,2007

3. Murthy ,Ad Hoc Wireless Networks: Architectures And Protocols, PearsonEducation ,2007

4. C. S. Raghavendra ,Wireless sensor Networks Springer ,2004

5. Sridhar S. Iyengar, NandanParameshwaran, Vir V. Phoha, N. Balakrishnan, Chuka D. Okoye,Fundamentals of Sensor Network Programming: Applications and Technology , Wiley Publications, 2011

8 Honors Electives Courses

8.1 CSE18R322–Advanced Computer Architecture

CSE18R322	ADVANCED COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R174/Computer Organization and Architecture				

Course Objectives:

- To introduce students about the principles of computer design, instruction set design concepts, performance enhancements, new and alternative computer architectures, and the design and implementation of high performance computing systems.

- To equip students with the skills to undertake performance comparisons, improve the performance of applications, and develop applications to solve computationally intensive problems.

Course Outcomes:

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

CO1 Understand the fundamentals of computer design.

CO2 Apply the knowledge of pipelining and ILP to solve the designing issues.

CO3 Understand the various issues in architecture.

CO4 Analyze the various multi processor architecture.

CO5 Demonstrate the memory and I/O interface concepts.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: FUNDAMENTALS OF COMPUTER DESIGN Preliminary Considerations - Cost of Development - Importance of Mobile Strategies in Business World - Mobile Web Presence - Mobile Applications - Marketing – Web Services for Mobile Devices – Creating Example Web Service - Debugging Web Service.

UNIT II: PIPELINING AND ILP Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level Parallelism and Its Exploitation - Concepts and Challenges - Overcoming Data Hazards with Dynamic Scheduling Dynamic Branch Prediction.

UNIT III: THREAD LEVEL PARALLELISM Multi-threading Multiprocessors - Centralized and Distributed Shared Memory Architectures Cache Coherence Issues - Performance Issues Synchronization Issues Models of Memory Consistency Buses,-SMT Architecture and Performance.

UNIT IV: MULTIPROCESSOR ARCHITECTURE Taxonomy of Parallel Architectures - Centralized Shared Memory Architecture - Synchronization - Memory Consistency - Symmetric and Distributed Shared Memory Architectures - SISD, MISD, MIMD, Single Instruction Multiple Data Stream (SIMD) Architectures.

UNIT V: MEMORY AND I/O Memory Hierarchy - Memory Technologies - Cache Performance Optimizations of Cache Performance - Main Memory and Performance Types of Storage Devices RAID - Virtual Memory and Virtual Machines Input Output Interface.

TEXT BOOK(S):

1. John L. Hennessey and David A. Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann/Elsevier, Fifth edition, 2012.

2. Richard Y. Kain, Advanced Computer Architecture a Systems Design Approach, PHI, 2011.

REFERENCE BOOK(S):

1. Kai Hwang and Faye Briggs, "Computer Architecture and Parallel Processing", Mc Graw-Hill International Edition, 2000.

2. John P.Hayes, 'Computer architecture and Organization', Tata McGraw Hill, Third edition, 1998.

3. David E. Culler, Jaswinder Pal Singh, Parallel computing architecture : A hardware/software approach , Morgan Kaufmann /Elsevier Publishers, 1999.

8.2 CSE18R323–High Performance Computing

CSE18R323	HIGH PERFORMANCE COMPUTING	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R371 / Computer Networks				

Course Objectives:

- To give students solid foundations for developing, analyzing, and implementing parallel and locality-efficient algorithms by making them to understand the architecture of several types of high performance computers and the implications on the performance of algorithms on these architectures.

Course Outcomes:

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

CO1 Describe architectural hardware and software issues for high performance computing systems.

CO2 Recognize the importance of Load Sharing and balancing for high performance computing systems.

CO3 Understand various parallel programming languages and HPC environments with particular reference to Grid Computing.

CO4 Understand the role of cloud computing for high performance computing.

CO5 Understand various task scheduling methods for high performance computing.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: CLUSTER COMPUTING   Introduction to Cluster Computing - Scalable Parallel Computer Architectures - Cluster Computer and its Architecture - Classifications - Components for Clusters - Cluster Middleware and Single System Image - Resource Management and Scheduling - Programming Environments and Tools - Applications - Representative Cluster Systems - Heterogeneous Clusters - Security - Resource Sharing - Locality - Dependability - Cluster Architectures - Detecting and Masking Faults - Recovering from Faults - Condor - Evolution of Metacomputing.

UNIT II: LOAD SHARING AND BALANCING   Evolution - Job and Resource Management Systems - State-of-the- Art in RMS and Job - Rigid Jobs with Process Migration - Communication-Based Scheduling - Batch Scheduling - Fault Tolerance - Scheduling Problem for Network Computing - Algorithm - ISH - MCP and ETF - Dynamic Load Balancing - Mapping and Scheduling - Task Granularity and Partitioning - Static and Dynamic Scheduling.

UNIT III: GRID COMPUTING   Introduction to Grid Computing - Virtual Organizations - Architecture - Applications - Computational - Data - Desktop and Enterprise Grids - Data-intensive Applications - High-Performance Commodity Computing - High-Performance Schedulers - Grid Middleware: Connectivity - Resource and Collective Layer - Globus Toolkit - GSI - GRAM - LDAP - GridFTP - GIIS - Heterogeneous Computing Systems - Mapping Heuristics: Immediate and Batch Mode - Immediate: MCT - MET - Switching Algorithm - KPB and OLB - Batch: Min-Min - Max-Min - Sufferage - Duplex - GA - SA - GSA - Tabu and A* - Expected Time to Compute Matrix - Makespan - Heterogeneity: Consistent - Inconsistent and Partially-Consistent - QoS Guided Min-Min - Selective Algorithm - Grid Computing Security - Introduction to GridSim - Architecture - Grid Resource Broker - Grid Referral Service.

UNIT IV: CLOUD COMPUTING   Introduction to Cloud Computing - Types: Deployment and Service Models - Characteristics - Applications - Service-Level Agreement - Virtualization - High-Throughput Computing: Task Computing and Task-based Ap-

plication Models - Market-Based Management of Clouds - Energy-Efficient and Green Cloud Computing Architecture - Resource Allocation - Leases.

UNIT V: TASK SCHEDULING Task Scheduling: RR - CLS and CMMS - Workflow Scheduling - Montage - Epigenomics - SIPHT - LIGO - CyberShake - Task Consolidation - Introduction to CloudSim - Cloudlet - Virtual Machine and its Provisioning - Time and Space-shared Provisioning.

TEXT BOOK(S):

1. R. Buyya, High Performance Cluster Computing: Architectures and Systems, Vol:1, Pearson Education, 2008.

2. I. Foster and C. Kesselman, The Grid: Blueprint for a New Computing Infrastructure, Morgan Kaufmann, Elsevier, 2004.

REFERENCE BOOK(S):

1. A.Chakrabarti, Grid Computing Security, Springer, 2007.

2. B.Wilkinson, Grid Computing: Techniques and Applications, CRC Press, 2009.

3. C.S. R. Prabhu, Grid and Cluster Computing, PHI, 2008.

4. B. Sosinsky, Cloud Computing Bible, Wiley, 2011.

5. D. Janakiram, Grid Computing, Tata McGraw-Hill, 2005.

6. R. Buyya, C. Vecchiola and S. T. Selvi, Mastering Cloud Computing Foundations and Applications Programming, Morgan Kaufmann, Elsevier, 2013.

8.3   CSE18R324–Augmented Reality

CSE18R324	AUGMENTED REALITY	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To introduce students to augmented reality technology.

- To expose students to the various capabilities of augmented reality technology.

- To equip student with technical knowledge in creating an augmented reality application.

Course Outcomes:

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

CO1   Understand the basic concept and display devices used for augmented reality.

CO2   Understand and apply various tracking systems using in AR.

CO3   Understand the visualization through camera and analyze the visualization challenges.

CO4   Apply modeling, annotations and collaborating and navigating with AR environment.

CO5   Analyze the software engineering requirements for an AR developer and predict the future of AR.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: INTRODUCTION OF AUGMENTED REALITY   Definition and Scope, Examples, Related Fields, Displays Multimodal Displays, Visual Perception, Spatial and Visual Displays.

UNIT II: TRACKING   Coordinate system, Characteristics of Tracking Technology, Stationary Tracking System, Mobile Sensors, Optical Tracking, Computer Vision for Augmented Reality.

UNIT III: CALIBRATION, REGISTRATION, COHERENCE, VISUALIZA- TION, INTERACTION   Camera and Display Calibration, Registration, Visual Coherence, Situated Visualization Challenges and Registration, Annotations and Labeling, X-ray Visualization, Spatial Manipulation and Information Filtering.

UNIT IV: MODELING, ANNOTATIONS, AUTHORING, NAVIGATION AND COLLOBORATION   Specifying Geometry and Appearance, Annotation, Requirements, Elements and Solutions of AR Authoring, Navigation, Properties, Co-located and Remote Collaboration.

UNIT V: SOFTWARE ARCHITECTURE AND FUTURE   AR Application and Software Engineering Requirements, Developer Support and Wish List, Interfacing with Smart Objects, Augmented Human, AR as a Social Computing Platform.

TEXT BOOK(S):

1. D.Schmalstieg, T.Hollerer, "Augmented Reality: Principles & Practice", Addison Wesley - Pearson Education, 2016.

8.4 CSE18R325–Visual Cryptography

CSE18R325	VISUAL CRYPTOGRAPHY	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To make students to understand about visual cryptography using a variety of applications.

Course Outcomes:

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

CO1 Understand the fundamentals of images.

CO2 Analyze the security techniques for images.

CO3 Construct visual crypto systems.

CO4 Analyze the various schemes of visual crypto systems.

CO5 Construct color visual crypto system.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

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UNIT I: FUNDAMENTALS OF IMAGE PROCESSING Digital Image Processing: Fundamentals:-Digital Image Representation-Coordinate Conversions - Images As Matrices - Image Types-Intensity Images - Binary Images - RGB Images; Color Image Processing:- - Colour Image Representation RGB Model - CMY Model - CMYK Model - HSI Model. Image File Formats.

UNIT II: PRINCIPLES OF STEGANOGRAPHY Principles of Steganography and Digital Watermarking and Their Applications. Secret Sharing-Introduction - History of Secret Sharing - Principle of Secret Splitting - Phases of Secret Sharing - Access Structures - Threshold Schemes - Shamirs Scheme, Applications.

UNIT III: VISUAL CRYPTOGRAPHY Visual Cryptography-Introduction-History of Visual Cryptography - Construction of Visual Cryptography Schemes - Basis Matrices - Construction of 2-Out-of-2 Visual Cryptography Schemes - Construction of 2-Out-of-2 Visual Cryptography Schemes With Square Pixel Expansion - Construction of Visual Cryptography Schemes With Consistent Image Size.

UNIT IV: VISUAL CRYPTOGRAPHY SCHEMES Visual Cryptography Schemes-Construction of 2-Out-of-N Visual Cryptography Schemes - Basis Matrices for 2-Out-Of-N Visual Cryptography Schemes - Construction of N-Out-of-N Visual Cryptography Schemes - Basis Matrices For N-Out-of-N Visual Cryptography Schemes - Construction of K-Out-of-N Visual Cryptography Schemes - Basis Matrices for K-Out-of-N Visual Cryptography Schemes.

UNIT V: APPLICATIONS Colour Visual Cryptography Subpixel Layout of Colour Visual Cryptography - Variations of Colour Visual Cryptography Schemes-Constructing A '2 Out of 2' Colour Visual Cryptography Schemes - Constructing A '2 Out of N' Colour Visual Cryptography Schemes - Applications of Visual Cryptography.

REFERENCE BOOK(S):

1. BorkoFurht, EdinMuharemagic and Daniel Socek, "Multimedia Encryption and Watermarking", Springer,2007.

2. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson Education 3rd Edition, 2010

3. Jen-Shyang Pan, Hsiang-Cheh Huang and Lakhi C. Jain, "Intelligent Watermarking Techniques", World Scientific,2007.

4. JosefPieprzyk, Thomas hardjino and Jennifer Sebberry,Fundamentals of computer security, Springer International 2nd Edition,2004.

8.5 CSE18R420–Video Analytics

CSE18R420	VIDEO ANALYTICS	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R370/ Big Data Analytics				

Course Objectives:

- To address the research issues towards developing algorithms that can perform high-level visual recognition tasks on real-world images and videos.

- To review and discuss current approaches to high-level visual recognition problems, such as background modeling, object recognition and categorization, tracking, scene understanding, human motion understanding, etc.

Course Outcomes:

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

CO1 Understand the various data analytic tools.

CO2 Apply principles of Data Science to the analysis of large-scale problems.

CO3 Understand the fundamental principles of video analytics and their application.

CO4 Understand behavioral analysis and identify suspicious activity of human.

CO5 Analyze the various human face recognition and gait algorithms.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

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UNIT I: INTRODUCTION TO BIG DATA AND DATA ANALYSIS Introduction to Big Data Platform Challenges of Conventional Systems Web Data Evolution of Analytic Scalability Analytic Processes and Tools Analysis Vs Reporting Modern Data Analytic Tools Data Analysis: Regression Modelling Bayesian Modelling Rule Induction.

UNIT II: MINING DATA STREAMS Introduction to Stream Concepts Stream Data Model and Architecture Stream Computing Sampling Data in a Stream Filtering Streams Counting Distinct Elements in a StreamEstimating Moments Counting Oneness in a Window Decaying Window Real Time Analytics Platform(RTAP) Applications Case Studies.

UNIT III: VIDEO ANALYTICS Introduction Video Basics Fundamentals for Video Surveillance Scene Artifacts Object Detection and Tracking: Adaptive Background Modelling and Subtraction Pedestrian Detection and Tracking Vehicle Detection and Tracking Articulated Human Motion Tracking in Low Dimensional Latent Spaces.

UNIT IV: BEHAVIOURAL ANALYSIS AND ACTIVITY RECOGNITION Event Modelling Behavioural Analysis Human Activity Recognition Complex Activity Recognition Activity modeling using 3D shape - Video summarization shape based activity models Suspicious Activity Detection.

UNIT V: HUMAN FACE RECOGNITION AND GAIT ANALYSIS Introduction: Overview of Recognition algorithms Human Recognition using Face: - Face Recognition from still images Face Recognition from video Evaluation of Face Recognition Technologies Human Recognition using gait: HMM Framework for Gait Recognition View Invariant Gait Recognition Role of Shape and Dynamics in Gait Recognition.

REFERENCE BOOK(S):

1. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

2. Yunqian Ma, Gang Qian, Intelligent Video Surveillance: Systems and Technology, CRC Press (Taylor and Francis Group), 2009.

3. Michael Berthold, David J.Hand, Intelligent Data Analysis, Springer, 2007.

4. Rama Chellappa, Amit K.Roy Chowdhury, Kevin Zhou.S, Recognition of Humans and theirActivities using Video, Morgan & Claypool Publishers, 2005.

8.6 CSE18R421–Next Generation Networks

CSE18R421	NEXT GENERATION NETWORKS	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R371/ Computer Networks				

Course Objectives:

- To make students to understand the core technologies, theories, and dilemmas that face next generation network engineers in this field.

- To introduce students the best practices about how to design, deploy, and troubleshoot next generation networks.

Course Outcomes:

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

CO1 Understand the technical, economic and service advantages of next generation networks.

CO2 Familiar with NGN Functional Architecture of a next generation network(NGN) with reference.

CO3 Analyze various NGN key development areas such as Access Network Area, Core Transport Network Area, Service Creation Area and Advanced Technologies for Network and Service Management.

CO4 Compare various NGN Standards in the vein of TMF, NGOSS, 3GPP and LTE/SAE.

CO5 Evaluate various NGN Wireless LANs with respect to OFDM device High Throughput and Robust Performance.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: INTRODUCTION Next Generation Networks (NGN) Vision, Scenarios and Advances NGN Networks : Perspectives and Advances Some Possible Scenarios Virtual International Congress Virtual Class Rooms e-Education and Experimental Laboratory Virtual Home Home Networks Automatic Traffic and Car Driving NGN Requirements on Technology and Management.

UNIT II: NGN FUNCTIONAL ARCHITECTURE ITU NGN Functional Architecture Proposed NGN Functional Architecture NGN Network Operator NGN Network Service Provider NGN Customer and CTE Network and Service Evaluation towards NGN- Fixed Network Evaluation Mobile Network Evaluation Internet Evaluation .

UNIT III: NGN KEY DEVELOPMENT AREAS Terminal Area Access Network Area Backhaul Network Area Core Transport Network Area Service Creation Area Network Control and Managerial Area Service Control and Management Advanced Technologies for Network and Service Management.

UNIT IV: NGN STANDARDIZATION ITU and GSI NGN ETSI and TISPAN - NGN ATIS and NGN CJA and NGN - TMF and NGOSS, NGMN Alliance and NGMN - 3GPP and LTE/SAE NGMN Alliance and NGMN, 3GPP and LTE/SAE.

UNIT V: NEXT GENERATION WIRELESS LANS An overview of IEEE 802.11 History of high throughput and 802.11 n- Environments and applications of 802.11 n Major features of 802.11 n Orthogonal Frequency Division Multiplexing MIMO/SDM Basics Physical Interoperability with 11 a/g legacy OFDM device High Throughput and Robust Performance.

REFERENCE BOOK(S):

1. Jingming Li Salina and Pascal Salina, Next Generation Networks, Prospective and Potentials , John Wiley and Sons, 2007.

2. Thomas Plavyk, Next generation Telecommunication Networks, Services and Management, Wiley & IEEE Press Publications, 2012.

3. Eldad Perahia and Robert Stacey, Next Generation Wireless LANs, Cambridge University Press, 2008.

4. Monique J. Morrow, Next Generation Networks, CISCO Press, 2007.

8.7   CSE18R422–Software Defined Networking

CSE18R422	SOFTWARE DEFINED NETWORKING	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R371/ Computer Networks				

Course Objectives:

- To make students to learn about Software Defined Networking, an emerging Internet architectural framework, including the main concepts, architectures, algorithms, protocols and applications and related topics including Data Center Networks.

Course Outcomes:

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

CO1 Understand the Control Planes and Data Planes in Software Defined Networking.

CO2 Understand the operations of SDN Controllers.

CO3 Compare the SDN Solutions for the Data Centre Network.

CO4 Analyze the Use cases of Software Defined Networking.

CO5 Implement an Open Flow Switch.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: INTRODUCTION   Introduction Centralized and Distributed Control and Data Planes Evolution versus Revolution   The Control Plane Data Plane Moving Information between Planes Distributed Control Planes IP and MPLS Creating IP Underlay Convergence Time Load Balancing High availability creating the MPLS overlay Replication Centralized Control Planes ATM/LANE Route Servers.

UNIT II: SDN CONTROLLERS   Introduction General Concepts Layer 3 Centric Plexxi Cisco OnePK Network Programmability The Management Interface The Application Network Divide The Command line Interface NETCONF and NETMOD- SNMP- Modern Programmatic Interfaces- I2RS Modern Orchestration OpenStack- CloudStack- Puppet.

UNIT III: NETWORK FUNCTION VIRTUALIZATION   The Multitenant Data Centre The virtualized Multitenant Data Centre SDN Solutions for the Data Centre Network VLANs- EVPN VxLAN NVGRE Network Function Virtualizations Virtualization and Data Plane I/O Services Engineered Path Service Locations and Chaining NFV at ETSI Non- ETSI NFV Work.

UNIT IV: USE CASES   Use cases for Bandwidth Scheduling, Manipulation, and Calendaring Bandwidth Calendaring Big Date and Application Hyper Virtualization for Instant CSPF- Use cases for Data Centre Overlays, Big data, and Network Function Virtualization Use case for Input Traffic Monitoring, Classification, and Triggered Actions.

UNIT V: OPEN FLOW   Introduction to OpenFlow Building Blocks OpenFlow Messages Northbound Interface- Implementing OpenFlow Switch OpenFlow Reference Switch Hardware Implementations Software based Switches Openflow in Cloud Computing.

REFERENCE BOOK(S):

1. Thomas D.Nadeau and Ken Gray, Software Defined Networks, Oreilly, 2013.

2. Siamak Azodolmolky, Software Defined Networking with OpenFlow, PACKT Publishing, 2013.

3. Rajesh Kumar Sundarrajan, Software Defined Networking(SDN)- a Definitive Guide, E-book, March 2014.

8.8 CSE18R423–Service Oriented Architecture

CSE18R423	SERVICE ORIENTED ARCHITECTURE	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	NIL				

Course Objectives:

- To introduce the concepts and design principles of SOA, Non-technical aspects such as governance, impact on culture and organization, as well as the various interoperability standards, technology infrastructure and security considerations associated with SOA implementations.

Course Outcomes:

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

CO1 Understand fundamental and basic principles of service orientation.

CO2 Understand web service composition, orchestration and Choreography.

CO3 Analyse the SOA techniques for Web services.

CO4 Analyse web service implementation in various SOA platforms.

CO5 Analyse SOA for real time operations and apply security.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: INTRODUCTION TO SERVICE ORIENTED ARCHITECTURE

Introduction - Defining SOA-Evolution of SOA-Service Oriented Enterprise-Comparing SOA to Client-Server and Distributed Internet Architectures-Basic SOA Architecture-Concepts-Key Service Characteristics-Technical Benefits-Business Benefits.

UNIT II: WEB SERVICES

Web Services Service Descriptions Messaging with SOAP Message Exchange Patterns Coordination Atomic Transactions Business Activities Orchestration Choreography - Service Layer Abstraction Application Service Layer Business Service Layer Orchestration Service Layer.

UNIT III: SERVICE ORIENTED ANALYSIS

Service Oriented Analysis Business-Centric SOA Deriving Business Services- Service Modeling - Service Oriented Design WSDL Basics SOAP Basics SOA Composition Guidelines Entity-Centric Business Service Design Application Service Design Task Centric Business Service Design.

UNIT IV: SOA PLATFORM

SOA Platform Basics SOA Support in J2EE Java API for XML-Based Web Services (JAX-WS) - Java Architecture for XML Binding (JAXB) Java API for XML Registries (JAXR) - Java API for XML Based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA Support in .NET Common Language Runtime - ASP.NET Web Forms ASP.NET Web Services Web Services Enhancements (WSE).

UNIT V: REAL TIME OPERATION AND SECURITY

Goal of the Real Time Enterprise - Delivering Real Time with the SOA - Real Time Virtual Data Warehouse - Setting Business Level Agreements. Security: Risks of Loose Coupling - Layers of SOA Security - Solutions to SOA Security.

TEXT BOOK(S):

1. Thomas Erl, Service-Oriented Architecture: Concepts, Technology, and Design, Pearson Education, 2007.

2. Eric Newcomer, Lomow, Understanding SOA with Web Services, Pearson Education, 2005.

REFERENCE BOOK(S):

1. JamesMcGovern,Sameer Tyagi,Michael E Stevens,Sunil Mathew, Java Web Services Architecture, Elsevier, 2003.

2. Newcomer, Lomow, Understanding SOA with Web Services, Pearson Education, 2005.

3. Sandeep Chatterjee, James Webber, Developing Enterprise Web Services, An Architects Guide, Pearson Education, 2005.

4. Dan Woods and Thomas Mattern, Enterprise SOA Designing IT for Business Innovation, OREILLY, First Edition, 2006

8.9 CSE18R424–Vulnerability Management

CSE18R424	VULNERABILITY MANAGEMENT	L	T	P	C
		3	0	0	3
Course Category:	Honors Elective				
Course Type:	Theory				
Pre-requisite:	CSE18R371/ Computer Networks				

Course Objectives:

- To focus on the concept and operational aspects of information security vulnerability management with an understanding about network and system monitoring, risk assessment and mitigation, patch management, and incident response.

Course Outcomes:

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

CO1 Analyze the need for vulnerability management.

CO2 Understand the fundamental concepts and technology for vulnerability management.

CO3 Understand VM processing concepts in risk assessment.

CO4 Understand and generate various VM reports.

CO5 Analyze the vulnerability strategies and principles.

Mapping of Course Outcomes with PO.PSO:

	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	S												M			
CO2	S	M	M	M	M								M	L		L
CO3	S												M			
CO4	S	M	M	M	M								M	L		L
CO5	S	S	S	S	S						M	M	M	L		L

UNIT I: INTRODUCTION   Introduction -Vulnerability experience-Program and organization.

UNIT II: TECHNOLOGY   Technology-General Architecture-Agents-Passive Network Analysis-Active Scanning Technology Hybrid Approach-CVE-The Standard for Vulnerability Test Data-NVD-SCAP.

UNIT III: PROCESS   VM Process-Baselines-ITIL ITSM Processes IAVA Process-Data Classification-Risk Assessment.

UNIT IV: REPORTING   Discovery Reports-Evaluation Reports-Profile Reports-Audit Reports-Active Scanning-Audit Trends and Performance Reports-Compliance Reports Planning-Charter Development Business Case Requirements Documents-REP-Implementation Plan.

UNIT V: STRATEGIC VULNERABILITY   Operating Environment Management External Factors Controlling Internal Vulnerability Principles of Mitigation-Understanding The Enemy-Cross Discipline Opportunities Cross Technology Opportunities.

TEXT BOOK(S):

1. Park Foreman, Vulnerability Management, Auerbach Publication, Taylor And Francis Group,2010.

REFERENCE BOOK(S):

1. Wolfgang Kandek,Vulnerability Management, Second Edition ,2004.

2. Gheorghe,A., Integrated risk and Vulnerability Management assisted by decision support systems, Springer 2005.

9   Mandatory Corses

1	MAN18R001	Environmental Sciences
2	MAN18R002	Indian constitution
3	MAN18R003	Essence of Indian Traditional Knowledge