GALGOTIAS UNIVERSITY

Syllabus of

Course Book B.Tech. (CSE) 2016-17

Name of School: School of Computing Science and Engineering

Department: Computer Science and Engineering

Year: 2016-17

Semester - I

Name of The Course	General Chemistry				
Course Code	CHY111				
Prerequisite					
Co-requisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	3	0	0	3	

Course Objectives

1. To acquire knowledge about desalination of brackish water and treatment of municipal water.
2. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
3. To learn significance of green chemistry and green synthesis and the synthesis of nano materials.
4. To understand mechanism of corrosion and preventive methods.
5. To understand concept of semi conductivity, superconductivity and liquid crystal and solar energy.

Course Outcomes

CO1	Determine the atomic structure and predict the position of element in periodic table. (**K2)**
CO2	Determinethe properties and shape of molecules by various theories of chemical bonding. **(K4)**
CO3	Differentiate nuclear reactions and apply nuclear chemistry to calculate age of samples. **(K4)**
CO4	Demonstrate the concepts of thermodynamics and chemical kinetics.**(K3)**
CO5	Correlate the structure and properties of biomolecules and identify the photochemical reactions. **(K2)**

Text Book (s)

1. Darrell *Ebbing*, Steven *Gammon*, *General Chemistry*, Cengage Learning, *2012, ISBN* 978-1-285-05137- 6, *10th Edition*

2. William R. *Robinson*, Jerome D. *Odom*, Henry Fuller *Holtzclaw*. General Chemistry, Houghton Mifflin Harcourt Publishing Company, 1996, Edition 10, ISBN 066935483X, 9780669354836.
3. ArunBahl, B. S. Bahl and G.D. Tuli, Essential of Physical Chemistry, S. Chand and Company Ltd., New Delhi, 2009, ISBN 81-219-2978-4, Ed 2009.
4. M. Siberberg, The Molecular Nature of Matter and Change, McGraw-Hill Education; 7 *edition*, *2014*, *ISBN*-10: 0021442541

Reference Book (s)

1. T.W. Graham Solomons and Craig Fryhle, Organic Chemistry, John Wiley and Sons, Inc., 2011, ISBN: 0470556597, 10th Ed.
2. Julio De Paula, Peter Atkins, Physical Chemistry, Oxford University Press, 2011, ISBN-13: 9780199599592
3. Lehninger, Principles of Biochemistry [David L. Nelson, Michael M. Cox] on W H Freeman &Co.,February 1, 2008, | *ISBN*-10: 071677108X | *ISBN*-13: 978- 0716771081 | Edition: 5th.
4. Mehrotra R. C, Singh Anirudh Organometallic Chemistry: a unified approach, New Age International, New Delhi, 2007, ISBN: 9788122412581.
5. J. House, Inorganic Chemistry, Imprint Academic Press, 2012, ISBN 9780123851109

Course Content

Unit I: Introduction to Atomic Structure **12 Hours**
Structure of the Atom, Introduction to Periodic Table, Evolution of Atomic Theory, Thomson's plum pudding model, Rutherford's model and Rutherford-Geiger-Marsden Experiment, Black body radiation; Planck-Einstein Relationship, Planck's constant; Bohr's Model; Bohr's postulates; Matter-Energy interactions involving hydrogen atom; Rydberg Equation; Bohr-Sommerfield Model; Hydrogen Spectral Series (Balmer Series); Wave- Particle duality (de-Broglie's rule); Heisenberg's Uncertainty Principle; Quantum-Mechanical Model of the Atom; Quantum numbers; s, p, d, f, orbitals; Stern-Gerlach Experiment; Aufbau Principle; Pauli's Exclusion Principle; Hund's Rule; Electronic configuration based on Quantum States
Unit II: Introduction to Chemical Bonding **9 Hours**
Covalent Bond; sigma and pi bond; single, double and triple bonds; Ionic Bond; Octet stability; Lewis dot structure ; VSEPR Theory; LCAO-MO; H2; CO; Valence Bond Theory; Periodic trends of chemical properties; Inter-molecular and Intra-molecular bonding (Hydrogen Bonding, Van Der Waals forces, London Forces, etc); dipole moment; polarizibility of molecules; Metallic bonding. Band theory of solids; conductors; semiconductors; insulators.
Unit III: Nuclear Chemistry **6 Hours**
Nuclear Fission, Nuclear Fusion, Half Life, Mass Defect, Astro-chemistry (Reactions in Stars, Mechanism of decay of Stars); Carbon Dating, Related Numerical
Unit IV: Thermodynamics and Chemical Kinetics **6 Hours**

First Law, Second Law, Third Law and Zeroeth Law of Thermodynamics, Enthalpy, Entropy, Gibbs Free Energy, First, second and zero order reactions; Arrhenius Equation
Unit V: Photochemistry and Biochemistry **8 Hours**
Introduction to Photochemistry; Photochemical reactions of organic molecules (Electrocyclic reactions, Norrish reactions; photoisomerization, Zimmerman's Rearrangement), Introduction to Carbohydrates, Lipids and Proteins. DNA structure.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**			
Course Code	EEE101			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. To develop solid foundation for further study of electrical and electronics courses
2. To develop the analytical skills for solving the electrical and electronics circuits
3. To learn the utility of basic electronics devices and circuits
4. To understand the basic principles of electrical machines

Course Outcomes

CO1	Learn and solve different electrical and electronic circuits applying different laws and theorems.
CO2	Develop concepts of the logic circuits, minimize and realize the digital circuits
CO3	Implement electronic circuits involving semiconductor diodes and transistors
CO4	Acquire the knowledge about working of transformers, DC, induction and synchronous machines
CO5	Explain the electrical and electronic circuit theories and verify them through experiments

Text Book (s)

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical and Electronics Engineering”, McGraw Hill, 20016.
2. V. Mittle and Arvind Mittle, “Basic Electrical Engineering”, McGraw Hill, 2005.
3. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 9th Edition, Pearson Education, 2007.
4. A. P. Malvino and Donald Leach, “Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006.

Reference Book (s)

1. D. C. Kulshreshtha,"Basic Electrical Engineering", Tata McGraw Hill, 2009.
2. J. Edminister and M. Nahvi , "Electric Circuits", 3rd Edition, Tata McGraw-Hill, New Delhi, 2002.
3. Jacob Millman, Christos C. Halkias, Satyabrata Jit, "Electronics Devices and Circuits",
4. 3rd Edition, Tata McGraw Hill, 2008

Course Content

Unit I: Elementary Circuit Analysis **8 lecture hours**
Ohm's law, KCL, KVL, node voltage analysis, mesh current, circuits with independent sources, Thevenin's & Norton's equivalent, maximum power transfer and superposition theorem.
Unit II: Analysis of DC and AC Circuits **7 lecture hours**
RL and RC transients in circuits with DC source, RMS values, the use of phasors for constant frequency sinusoidal sources, steady state AC analysis of a series circuit, parallel circuits, AC power calculations.
Unit III: Digital Systems **8 lecture hours**
Basic logic circuit concepts, Basic Gates and Universal Gates, representation of numerical data in binary form – Binary to decimal, Octal, Hexadecimal, Boolean algebra, combinational logic circuits-Half adder, full adder, synthesis of logic circuits, minimization of logic circuits.
Unit IV: Semiconductor Devices **7 lecture hours**
Basic diode concepts, ideal diode model, rectifier and wave-shaping circuits, zener diode voltage regulator concepts, bipolar junction transistors, current and voltage relationship, common emitter characteristics.
Unit V: Electro-mechanics **10 lecture hours**
Transformers-Ideal and real transformers, Construction, Principle of operation of transformer, E.M.F Equation, Phasor diagram of transformer, Losses, efficiency. D.C Machines-Construction, principles of rotating DC machines, Types of Excitations-separately excited and self excited (shunt, series and compound) DC machines. Three phase induction motors-Construction, Principle of operation, synchronous speed, slip, and frequency of rotor emf. Synchronous Machines-construction, principle of operation of synchronous motor and applications.

Continuous Assessment Pattern

COs	Knowledge level	Assessment tools					
		Internal test			End semester exam	Mini Project	Target
		CAT-1	CAT-2	Assignment			
CO1	K1, K2	5			10	0	70%
CO2	K1, K2, K3	5			10	0	70%
CO3	K4	5	5	5	10	0	70%
CO4	K5		5	5	10	0	70%
CO5	K5		5	10	10	0	70%
Total		**15**	**15**	**20**	**50**	**0**	**70%**

Name of The Course	**Computer Programming and Problem Solving**			
Course Code	CSE101			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Provide an overview of computers and problem solving methods using ‘C’ language
2. Serve as a foundation for the study of programming languages.
3. Learn to develop program using ‘C’ language.
4. To develop the software using the concept of ‘C’ Language.

Course Outcomes

CO1	The student would learn the basic concepts of Computer and acquire various problem solving techniques such as algorithms and flowchart.
CO2	To understand the basic terminology used in programming and able to write, compile and debug programs in ‘C’ programming language and to develop program logics using decision structures and loop structures.
CO3	To develop program logics using the concept of arrays and arrays of characters.
CO4	To understand the modular techniques such as functions and difference between call by value and call by reference methods.
CO5	Implement and develop small projects using the concept Structures in C programming language.

Text Book (s)

1. Alexis Leon and Mathews Leon (2001), Introduction to Information Technology, Tata McGraw-Hill.

2. R.G. Dromey (2001), How to Solve it by Computer, Prentice Hall of India.
3. Al Kelley and Ira Pohl (1998), A Book on C Programming in C, 4th Edition, Pearson Education.

Reference Book (s):

1. E. Balagurusamy7th Edition, Programming ANSI C, McGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, The C programming Language, Prentice-Hall in 1988
3. Byron Gottfried, Programming with C, Schaum's Outline

Course Contents:

Unit I: Introduction to Computers and Algorithms **9 lecture hours**
Parts of a computer – Overview of operating systems, assembler, compilers, interpreters and programming languages. Algorithms for exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer, flowchart.
Unit II:Constructs of C **8 lecture hours**
Lexical elements – Operators - data types – I/O statements – format specifications – control statements – decision making and Loop control structure: while loop, for loop, do-while loop, nested loop, break, continue, case control structure, go to, exit statement
Unit III: Arrays **8 lecture hours**
Array handling in C – declaration – single dimensional arrays, two – dimensional arrays, multi-dimensional arrays, sorting and searching on single and two dimensional arrays. Array order reversal, string handling function, manipulation on strings.
Unit IV:Functions **8 lecture hours**
Prototype – declaration - arguments (formal and actual) – return types – types of functions difference between built-in and user-defined functions.
Unit V: Structures **7 lecture hours**
Declarations - nested structures- array of structures - structure to functions - unions- difference between structure and union.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Environmental Science & Energy			
Course Code	EVS102			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. To develop solid foundation for further study of electrical and electronics courses
2. To develop the analytical skills for solving the electrical and electronics circuits
3. To learn the utility of basic electronics devices and circuits
4. To understand the basic principles of electrical machines

Course Outcomes

CO1	Identify the scope and importance of studying the environment and analyze the problems associated with various natural resources. **(K4)**
CO2	Determine the harmful effects of toxic chemicals on living beings and environment. **(K2)**
CO3	Identify the harmful effects of environmental pollution and apply suitable control methods. **(K4)**
CO4	Analyze the different social issues affecting the society and environment. **(K4)**
CO5	Interpret and utilize the different tools of Green Chemistry towards generating a zero waste environment **(K3)**

Text Book (s)

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2008, ISBN:978-81-224-2159-0.
2. Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons , 2008, ISBN: 81-88458-77-5

3. Text Book of Environmental Studies, ErachBharucha, University Press (India) Private Limited, 2005, ISBN: 978 81 7371 540 2
4. Environmental Studies (From Crisis to Cure) Second Edition. , R. Rajagopalan, Oxford University Press, 2012, ISBN 0-19-807208-2.
5. Environmental Studies, RanuGadi, Sunitta Rattan, Sushmita Mohapatra, S.K. Kataria and Sons, 2008, ISBN: 81-89757-98-9.

Reference Book (s)

1. Environmental Studies, Benny Joseph , Tata McGraw Hill Education Private Limited, 2009, ISBN: 987-0-07-064813-5.
2. Environmental Studies, AninditaBasak, Pearson Education, 2009, ISBN: 978-81-317-2118-6.
3. Principles of Environmental Science (Inquiry and Applications), William P. Cunningham & Mary Ann Cunningham, Tata McGraw Hill Education Private Limited, 2007, ISBN: 987-0-07-064772-0.

Course Contents:

Unit I: Environment and Natural Resources **10 Hours**
Definition, scope, importance, need for public awareness, Environmental Management Systems its objectives, components, EIA, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, Mineral resources –Use and exploitation, environmental effects of extracting and using mineral resources, Food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, landslides, soil erosion, desertification & case studies.
Unit II: Chemical Toxicology **7 Hours**
Toxic chemicals in the environment, Impact of toxic chemicals on enzymes, biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides
Unit III: Environmental Pollution **10 Hours**
Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.
Unit IV: Social Issues, Human Population and the Environment **10 Hours**
Urban problems related to energy & sustainable development, water conservation, problems related to rehabilitation – case studies, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness. Population growth, variation among nations, Population explosion, Environment and human health, Value Education, Women and Child Welfare, Role of Information Technology – Visit to local

polluted site /Case Studies.
Unit V: Green Chemistry **4 Hours**
Introduction, Basic principles of green technology, concept of Atom economy, Tools of Green technology, zero waste technology.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**BASIC ENGLISH**
Course Code	LLL111

Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	4	2

Course Objectives

The main goal of this course is to help you improve your spoken English skills to enable you to communicate more effectively in English.

Course Outcomes

CO1	Able to communicate effectively
CO2	Able to develop neutral accent.
CO3	
CO4	
CO5	

Course Content

Unit I: Soft Skills **16 Hours**
1. Introduction and Ice breaking 2. SWOT Analysis 3. Pronunciation - stress and intonation patterns 4. Listening and Comprehension skills **5.** Communication Games
Unit II: English Grammar **8 Hours**

1. Vocabulary
2. Error Detection -error in use of words: Nouns, Pronouns, Verbs, Adjectives, Adverbs, Prepositions, Articles
3. Tenses
4. Antonyms / Synonyms
5. Idioms and Phrases

Continuous Assessment Pattern

COs	**Knowledge level**	**Assessment tools**					
		MTE Test			**End semester exam**	**Internal**	**Target**
		1	**2**	3			
CO1	K1	50	50		50	50	>80%= 10%, 60%<=M<80% = 40%,<60% = 50%
CO2	K2	50	50		50	50	>80%= 10%, 60%<=M<80% = 40%,<60% = 50%
Total :400		**100**	**100**		**100**	**100**	

Name of The Course	Differential and Integral Calculus			
Course Code	MAT113			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. Perform calculations and algebraic manipulations, particularly differentiation and integration, quickly and accurately.
2. Use the language of mathematics to communicate mathematical ideas, using symbols and notations correctly, and presenting solutions in a clear and organized way
3. Use concepts of calculus to the model real-world problems.
4. Make connections between different mathematical concepts, such as geometric, analytic and numerical interpretations of functions, derivatives and integrals.
5. Develop ability to understand and create rigorous formal mathematical arguments. Apply basic mathematical logic.

Course Outcomes

CO1	Solve partial derivatives for functions of several variables and apply it in series expansion and extreme values and saddle points. (K4)
CO2	Evaluate the multiple integrals and utilize them in finding the area and volume of a region bounded by the given curves/surfaces. (K4)
CO3	Evaluate the derivatives and integrals for vector valued functions. (K4)
CO4	Apply vector analysis to evaluate work done and circulation.(K4)
CO5	Apply Green's, Stokes' and Gauss divergence theorem to evaluate Integrals. (K4)

Text Book (s)

1. Robert T. Smith and Roland B. Minton, Calculus, McGraw Hill education, 4th Edition.
2. George B. Thomas and Ross L. Finney, Calculus, Pearson Education, 9th Edition.

Reference Book (s)

1. K. Jain and S. R. K. Iyenger, Advanced Engineering Mathematics, Narosa Publishers.
2. Michael D. Greenberg, Advanced Engineering Mathematics, Pearson Education, Asia.

Course Content

Unit I: Differential Calculus **10 Hours**
Functions of two and more than two variables, Limits and continuity, Partial derivatives, Total differential, Derivatives of composite and implicit functions, Jacobian, Taylor's series of functions of one and two variables, Extreme values and saddle points, Lagrange's method of undetermined multipliers.
Unit II: Multiple integrals **10 Hours**
Double integrals in Cartesian and Polar coordinates, Change of order of integration, change of variables, Applications of double integrals to find area and volume, Beta and Gamma functions, Triple integrals in Cartesian, cylindrical and spherical coordinates, Change of variables in triple integrals, Applications of triple integrals to find volume **.**
Unit III: Vector Calculus **10 Hours**
Scalar and vector fields, Differentiation of Vector functions, Gradient, divergence, curl and their physical interpretations, line integrals, path independence, potential functions and conservative fields, surface integrals, Green's theorem, Stokes's theorem and Gauss's divergence theorems (without proof).

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

MEE152	**Workshop Practice**	L 0	T 0	P 4	C 2
Version No.	1.0				
Prerequisite	-				
Objectives:	1. To train the students in metal joining process like welding, soldering, etc. 2. To impart skill in fabricating simple components using sheet metal. 3. To cultivate safety aspects in handling of tools and equipment.				
Expected Outcome:	On completion of this course, the students will be able to 1. Welding and soldering operations. 2. Fabrication of simple sheet metal parts.				
Module I	Welding Shop				
1. Instruction of BI standards and reading of welding drawings. 2. T- Joint 3. Lap Joint 4. TIG Welding 5. MIG Welding					
Module II	Sheet Metal Shop				
1. Making of Cylinder 2. Making of Cylinder using development of surface. 3. Making of Square box using development of surface.					
Module III	Soldering Shop				
1. Soldering and desoldering of Resistor in PCB. 2. Soldering and desoldering of IC in PCB. 3. Soldering and desoldering of Capacitor in PCB.					
Module IV	Bosch Tools				
Demonstration of all BOSCH TOOLS					
Text Books					
Workshop Manual prepared by staff					
Mode of Evaluation	Tutorials / Class Tests / Lab Exam				
Recommended by the Board of Studies on:					
Date of Approval by the Academic Council:					
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination				
Recommended by the Board of Studies on:					
Date of Approval by the Academic Council:					

Name of The Course	Engineering Graphics
Course Code	MEE151
Prerequisite	
Co-requisite	

Anti-requisite				
	L	**T**	**P**	**C**
	0	0	4	2

Course Objectives

The objective of the course is to enable students to

1. Provide basic foundation in computer aided design / manufacturing
2. Understand the fundamentals used to create and manipulate geometric models
3. Get acquainted with the basic CAD software designed for geometric modelling
4. Learn working principles of NC machines CNC control and part programming
5. Understand concept of Group Technology, FMS and CIM

Course Outcomes

CO1	Understand the concept and principles of engineering graphics in product design (**K2)**
CO2	make isometric and orthographic projection of solids along with free hand sketching. **(K4)**
CO3	Develop a solid model using AutoCAD**(K4)**
CO4	Make a solid modeling for a given assembly.**K3)**
CO5	Apply the concepts and techniques learnt in the course in making hands-on project.**(K2)**

Text Book (s)

1. Asimow, M. (1962). Introduction to design. Englewood Cliffs: Prentice-Hall.
2. K C John (2009), Engineering Graphics for Degree, Prentice Hall of India. ISBN: 978-8-120-33788-3.
3. P N Rao (2010), CAD/CAM Principles and Applications, 3rd Edition, Tata McGraw-Hill Education, ISBN: 978-0-070-68193-4.

Reference Book (s)

1. Course material uploaded on LMS

Course Content

Unit I: Introduction – Understanding the Concept of Product Design 10 Hour
Fundamentals of Design : Design by Evolution and Design by Innovation, Principles that govern any design, Morphology and Process of Design, Application of Graphics in Design, Engineering Graphics: An Overview, Introduction to Computer Aided Drafting , Lettering, Numerals and Dimensioning.
Unit II:Projection of Solids16 Hour
Concept of Projection, Object in four quadrant, 2-D description of quadrants, Orthographic Projection of Solids, Isometric Projection of Solids, Free-hand sketching
Unit III: Solid Modeling10 Hour
Division of Engineering Solids- Polyhedra, Regular and Irregular polyhedral, solids of revolution, Geometric Modeling – Wireframe, B-Rep and Solid Modeling, Solid Modelling using AutoCAD
Unit IV:Introduction to Assembly 10 Hour
Types of assembly drawings, Accepted Norms for Assembly Drawings, Sequences of Preparing the Assembly Drawing, Solid Modeling of assembly
Unit V:Application of Design Concepts for Product Design 10 Hour
Hands-on Project in Groups: Choose a specific objective for Product Design, Design the Product and Model it using AutoCAD, presentation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Modern Physics			
Course Code	PHY111			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. To prepare students with fundamental knowledge of physics.
2. To develop skills necessary for higher-level Science and Engineering courses.

Course Outcomes

CO1	Discuss the Origin and basic concepts of Quantum Physics like wave function, Schrodinger wave equations and its application.
CO2	Interpret the phenomenon of Interference and Diffraction of light
CO3	Explain Maxwell's equations and their significance and utilization of these equations in EM wave propagation
CO4	Describe the principle and characteristics of LASER and its Applications.
CO5	Express and Categorize the magnetic materials and their technical aspects.

Text Book (s)

1. Arthur Beiser, S Rai Choudhury, Shobhit Mahajan, (2009), Concepts of Modern Physics, 6th Edition, Tata-McGraw Hill. ISBN- 9780070151550.
2. Neeraj Mehta, (2011), Applied Physics For Engineers, New Arrivals – PHI, ISBN-9788120342422.

Reference Book (s)

1. Robert Kolenkow, David Kleppner (2007), An Introduction to Mechanics, 1st Edition, Tata-McGraw Hill.

2. B.B. Laud, Lasers and Non-Linear Optics (2011), 3rd Edition, New Ages International.
3. William Silfvast (2002), Laser Fundamentals, Cambridge University Press.
4. David. J. Griffiths (2009), Introduction to Electrodynamics, 3rd Edition, PHI Learning.

Course Content

Unit 1 -Quantum Mechanics **8 hours**
Wave-Particle duality, de-Broglie waves, Davisson &Germer Experiment (Experimental verification of de-Broglie waves), Heisenberg Uncertainty Principle and its Applications, Schrodinger's wave equations, Particle in a Box.
Unit 2 –Optics **8 hours**
Interference- Interference of Light, Biprism experiment, interference in thin films, Newton's rings; Diffraction-Single slit, Diffraction grating, Grating spectra, Rayleigh's criterion and resolving power of grating.
Unit 3 -LASER **8 hours**
Einstein's coefficients, Population Inversion, Three level and four level laser, Laser characteristics, He-Ne laser and applications.
Unit 4 –Electromagnetics **8 hours**
Displacement current, Maxwell's Equations (Intergral and Differential form), Equation of continuity, EM-Wave equations and its propagation characteristics in free space, Poynting theorem and Poynting vectors.
Unit 5 -Magnetism **8 hours**
Origin of magnetization, Orbital and spin magnetic moment, Classification and properties of magnetic materials, Hysteresis curve, soft and hard magnetic materials.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test**	**Total Marks**

		(ETE)	
20	30	50	100

CSE-215	INTRODUCTION TO OPEN SOURCE SOFTWARE AND OPEN STANDARE
Version No. 1.0	Date of Approval: Jun XX, 2013
Prerequisite	
co-requisites	

1.1 INTRODUCTION TO OPEN SOURCE SOFTWARE & OPEN STANDARDS*

- **Unit 1 - Introduction & Advantages of OSS**

Introduction to Open Source Software - History of Open Source Software, Initiation of Open Source project start; Open Source Software examples : The Origins, The GNU projects, The Operating System GNU/Linux, The Graphical User Interface KDE/GNOME, Apache Web Server, Application Software; Strengths and Advantages of Open Source Software - Network effects, Lower cost, Availability, Maintainability.

- **Unit 2 - Adoption of Open Source**

Introduction, Drivers for Adoption - Lower cost of ownership, Quality, Innovation reuse, Technical competence; Open Source Software Assessment, Examples of Open Source Adoption in the World, Open Source Challenges.

- **Unit 3 - History of Open Source**

History of Open Source - Evolution of UNIX, GNU General Public License - Genesis of GNU, Copy left- All Rights reserved; Benefits of Open Source.

- **Unit 4 – Open Source Case Study**

Introduction, Case Study 1 - Mozilla, Case Study 2 - Linux : Linux Distribution, Development Model, Change rate, Who writes the kernel? Why companies support kernel development? Linux dominance in industry.

- **Unit 5 - Introduction to Open Standards**

Standard Organizations, De Jure standard setters - International Organization for Standardization, International Electro technical Commission, International Telecommunication Union, ASEAN, Bureau of Indian Standards, De Facto Standard Setters -Bluetooth Special Interest group, USB Implementers forum; Testing and certification, Summary.

- **Unit 6 - Adoption of Open Standards**

Introduction, Drivers for adoption - Network effects, Lower costs, Impending benefits; Adoption methods and Process - Degree of association, Methods, process; Examples of Open Standards adoption in the world - SCOSTA, Web Standards; Adoption barriers, Early adopters.

- **Unit 7 - Open Standards Case Study**

Introduction, Case Study 1 - Transfer Account Procedure (TAP), Case Study 2 - Open Document Format (ODF)**.**

- **Unit 8 - Evolution of Standards**

Evolution, Life Cycle, importance of Standards, Benefits of Open Standards.

- **Unit 9 - Principles and Practices of Open Standards.**

Major Principles of Open Standards - Openness, Consensus, Due Process, Open IPR, Open World, Open Access, Open meetings, Ongoing support, Open interfaces, Open use.

Appear in Multiple programs

Name of The Course	Physics Lab I
Course Code	PHY151
Prerequisite	
Co-requisite	

Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives

1. To impart knowledge in basic concepts of physics relevant to engineering applications
2. To introduce advances in technology for engineering applications

Course Outcomes

CO1	Understand the physical principle involve in the various instruments and relate them to new applications.
CO2	Operate CRO and various optical instruments such as- spectrometer, travelling microscope and spherometer.
CO3	Calculate the physical constants by various methods such as- Planck's constant, wavelength of monochromatic light, angle of prism and realize the accuracy in measurements.
CO4	Develop the individual and team work for the performance of scientific works.
CO5	Develop the skill for making scientific graphs, error analysis and measurement technology used in engineering.

Course Content

S. No	**List of Experiment**
1	To determine the wavelength of He-Ne laser light by diffraction method at a single slit.
2	To study the polarization of light by simple reflection using He-Ne laser
3	To study the variation of magnetic field with distance along the axis of current carrying coil and then to estimate the radius of coil.
4	To verify the Stefan's law by electrical method.

5	To calibrate the ammeter and voltmeter with the help of potentiometer.
6	To determine the resolving power of telescope.
7	To measure the numerical aperture of an optical fiber.
8	Find the angle of a prism and calculate Cauchy's constant.
9	To determine the velocity of ultrasonic wave in liquid.
10	To find the frequency of A.C. mains using sonometer.

Continuous Assessment Pattern

	Laboratory evaluation scheme		
Components	**Internal Exam Practical (IEP) (50)** **= [(60% of M1) + (40% of M2)]**		**EEP (50)**
Max Marks	Mid Term Lab Exam (**M1** = 50)	End Term Lab Internal Exam(**M2** = 50)	50
Marks Distribution	CA(30) + Viva Voce(10) + Lab Question(10)	CA(30) + Viva Voce(10) + Lab Question(10	
Total Marks	**100**		

Name of The Course	Engineering Chemistry Lab I			
Course Code	CHY151			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives

This Engineering Chemistry Laboratory is common to first year branches of UG Engineering. At the end of the course the student is expected to

1. Provide the students with a solid foundation in Chemistry laboratory required to solve engineering problems.
2. Practical implementation of fundamental concepts

Course Outcomes

CO1	Employ the volumetric titrations techniques used in chemistry laboratory for analysis.(K3)
CO2	Analyse to differentiate between hard and soft water using complexometric titration.(K2)
CO3	Calculate the percentage of dissolved oxygen in water sample.(K3)
CO4	Identify the viscosity of liquid using Ostwald viscometer.(K2)
CO5	Analyse the Carbohydrate and protein in given organic compound.(K3)

Course Content

S. No	**List of Experiment**

1	To estimate the total permanent and temporary hardness of the given hard water sample. A standard calcium ion solution (1 mg of $CaCO_3$ in 1 ml) and an approximately 0.01M solution of EDTA are provided.
2	To estimate the amount of Zinc in the given solution by using the standard solution of Potassium Ferrocyanide.
3	To Determine the Alkalinity of a given Water Sample
4	To find out the amount of dissolved oxygen in the given sample of water.
5	To find out relative and absolute viscosity of a given liquid using Ostwald's viscometer.
6	Detection of the elements in given organic compound.
7	To estimate the amount of Copper present in the given solution using a standard solution by provided hypo solution.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**			
Course Code	EEE151			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. An understanding of basic electrical wiring, measurements, and methods
2. Students understand measurement errors and non-ideal electrical devices
3. Students understand wiring and operation or operational amplifiers
4. Students demonstrate effective written communication skills

Course Outcomes

CO1	Apply and verifying basic electrical laws.

CO2	Realize and apply basic theorems in electrical network and circuits.
CO3	Verify the truth tables of logic Gates.
CO4	Analyze characteristics of basic diodes and transistors
CO5	Realize and verify the working of transformer.

Course Content

S. No	List of Experiment
1	To verify (i) Kirchoff's current law (ii) Kirchoff's voltage law
2	Verification of Thevenin's Theorem
3	Verification of Norton's Theorem
4	Verification of Maximum power transfer Theorem
5	Verification of Truth table for logic Gates- AND , OR, NOT, NAND, NOR and XOR and Half adder Circuit.
6	Study of P-N Junction Diode characteristics.
7	Study of ZENER Diode characteristics.
8	Study of CE characteristics of a Bipolar Junction Transistor.
9	Study of characteristics of FET.
10	Study of open circuit and short circuit tests on a single phase transformer and obtaining its equivalent circuit parameters.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks

50		50	100

Sl. No.	Course Code	Course Name	L	T	P	C
9	CSE151	Computer Programming and Problem Solving Lab	0	0	2	1

Course Outcomes

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

1. Understand the C Programming environment. Learn to solve the bigger problems step by step. (K3)
2. Understand when and how to take decisions, to compare and iterate, so as to simplify the problems. (K3)
3. Recognize the contiguous memory allocation for data storage in computer memory and perform various operations by understanding them. Learn the use of memory address. (K3)
4. Implement the modular techniques such as functions and difference between call by value and call by reference methods. (K3)
5. Implement and develop user defined variables like Structures. Learn to create them dynamically in C programming language. (K3)

Text Books:

1. Alexis Leon and Mathews Leon (2001), Introduction to Information Technology, Tata McGraw-Hill.
2. R.G. Dromey (2001), How to Solve it by Computer, Prentice Hall of India.
3. Al Kelley and Ira Pohl (1998), A Book on C Programming in C, 4th Edition, Pearson Education.

Reference Books

1. E. Balagurusamy 7th Edition, Programming ANSI C, McGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, The C programming Language, Prentice-Hall in 1988
3. Byron Gottfried, Programming with C, Schaum's Outline

Course Content

Student must be aware of:- Parts of a computer – Overview of operating systems, assembler, compilers, interpreters and programming languages.

Unit I: Introduction to Computers and Algorithms **8 lab hours**

Character Set, Variable, Identifiers, Built-in Data Types. Arithmetic Operators, Expressions, Constants, Literals. Assignment Operator. Input/Output operations. Basic C-Programs; Exchanging the values of two variables, counting, summation of a set of numbers, Factorial computation, finding LCM and HCF, generation of the Fibonacci sequence, reversing the digits of an integer, Write Algorithms and draw Flowcharts.

Unit II: Conditional Statement and Constructs of Loop **8 lab hours**

Decision Making, Relational and Logical Operators, IF and Nested IF statements.
Format specifications – control statements – decision making and Loop control structure: while loop, for loop, do-while loop, nested loop, infinite loop, break, continue, exit statement, Switch-Case control structure

Unit III: Arrays and Pointers **8 lab hours**

Array Declaration – One dimensional array, Multi dimensional arrays, Insertion, Searching, Sorting on arrays. Transpose of Array. Arithmetic operations on Array. String handling function, manipulation on strings, finding Palindrome.
Address operations using pointers. Arithmetic operations using Pointers. Array of Pointers.

Unit IV: Functions **8 lab hours**

Prototype – declaration - arguments (formal and actual) – return types – types of functions difference between built-in and user-defined functions, passing parameter by values and by reference (using pointer).

Unit V: Structures and Files **8 lab hours**

Structures: User defined variables. Declaration of Structure, Array of Structures, passing Structure to functions (Using Pointers). Dynamic memory allocation functions like calloc( ), malloc( ). Unions: Difference between structure and union. Concept of File storage and reading writing in file through C-program.

Mode of Evaluation

Quiz, Assignment, Seminar and Written Examination

	Laboratory evaluation scheme	
Components	**End Term Internal Exam Practical (IEP) (50)**	**End Term External Exam Practical EEP (50)**
Marks Distribution	Continuous Assessment (30) [Evaluated throughout the semester] + Viva Voce(10) + Lab Question(10) [Evaluated on IEP exam day]	50 Marks Evaluated on External Exam Practical (EEP) day (Viva + Question) = 50 Marks
Total Marks	**100**	

II semester

CSE123	**Web Programming through PHP & HTML**	L	T	P	C
Version1.1	Date of Approval: Dec 23rd, 2016	3	0	2	4
Pre-requisites//Exposure	Computer Programming and Problem Solving				
co-requisites					
Course Coordinator	Mr. Pratyush Kumar Deka				

Course Objectives

The objective of this course is to:

1. Design and develop the websites using PHP and HTML
2. Familiarize with PHP arrays, file handling techniques, object oriented programming concepts in PHP

3. Keep track of user information in the websites
4. Familiarize with web forms, form validation and database handling

Course Outcomes

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

1. Understand the basics of HTML page structure and PHP language constructs
2. Understand the concepts of control structures, string manipulations and functions in PHP
3. Familiarize with PHP arrays and file handling techniques and build modular web applications with different frameworks
4. Implement object oriented programming techniquesand keep track of users with sessions and cookies
5. Process web forms robustly, securing website and handling databases
6. Design and develop dynamic web pages and web applications

Catalog Description

This technical course is designed to help student to learn about HTML language. Further PHP programming will be taught to make active web pages and website. Concepts of server side and client side software and middleware like web server and database server will be explained. An introduction to JavaScript will also be provided for form validation.

Text Books

1. **Web Programming Thru PHP (IBM ICE Publication), Edition 1.0, 2013**

Reference Books

1. PHP Bible - Tim Converse
2. PHP A beginner's guide - Bill McCarthy
3. PHP and MySQL Web Development - Luke Welling
4. Learning PHP - OReilly Press
5. http://in.php.net/quickref.php
6. http://www.w3schools.com/php/default.asp
7. http://www.tizag.com/php/

Course Content

Unit I: HTML & PHP Basics — 6 Lecture hours

Introduction to HTML, Basic HTML tags, HTML page structure, HTML elements, attributes, headings, paragraphs styles & formatting, Introduction to PHP, Why PHP?, Basic Syntax of PHP, PHP statement terminator and case insensitivity, Embedding PHP in HTML, PHP echo/print, Comments, Variables, Data types, Assigning value to a variable, Constants, Managing Variables, working with XAMPP.

Unit II:Operator's, Controls Structures and Functions in PHP — 8 Lecture hours

Operators in PHP, String Manipulation: strtoupper(), strtolower(), ucfirst(), ucwords(), strcmp(), strlen(), substr(), trim(), Conditional Control Structures: If statement, If- else statement, If- else if statement, Nested If, Switch statement, Looping Control Structures: For loop, While loop, Do- While loop, Foreach, Loop control: Break and Continue. Functions, User-Defined function, Function Definition, Function Call, Function with arguments, Function with return value, Call by value and call by references, Understanding variable scope, Global Variables, Static Variables, Include and Require, Built-in functions in PHP.

Unit III:Arrays and File Handling in PHP — 9 Lecture hours

Introduction to Array, Array in PHP, Creating an Array, Accessing Elements of an Array, Modifying Elements of an Array, Finding the Size of an Array, Printing an Array in the readable Way, Iterating Array Elements,

Modifying Array while iteration, Iterating Array with Numeric index, Removing Element from an Array, Converting an Array to String, Converting String to an Array, Array Sorting, Multidimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array. Introduction, File Open, File Creation, Writing to files, Reading from File, Searching a record from a file, Closing a File, Form Handling in PHP using HTML, Sending mails & File Uploading in PHP.

Unit IV:OOPs Concepts, Regular Expressions, Cookies & Sessions in PHP **9 Lecture hours**

OOPs Concepts: Defining Class in PHP, Object in PHP, Usage of $this variable, Constructor, Constructor with Parameters. Introduction to Exception, Exception Handling mechanisms, Creating Custom Exceptions, Multiple Catch Blocks, Exception Propagation, Error Handling in PHP, Regular Expressions: What is regular expression?, Pattern matching in PHP, Replacing text, Splitting a string with a Regular Expression, Validating input with regular expressions, Cookies & Sessions: Advantages and limitations, Comparison between Cookies and Sessions, How to use them?

Unit V:JavaScript, Handling Databases in PHP, Zend Framework **8 Lecture hours**

Introduction to JavaScript, variables and literals, JavaScript and the web browser, event handlers, DOM, Client-side Validation, Database: Connection with MySql Database, Performing basic database operation(DDL and DML), PHP Zend Framework

Mode of Evaluation: Class Quiz / Class Assignment / Group-Class Discussion

	Theory without PBL						
Components	**Internal (50)**						**SEE**
Marks	Cat-1 (15)	Cat-2 (15)	Quiz (6)	Assignment (5)	Class Discussion (5)	Attendance (4)	Semester End Exam (50)
Total Marks	100						

	Theory with PBL	
Components	**Internal (50)**	**SEE**

Marks	Update Cat-1 (15)		Update Cat-2 (15)		Quiz (6)	Assignment (5)	Class Discussion (5)	Attendance (4)	Semester End Exam (50)
	CAT-1 (Scaled to 9)	PBL-1 (Scaled to 6)	CAT-2 (Scaled to 9)	PBL-2 (Scaled to 6)					
Total Marks	100								

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	Understand the basics of HTML page structure and PHP language constructs	PO1, PO5
2	Understand the concepts of control structures, string manipulations and functions in PHP	PO2, PO3, PO4
3	Familiarize with PHP arrays and file handling techniques and build modular web applications with different frameworks	PO2, PO3, PSO1
4	Implement object oriented programming techniques and keep track of users with sessions and cookies	PO1, PO2, PO3
5	Process web forms robustly, securing website and handling databases	PO2, PO3, PSO3
6	Design and develop dynamic web pages and web applications	PO2, PO3, PO9, PSO1, PSO3

1=addressed to small extent
2= addressed significantly
3= addressed strongly (major part of course)

The course addresses significantly towards Program outcome **Engineering Knowledge (PO1)**, **Ability to design real world applications using high performance computing systems, computer networks and mobile computing systems(PSO1)** and **Ability to integrate the concepts of theoretical computer science, data structure, algorithms and programming into projects**.

Two evaluation methods will be used for the evaluation of course and program outcomes of this course.

The outcomes will be measured based on student performance on specific questions that will be part of the **semester end examination (SEE).** Question number 9 will test the ability of the student for **Problem Analysis (PO2) and Design/development of solutions (PO3)**. The outcome based question is put in question serial number 9. That question is compulsory so all students will be expected to attempt it.

Direct Measurement Report

CSE123 Outcome (2, 3) and PSO(1, 3) Report Form

1. **Measure**– percent of students scoring at least 70% marks for the question 9 in the SEE examination.
   Rubric - none
   Target – 70% of students

2. **Besides that various assignments and all CAT-1 / CAT-2 questions will also be mapped to one of the outcomes associated with the course. The attainment level of the outcomes associated with the course may also be calculated with the performance of the students in respective assignments and all CAT-1 / CAT-2 questions.**

Indirect Measurement

In end term survey, the questions are asked from the students about the attainment of course outcomes associated with a particular course.

Name of The Course	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**			
Course Code	EEE101			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

5. To develop solid foundation for further study of electrical and electronics courses
6. To develop the analytical skills for solving the electrical and electronics circuits
7. To learn the utility of basic electronics devices and circuits
8. To understand the basic principles of electrical machines

Course Outcomes

CO1	Learn and solve different electrical and electronic circuits applying different laws and theorems.
CO2	Develop concepts of the logic circuits, minimize and realize the digital circuits
CO3	Implement electronic circuits involving semiconductor diodes and transistors
CO4	Acquire the knowledge about working of transformers, DC, induction and synchronous machines
CO5	Explain the electrical and electronic circuit theories and verify them through experiments

Text Book (s)

5. D. P. Kothari and I. J. Nagrath, “Basic Electrical and Electronics Engineering”, McGraw Hill, 20016.
6. V. Mittle and Arvind Mittle, “Basic Electrical Engineering”, McGraw Hill, 2005.
7. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 9th Edition, Pearson Education, 2007.
8. A. P. Malvino and Donald Leach, “Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006.

Reference Book (s)

1. D. C. Kulshreshtha,"Basic Electrical Engineering", Tata McGraw Hill, 2009.
5. J. Edminister and M. Nahvi , "Electric Circuits", 3rd Edition, Tata McGraw-Hill, New Delhi, 2002.
6. Jacob Millman, Christos C. Halkias, Satyabrata Jit, "Electronics Devices and Circuits",
7. 3rd Edition, Tata McGraw Hill, 2008

Course Content

Unit I: Elementary Circuit Analysis **8 lecture hours**
Ohm's law, KCL, KVL, node voltage analysis, mesh current, circuits with independent sources, Thevenin's & Norton's equivalent, maximum power transfer and superposition theorem.
Unit II: Analysis of DC and AC Circuits **7 lecture hours**
RL and RC transients in circuits with DC source, RMS values, the use of phasors for constant frequency sinusoidal sources, steady state AC analysis of a series circuit, parallel circuits, AC power calculations.
Unit III: Digital Systems **8 lecture hours**
Basic logic circuit concepts, Basic Gates and Universal Gates, representation of numerical data in binary form – Binary to decimal, Octal, Hexadecimal, Boolean algebra, combinational logic circuits-Half adder, full adder, synthesis of logic circuits, minimization of logic circuits.
Unit IV: Semiconductor Devices **7 lecture hours**
Basic diode concepts, ideal diode model, rectifier and wave-shaping circuits, zener diode voltage regulator concepts, bipolar junction transistors, current and voltage relationship, common emitter characteristics.
Unit V: Electro-mechanics **10 lecture hours**
Transformers-Ideal and real transformers, Construction, Principle of operation of transformer, E.M.F Equation, Phasor diagram of transformer, Losses, efficiency. D.C Machines-Construction, principles of rotating DC machines, Types of Excitations-separately excited and self excited (shunt, series and compound) DC machines. Three phase induction motors-Construction, Principle of operation, synchronous speed, slip, and frequency of rotor emf. Synchronous Machines-construction, principle of operation of synchronous motor and applications.

Continuous Assessment Pattern

COs	Knowledge level	Assessment tools					
		Internal test			End semester exam	Mini Project	Target
		CAT-1	CAT-2	Assignment			
CO1	K1, K2	5			10	0	70%
CO2	K1, K2, K3	5			10	0	70%
CO3	K4	5	5	5	10	0	70%
CO4	K5		5	5	10	0	70%
CO5	K5		5	10	10	0	70%
Total		**15**	**15**	**20**	**50**	**0**	**70%**

Name of The Course	**Computer Programming and Problem Solving**			
Course Code	CSE101			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

5. Provide an overview of computers and problem solving methods using ‘C’ language
6. Serve as a foundation for the study of programming languages.
7. Learn to develop program using ‘C’ language.
8. To develop the software using the concept of ‘C’ Language.

Course Outcomes

CO1	The student would learn the basic concepts of Computer and acquire various problem solving techniques such as algorithms and flowchart.
CO2	To understand the basic terminology used in programming and able to write, compile and debug programs in ‘C’ programming language and to develop program logics using decision structures and loop structures.
CO3	To develop program logics using the concept of arrays and arrays of characters.
CO4	To understand the modular techniques such as functions and difference between call by value and call by reference methods.
CO5	Implement and develop small projects using the concept Structures in C programming language.

Text Book (s)

4. Alexis Leon and Mathews Leon (2001), Introduction to Information Technology, Tata McGraw-Hill.
5. R.G. Dromey (2001), How to Solve it by Computer, Prentice Hall of India.
6. Al Kelley and Ira Pohl (1998), A Book on C Programming in C, 4th Edition, Pearson Education.

Reference Book (s):

4. E. Balagurusamy7th Edition, Programming ANSI C, McGraw-Hill
5. Brian W. Kernighan and Dennis M. Ritchie, The C programming Language, Prentice-Hall in 1988
6. Byron Gottfried, Programming with C, Schaum's Outline

Course Contents:

Unit I: Introduction to Computers and Algorithms **9 lecture hours**
Parts of a computer – Overview of operating systems, assembler, compilers, interpreters and programming languages. Algorithms for exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer, flowchart.
Unit II:Constructs of C **8 lecture hours**
Lexical elements – Operators - data types – I/O statements – format specifications – control statements – decision making and Loop control structure: while loop, for loop, do-while loop, nested loop, break, continue, case control structure, go to, exit statement
Unit III: Arrays **8 lecture hours**
Array handling in C – declaration – single dimensional arrays, two – dimensional arrays, multi-dimensional arrays, sorting and searching on single and two dimensional arrays. Array order reversal, string handling function, manipulation on strings.
Unit IV:Functions **8 lecture hours**
Prototype – declaration - arguments (formal and actual) – return types – types of functions difference between built-in and user-defined functions.
Unit V: Structures **7 lecture hours**
Declarations - nested structures- array of structures - structure to functions - unions- difference between structure and union.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Environmental Science & Energy			
Course Code	EVS102			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

5. To develop solid foundation for further study of electrical and electronics courses
6. To develop the analytical skills for solving the electrical and electronics circuits
7. To learn the utility of basic electronics devices and circuits
8. To understand the basic principles of electrical machines

Course Outcomes

CO1	Identify the scope and importance of studying the environment and analyze the problems associated with various natural resources. **(K4)**
CO2	Determine the harmful effects of toxic chemicals on living beings and environment. **(K2)**

CO3	Identify the harmful effects of environmental pollution and apply suitable control methods. **(K4)**
CO4	Analyze the different social issues affecting the society and environment. **(K4)**
CO5	Interpret and utilize the different tools of Green Chemistry towards generating a zero waste environment **(K3)**

Text Book (s)

6. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2008, ISBN:978-81-224-2159-0.
7. Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons , 2008, ISBN: 81-88458-77-5
8. Text Book of Environmental Studies, ErachBharucha, University Press (India) Private Limited, 2005, ISBN: 978 81 7371 540 2
9. Environmental Studies (From Crisis to Cure) Second Edition. , R. Rajagopalan, Oxford University Press, 2012, ISBN 0-19-807208-2.
10. Environmental Studies, RanuGadi, Sunitta Rattan, Sushmita Mohapatra, S.K. Kataria and Sons, 2008, ISBN: 81-89757-98-9.

Reference Book (s)

4. Environmental Studies, Benny Joseph , Tata McGraw Hill Education Private Limited, 2009, ISBN: 987-0-07-064813-5.
5. Environmental Studies, AninditaBasak, Pearson Education, 2009, ISBN: 978-81-317-2118-6.
6. Principles of Environmental Science (Inquiry and Applications), William P. Cunningham & Mary Ann Cunningham, Tata McGraw Hill Education Private Limited, 2007, ISBN: 987-0-07-064772-0.

Course Contents:

Unit I: Environment and Natural Resources **10 Hours**
Definition, scope, importance, need for public awareness, Environmental Management Systems its objectives, components, EIA, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, Mineral resources –Use and exploitation, environmental effects of extracting and using mineral resources, Food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, landslides, soil erosion, desertification & case studies.
Unit II: Chemical Toxicology **7 Hours**
Toxic chemicals in the environment, Impact of toxic chemicals on enzymes, biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides

Unit III: Environmental Pollution	**10 Hours**
Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.	
Unit IV: Social Issues, Human Population and the Environment	**10 Hours**
Urban problems related to energy & sustainable development, water conservation, problems related to rehabilitation – case studies, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness. Population growth, variation among nations, Population explosion, Environment and human health, Value Education, Women and Child Welfare, Role of Information Technology – Visit to local polluted site /Case Studies.	
Unit V: Green Chemistry	**4 Hours**
Introduction, Basic principles of green technology, concept of Atom economy, Tools of Green technology, zero waste technology.	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**PSYCHOLOGY AND SOCIOLOGY**			
Course Code	HUM201			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	2	**0**	**0**	**2**

Course Objectives

Objective of this course is to develop social-psychological skills among the students to meet out the challenges of industry and society**.**

Course Outcomes

CO1	Understanding of the basic facts of psychology and their application
CO2	Develop an ability to work in the work groups and communicate effectively
CO3	Develop sociological understanding of Social process, Social Institutions, Social inequality, stratification, mobility, Social change and Movement.

CO4	Demonstrate scientific understanding of major social themes & social phenomena of industrial society, that impact engineer's various realms of life.
CO5	Develop leadership quality, potential to analyze and address social issues and to transform young engineers as a very good human being and successful technocrat.

Text Book (s)

6. Bottomore, T B .,Sociology: A Guide to Problems and Literature, London: George Allen & Unwin1962
7. Robbins Stephens, Organizational Behaviour. P. Printice Hall International ,Inc. Eaglewood cliffs, 2005,ISBN: 0-13-191435,11th Edition
8. Giddens, A. ., Sociology, Cambridge; Polity ,2000.
9. Horton P B & Hunt C L Sociology, New York: McGraw-Hill Co., 1964.
10. *The Sociology of Social Problems*. Authors, Paul B. Horton, Gerald R. Leslie, Richard F. Larson. Edition, 10, illustrated. Publisher, Prentice Hall, 1991

Reference Book (s)

3. Clifford T. ***Morgan***, Richard A ***King***, John R Weisz and John Schopler; Introduction to Psychology Published: 19/02/2001; Edition: 7; ISBN: 9780074622506
4. Haralambos, M and Holborn., M. Sociology, London: HaperCollins,2000.

Course Content

Unit-1 Industrial Psychology	**8 hours**
Psychology: Meaning, Definition, nature and Scope. Relevance for engineers. **Personality:** Definition and types, theories. **Memory:** Types, and models, strategies to improve memory **Motivation:** Motivational theories and job satisfaction, **Learning**: Types, classical conditioning, operand conditioning & observational learning	
Unit-2 Group dynamics and leadership	**8 hours**
Group dynamics and leadership: skills and various types, **Stress ,Stress management** Definition, types, causes, strategies to cope with stress **Work Environment**: Fatigue and boredom, , accidents and safety	
Unit-3 Introduction To Industrial Sociology	**8 hours**

Sociology , Industrial Sociology: Meaning definition, Nature , scope, Importance of Sociology for Engineers, **Basic concepts:** Interaction, Group, community, Society, **Social Processes:** Associative & Dissociative, social process and organizational goals. **Social Institutions:**Family ,Marriage, Religion: Functions and dysfunctions & Impact of Industrialization
Unit-4 Social and Industrial Concerns **8 hours**
Social Inequality, Stratification & Mobility, Impact of Industrialization on Sanskritization Urbanization, Westernization, & Modernization, **Social Change and Social Movements:** Meaning Definition, Genesis, Types, Functions, role in Social transformation. **Industrialization in India and Industrial** policy resolution 1956., **Industrial Disputes:** Strikes and lockouts
Unit-5 Industrial relations machinery **8 hours**
Bi-partite & Tripartite agreement, Labour courts, Industrial tribunals, code of Discipline, Standing orders., **Social Problems:** - Social Disorganization, Unemployment, Deviance, Delinquent behaviour amongst youth, Crime, , Gender injustice, Child Abuse, Terrorism.

Name of The Course	Universal Human Values & Ethics			
Course Code	LLL101			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	4	2

Course Objectives

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes

CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO3	Understand the value of harmonious relationship based on trust and respect in their life and profession
CO4	Understand the role of a human being in ensuring harmony in society and nature.
CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Text Book (s)

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

Reference Book (s)

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E. F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.

8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers , Oxford University Press
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Course Content

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education
1. Understanding the need, basic guidelines, content and process for Value Education 2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels
Understanding Harmony in the Human Being - Harmony in Myself
1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' 2. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) 4. Understanding the characteristics and activities of 'I' and harmony in 'I' 5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail 6. Programs to ensureSanyam and Swasthya
Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship
1. Understanding harmony in the Family- the basic unit of human interaction 2. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; 3. Trust (Vishwas) and Respect (Samman) as the foundational values of relationship 4. Understanding the meaning of Vishwas; Difference between intention and competence 5. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship 6. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals 7. Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family!
Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in Professional Ethics:
   a) Ability to utilize the professional competence for augmenting universal human order,

   b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models

27. Case studies of typical holistic technologies, management models and production systems

28. Strategy for transition from the present state to Universal Human Order:

   a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

   b) At the level of society: as mutually enriching institutions and organizations

Continuous Assessment Pattern

COs	**Knowledge level**	**Assessment tools**			
		Internal test	**End**	**Mini**	**Target**

		CAT-1	CAT-2	Assignment	**semester exam**	**Project**	
CO1	K1, K2	5			10	0	70%
CO2	K1, K2, K3	5			10	0	70%
CO3	K4	5	5	5	10	0	70%
CO4	K5		5	5	10	0	70%
CO5	K5		5	10	10	0	70%
Total		**15**	**15**	**20**	**50**	**0**	**70%**

Name of The Course	**ENGLISH PROFICIENCY AND APTITUDE BUILDING - 1**			
Course Code	LLL123			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	4	2

Course Objectives

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes

CO1	Develop effective communication (listening and speaking) skills - be able to listen carefully and respectfully other's perspective and to express one's own ideas in a group.
CO2	Construct grammatically correct sentences and practicing correct pronunciation of common words in English language for effective communication.
CO3	Develop real-time problem solving skills in quantitative aptitude.
CO4	Develop basic data analyzing techniques which will help in forecasting and decision making.

Course Content

Unit I: Introduction& Communication Skills	**6 lectures**

- Ice Breaking Activity
- Speaking Activity
- Pronunciation
- Listening Skills
- Pronouns
- Articles and Prepositions

Unit II: Quantitative Aptitude **6 lectures**

- Number System
- Percentage
- Profit and Loss

Continuous Assessment Pattern

COs	**Knowledge level**	**Assessment tools**					
		CAT Test			**End semester exam**	**Internal**	**Target**
		1	**2**	3			
CO1	K1	40	0		20	50	>80%= 10%, 60%<=M<80% = 40%,<60% = 50%
CO2	K2	20	25		20	50	>80%= 10%, 60%<=M<80% = 40%,<60% = 50%
CO3	K2	20	25		30		>80%= 10%, 60%<=M<80% = 40%,<60% = 50%
CO4	K3	20	50		30		>80%= 10%, 60%<=M<80% = 40%,<60% = 50%
Total :400		**100**	**100**		**100**	**100**	

Name of The Course	Matrices & Ordinary Differential Equations			
Course Code	MAT122			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

Course Outcomes

CO1	**Apply** elementary matrix operations to find rank and **solve** a system of linear equations and **Utilize** it to solve Inverse problem, Eigen value problem and Diagonalisation problem. (**K3)**
CO2	**Solve** nth order ordinary differential equation with constant coefficients and apply it to **solve** Simple electric circuits. **(K3)**
CO3	**Produce** the Fourier series of a periodic function. **(K3)**
CO4	**Apply** separation of variable method to **solve** 1-dim wave equation, 1-dim heat and 2-

	dim Laplace equation.**(K3)**
CO5	

Text Book (s)

1. *Erwin Kreyszig*, **Advanced Engineering Mathematics,** 10th Edition, John Wiley &Sons.
2. *Peter V. O'Neil*, **Advanced Engineering Mathematics,** 7th Edition, CengageLearning

Reference Book (s)

1. *R. K. Jain and S. R. K. Iyengar*, **Advanced Engineering Mathematics**, 4th Edition, NarosaPublishers.
2. *Robert T. Smith and Roland B. Minton*, **Calculus**, 4th Edition, McGraw HillEducation.

Course Content

Unit I: Matrices and Eigen value Problem **12 Lectures**
Matrix algebra, Elementary transformations and Elementary matrices, Inverse of matrix using elementary transformations, Linear dependence and independence of vectors, Rank of a matrix, Solution of system of linear equations, Definition, properties and computation of Eigen values and Eigenvectors, Cayley-Hamilton theorem, Diagonalization.
Unit II:Ordinary Differential Equations **10 Lectures**
Basic concepts, Exact differential equations, Linear differential equations of second and higher order with constant coefficients, Complementary function and particular integral, Complete solution, Method of variation of parameters, Cauchy-Euler equation, System of linear differential equations with constant coefficients, Applications of linear differential equations.
Unit III: Fourier series **8 Lectures**
Periodic functions, Fourier expansion of general functions, Fourier expansion of odd and even functions, Fourier expansion of some standard waveforms, Half range sine and cosine series, Harmonic analysis.
Unit IV: Partial Differential Equations **10 Lectures**
Basic concept, Classification of second order linear PDE, Method of separation of variables and its application to solve Wave equation (one dimension), heat equation (one dimension) and heat equation (two dimension steady state only).

Unit V: Matrices and Eigen value Problem	**12 Lectures**
Matrix algebra, Elementary transformations and Elementary matrices, Inverse of matrix using elementary transformations, Linear dependence and independence of vectors, Rank of a matrix, Solution of system of linear equations, Definition, properties and computation of Eigen values and Eigenvectors, Cayley-Hamilton theorem, Diagonalization.	

Continuous Assessment Pattern

CO's	**Assessment tools**			
	Internal test		**QUIZ, SEMINAR/ Assignment**	**University Examination**
	1	2		
1	50	--	5	25
2		40	5	25
3	--	10	5	25
4	--		5	25
Total	**50**	**50**	**20**	**100**

MEE152	**Workshop Practice**	L 0	T 0	P 2	C 1
Version No.	1.0				
Prerequisite	-				
Objectives:	1. To train the students in metal joining process like welding, soldering, etc. 2. To impart skill in fabricating simple components using sheet metal. 3. To cultivate safety aspects in handling of tools and equipment.				
Expected Outcome:	On completion of this course, the students will be able to 1. Welding and soldering operations. 2. Fabrication of simple sheet metal parts.				
Module I	Welding Shop				
1. Instruction of BI standards and reading of welding drawings. 2. T- Joint 3. Lap Joint 4. TIG Welding 5. MIG Welding					
Module II	Sheet Metal Shop				
1. Making of Cylinder 2. Making of Cylinder using development of surface. 3. Making of Square box using development of surface.					
Module III	Soldering Shop				
1. Soldering and desoldering of Resistor in PCB. 2. Soldering and desoldering of IC in PCB. 3. Soldering and desoldering of Capacitor in PCB.					
Module IV	Bosch Tools				
Demonstration of all BOSCH TOOLS					
Text Books					
Workshop Manual prepared by staff					
Mode of Evaluation	Tutorials / Class Tests / Lab Exam				
Recommended by the Board of Studies on:					
Date of Approval by the Academic Council:					
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination				
Recommended by the Board of Studies on:					
Date of Approval by the Academic Council:					

Name of The Course	Engineering Graphics			
Course Code	MEE151			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives

The objective of the course is to enable students to

6. Provide basic foundation in computer aided design / manufacturing
7. Understand the fundamentals used to create and manipulate geometric models
8. Get acquainted with the basic CAD software designed for geometric modelling
9. Learn working principles of NC machines CNC control and part programming
10. Understand concept of Group Technology, FMS and CIM

Course Outcomes

CO1	Understand the concept and principles of engineering graphics in product design (**K2)**
CO2	make isometric and orthographic projection of solids along with free hand sketching. **(K4)**
CO3	Develop a solid model using AutoCAD**(K4)**
CO4	Make a solid modeling for a given assembly.**K3)**
CO5	Apply the concepts and techniques learnt in the course in making hands-on project.**(K2)**

Text Book (s)

4. Asimow, M. (1962). Introduction to design. Englewood Cliffs: Prentice-Hall.
5. K C John (2009), Engineering Graphics for Degree, Prentice Hall of India. ISBN: 978-8-120-33788-3.
6. P N Rao (2010), CAD/CAM Principles and Applications, 3rd Edition, Tata McGraw-Hill Education, ISBN: 978-0-070-68193-4.

Reference Book (s)

2. Course material uploaded on LMS

Course Content

Unit I: Introduction – Understanding the Concept of Product Design 10 Hour
Fundamentals of Design : Design by Evolution and Design by Innovation, Principles that govern any design, Morphology and Process of Design, Application of Graphics in Design, Engineering Graphics: An Overview, Introduction to Computer Aided Drafting , Lettering, Numerals and Dimensioning.
Unit II:Projection of Solids 16 Hour
Concept of Projection, Object in four quadrant, 2-D description of quadrants, Orthographic Projection of Solids, Isometric Projection of Solids, Free-hand sketching
Unit III: Solid Modeling 10 Hour
Division of Engineering Solids- Polyhedra, Regular and Irregular polyhedral, solids of revolution, Geometric Modeling – Wireframe, B-Rep and Solid Modeling, Solid Modelling using AutoCAD
Unit IV:Introduction to Assembly 10 Hour
Types of assembly drawings, Accepted Norms for Assembly Drawings, Sequences of Preparing the Assembly Drawing, Solid Modeling of assembly
Unit V:Application of Design Concepts for Product Design 10 Hour
Hands-on Project in Groups: Choose a specific objective for Product Design, Design the Product and Model it using AutoCAD, presentation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

S.NO	PHY121	Condensed Matter Physics	L	T	P	C
3	Version1.1	Date of Approval:	3	0	0	3
	Pre-requisites//Exposure	-				
	Co-requisites					

Course Objectives

1. To prepare students with fundamental knowledge of physics.
2. To develop skills necessary for higher-level science and engineering courses.

Course Outcomes

On completion of this course, the students will be able to

CO1	Calculate lattice parameters and interplanar spacing by determining crystal structure using X ray diffraction techniques.
CO2	Discuss classical and quantum free electron theory.
CO3	Explain origin of energy bands in solids.
CO4	Categorize semiconductors into different types and study their properties.
CO5	Explain polarization mechanisms in dielectric materials and their behavior in electric field.

Catalog Description

Text Books

1. Arthur Beiser, S Rai Choudhury, Shobhit Mahajan, (2009), Concepts of Modern Physics, 6th Edition, Tata-McGraw Hill. ISBN- 9780070151550.
2. Neeraj Mehta, (2011), Applied Physics For Engineers, New Arrivals – PHI, ISBN-9788120342422.

Reference Books

1. Neil W Ashcroft and N David Mermin, (2003), Solid State Physics, Cengage Learning, ISBN-9788131500521.
2. Pillai S O, Solid State Physics,(2010), sixth edition, New Age International (P) Ltd. ISBN-9788122427264.
3. Charles Kittel (2001), Solid State Physics, 8th Edition, John Wiley & Sons. ISBN- 9788126535187.
4. David J. Griffiths,(2009), Introduction to Electrodynamics 3rd Edition, PHI Learning, ISBN-9788120316010.

Course Content

Unit I: Crystal Structure **8 lecture hours**

Crystalline and amorphous materials, Space lattice, Unit cell and translation vectors, Miller indices, Simple crystal structures: SC, FCC, BCC, NaCl, CsCl and Diamond structure, X-Ray Diffraction and Bragg's law, Powder method, Elementary ideas of bonding in solids.

Unit II: Free electron theory **8 lecture hours**

Lorentz classical free electron theory and its limitations, Drude theory of conduction, Thermal conductivity, Weidemann-Franz law, Quantum theory of free electron, Fermi level, Density of states, Fermi-Dirac distribution, Thermionic emission, Richardson equation.

Unit III: Band theory of solids **8 lecture hours**

Origin of energy bands in solids, Electron in a periodic potential (Kronig-Penney model), E-K diagram and Brillouin zones, concept of effective mass and holes, Degree of freedom and classification of solids.

Unit IV : Semiconducting Materials **8 lecture hours**

Introduction, Types of semiconductors, carrier concentration and Fermi level in intrinsic and extrinsic semiconductors (Variation with temperature and impurity concentration), Hall effect and its applications, conductivity of semiconductors, P-N junction diode, forward and reverse bias, V-I characteristics, Solar cell and other applications.

Unit V: Dielectric materials **8 lecture hours**

Dielectrics introduction, Polarization and dielectric constant, Polarization mechanism: Ionic, Electronic, orientational and space charge polarization, Bound charges and their physical interpretation, Electric displacement vector, Equation of electric field inside dielectrics, Clausius–Mossotti relation, Dielectric losses, Dielectric breakdown and types, Applications of dielectric materials.

Mode of Evaluation: The theory and lab performance of students are evaluated separately.

	Theory		**Laboratory**		
Components	**Internal**	**SEE**	**Internal**	**SEE**	**Theory and laboratory**
Marks	50	50	50	50	
Total Marks	100		100		
Scaled Marks	75		25		100

Name of The Course	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**			
Course Code	EEE151			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. An understanding of basic electrical wiring, measurements, and methods
2. Students understand measurement errors and non-ideal electrical devices
3. Students understand wiring and operation or operational amplifiers
4. Students demonstrate effective written communication skills

Course Outcomes

CO1	Apply and verifying basic electrical laws.
CO2	Realize and apply basic theorems in electrical network and circuits.
CO3	Verify the truth tables of logic Gates.
CO4	Analyze characteristics of basic diodes and transistors
CO5	Realize and verify the working of transformer.

Course Content

S. No	**List of Experiment**
1	To verify (i) Kirchoff's current law (ii) Kirchoff's voltage law
2	Verification of Thevenin's Theorem

3	Verification of Norton's Theorem
4	Verification of Maximum power transfer Theorem
5	Verification of Truth table for logic Gates- AND , OR, NOT, NAND, NOR and XOR and Half adder Circuit.
6	Study of P-N Junction Diode characteristics.
7	Study of ZENER Diode characteristics.
8	Study of CE characteristics of a Bipolar Junction Transistor.
9	Study of characteristics of FET.
10	Study of open circuit and short circuit tests on a single phase transformer and obtaining its equivalent circuit parameters.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

Sl. No.	Course Code	Course Name	L	T	P	C
9	CSE151	Computer Programming and Problem Solving Lab	0	0	2	1

Course Outcomes

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

6. Understand the C Programming environment. Learn to solve the bigger problems step by step. (K3)
7. Understand when and how to take decisions, to compare and iterate, so as to simplify the problems. (K3)
8. Recognize the contiguous memory allocation for data storage in computer memory and perform various operations by understanding them. Learn the use of memory address. (K3)
9. Implement the modular techniques such as functions and difference between call by value and call by reference methods. (K3)
10. Implement and develop user defined variables like Structures. Learn to create them dynamically in C programming language. (K3)

Text Books:

4. Alexis Leon and Mathews Leon (2001), Introduction to Information Technology, Tata McGraw-Hill.
5. R.G. Dromey (2001), How to Solve it by Computer, Prentice Hall of India.
6. Al Kelley and Ira Pohl (1998), A Book on C Programming in C, 4th Edition, Pearson Education.

Reference Books

4. E. Balagurusamy 7th Edition, Programming ANSI C, McGraw-Hill
5. Brian W. Kernighan and Dennis M. Ritchie, The C programming Language, Prentice-Hall in 1988
6. Byron Gottfried, Programming with C, Schaum's Outline

Course Content

Student must be aware of:- Parts of a computer – Overview of operating systems, assembler, compilers, interpreters and programming languages.

Unit I: Introduction to Computers and Algorithms — 8 lab hours

Character Set, Variable, Identifiers, Built-in Data Types. Arithmetic Operators, Expressions, Constants, Literals. Assignment Operator. Input/Output operations. Basic C-Programs; Exchanging the values of two variables, counting, summation of a set of numbers, Factorial computation, finding LCM and HCF, generation of the Fibonacci sequence, reversing the digits of an integer, Write Algorithms and draw Flowcharts.

Unit II: Conditional Statement and Constructs of Loop — 8 lab hours

Decision Making, Relational and Logical Operators, IF and Nested IF statements.
Format specifications – control statements – decision making and Loop control structure: while loop, for loop, do-while loop, nested loop, infinite loop, break, continue, exit statement, Switch-Case control structure

Unit III: Arrays and Pointers — 8 lab hours

Array Declaration – One dimensional array, Multi dimensional arrays, Insertion, Searching, Sorting on arrays. Transpose of Array. Arithmetic operations on Array. String handling function, manipulation on strings, finding Palindrome.
Address operations using pointers. Arithmetic operations using Pointers. Array of Pointers.

Unit IV: Functions **8 lab hours**

Prototype – declaration - arguments (formal and actual) – return types – types of functions difference between built-in and user-defined functions, passing parameter by values and by reference (using pointer).

Unit V: Structures and Files **8 lab hours**

Structures: User defined variables. Declaration of Structure, Array of Structures, passing Structure to functions (Using Pointers). Dynamic memory allocation functions like calloc( ), malloc( ). Unions: Difference between structure and union. Concept of File storage and reading writing in file through C-program.

Mode of Evaluation

Quiz, Assignment, Seminar and Written Examination

	Laboratory evaluation scheme	
Components	**End Term Internal Exam Practical (IEP) (50)**	**End Term External Exam Practical EEP (50)**
Marks Distribution	Continuous Assessment (30) [Evaluated throughout the semester] + Viva Voce(10) + Lab Question(10) [Evaluated on IEP exam day]	50 Marks Evaluated on External Exam Practical (EEP) day (Viva + Question) = 50 Marks
Total Marks	**100**	

Name of The Course	Physics Lab II			
Course Code	PHY141			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

Course Objectives

Course Outcomes

CO1	Understand the physical principle involve in the various instruments and relate them to new applications.
CO2	Operate CRO and various optical instruments such as- spectrometer, travelling microscope and spherometer.
CO3	Calculate the physical constants by various methods such as- Planck's constant, wavelength of monochromatic light, Hall coefficients, band gap etc. and realize the accuracy in measurements.
CO4	Develop the individual and team work for the performance of scientific works.
CO5	Develop the skill for making scientific graphs, error analysis and measurement technology used in engineering.

Course Content

S. No	**List of Experiment**
1	To measure the Planck's constant using LED method.

2	To determine the wavelength of monochromatic light using Newton's ring method.
3	To find the wavelength of monochromatic light with the help of a plane transmission diffraction grating and spectrometer.
4	To determine the angle of prism with the help of spectrometer.
5	To draw the characteristics of solar cell and to estimate Fill Factor (FF), and efficiency of solar cell.
6	To determine the specific resistance of given unknown wire using Carey Foster's bridge.
7	To draw the hysteresis curve (B-H curve) of a given sample of Ferromagnetic material and to determine retentivity, coercivity and hysteresis loss.
8	To draw the characteristics of p-n junction diode and to estimate the dynamic and static resistance.
9	To study the Hall Effect and to determine the Hall coefficient, carrier density and hall mobility of a given semiconductor material using Hall set-up.
10	To determine the energy band gap of a given pure semiconductor using four probe method.

Continuous Assessment Pattern

	Laboratory evaluation scheme	
Components	**End Term Internal Exam Practical (IEP) (50)**	**End Term External Exam Practical EEP (50)**
Marks Distribution	Continuous Assessment (30) [Evaluated throughout the semester] + Viva Voce(10) + Lab Question(10) [Evaluated on IEP exam day]	50 Marks Evaluated on External Exam Practical (EEP) day (Viva + Question) = 50 Marks
Total Marks	**100**	

Name of The Course	**WEB PROGRAMMING THROUGH PHP & HTML-Lab**			
Course Code	CSE143			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	0	0	2	1

1. **Unit 1 - PHP Basics**

Introduction to PHP , Support for Database, PHP Installation, Working with PHP, Why PHP?, Basic Syntax of PHP, PHP statement terminator and case insensitivity, Embedding PHP in HTML, Comments, Variables, Assigning value to a variable, Constants, Managing Variables.

1. **Unit II - Operators and Controls Structures**

Arithmetic Operators, Bit-wise Operators, Comparison Operators, Logical Operators, Concatenation Operator, Incrementing/Decrementing Operator, Ternary Operator, Operator Precedence, String Manipulation: strtoupper(), strtolower(), ucfirst(), ucwords(), strcmp(), strlen(), substr(), trim(), Conditional Control Structures: If statement, If- else statement, If- else if statement, Nested If, Switch statement, Looping Control Structures: For loop, While loop, Do- While loop, For-each, Loop control: Break and Continue.

1. **Unit III Functions in PHP**

Functions, User-Defined function, Function Definition, Function Call, Function with arguments, Function with return value, Call by value and call by references, Understanding variable scope, Global Variables, Static Variables, Include and Require, Built-in functions in PHP.

1. **Unit IV Arrays**

Introduction to Array, Array in PHP, Creating an Array, Accessing Elements of an Array, Modifying Elements of an Array, Finding the Size of an Array, Printing an Array in the readable Way, Iterating Array Elements, Modifying Array while iteration, Iterating Array with Numeric index, Removing Element from an Array, Converting an Array to String, Converting String to an Array, Array Sorting, Multidimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array.

1. **Unit V PHP File Handling**

Introduction, File Open, File Creation, Writing to files, Reading from File, Searching a record from a file, Closing a File, Using PHP With HTML Forms.

1. **Unit VI Class and Object**

Introduction, Object, Class, Defining Class in PHP, Object in PHP, Usage of $this variable, Constructor,
Constructor with Parameters.

2. **Unit VII Exception Handling**

Introduction to Exception, Exception Handling mechanisms, Creating Custom Exceptions, Multiple Catch Blocks, Exception Propagation, Error Handling in PHP.

III semester

Name of The Course	**Object Oriented Programming with C++**			
Course Code	CSE121			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

The purpose of this course is to provide basic concepts of Object oriented programming with C++. The main goal of the course is to teach the students how to Apply the OOPS concepts in various applications that are appropriate for problems that they might encounter. This course is also to teach constructors, destructors, inheritances, polymorphism, virtual function and control structures. This also provides knowledge of input output stream functions.

Course Outcomes

CO1	Understand an Object Oriented Programming Features.
CO2	Analyze and Apply the role of constructors &destructors in program design.
CO3	Apply the concept of inheritances, polymorphism and virtual function for problem solution.
CO4	Use the control structures of c++ appropriately.
CO5	Apply the different input output streams for problem solution.

Text Book (s)

1. Object Oriented Programming with C++ - Rajiv Sahay, Oxford Mastering C++ - Venugopal, McGraw-Hill Education (India)
2. Herbert Schildt, C++ - The Complete Reference, Third Edition -Tata McGraw Hill - 1999.
3. Bruce Eckel, Thinking in C++, Second Edition, Volume One, Pearson Education Asia, 2000.

Reference Book (s):

1. Object Oriented Programming in C++ by Robert LaforeTechmedia Publication.
2. Object Oriented Programming in C++ SauravSahay Oxford University Press.
3. Object Oriented Programming in C++ R Rajaram New Age International Publishers 2nd.
4. OOPS C++ Big C++ Cay Horstmann Wiley Publication.
5. C++: The Complete Reference- Schildt, McGraw-Hill Education (India)
6. C++ and Object Oriented Programming – Jana, PHI Learning.

Unit I: Introduction: Basic Terminology **8 lecture hours**
Introduction to OOP- Overview of C++ - Classes - Structures - Union - Friend Functions - Friend Classes - Inline Functions - Constructors - Destructors - Static Members - Scope Resolution Operator
Unit II: POINTERS **8 lecture hours**
Array of Objects - Pointer to Object - This Pointer - References - Dynamic Memory Allocation - Function Overloading - Default Arguments - Overloading Constructors.
Unit III: OPERATORS **8 lecture hours**

Operator Overloading - Member Operator Function - Friend Operator Function - Inheritance - Types of Inheritance - Protected Members - Virtual Base Class - Polymorphism - Virtual Functions - Pure Virtual Functions.
Unit IV: CLASS **8 lecture hours**
Class Templates and Generic Classes - Function Templates and Generic Functions - Overloading a Function Template - Exception Handling – Namespaces
Unit V: I/O STREAMS **8lecture hours**
I/O Streams - Formations I/O with ios Class Functions and Manipulators - Overloading - File I/O.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Database Management Systems
Course Code	CSE312
Prerequisite	“Data Structures and Algorithms”, “Discrete Mathematics”

Corequisite	"C-Programming"				
Antirequisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. Develop the ability to design, implement and manipulate databases.
2. Introduce students to build data base management systems.
3. Able to store and analyze data into normalized format.
4. Apply DBMS concepts to various examples and real life applications

Course Outcomes

CO1	Learn knowledge of ER Modeling.
CO2	Apply programming concepts using DDL and DML commands in SQL.
CO3	Understand the storage system in Relational Database and imposing security.
CO4	Able to remove various anamolies from databses.
CO5	Understanding of transaction process.

Text Book (s)

1. "Database system concepts" Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill

Reference Book (s):

1. T2. Date C J, " An Introduction to Database Systems", Addision Wesley
2. T3. Elmasri, Navathe, " Fudamentals of Database Systems", Addision Wesley
3. T4: O'Neil, Databases, Elsevier Pub.
4. T5: Leon &Leon,"Database Management Systems", Vikas Publishing House
5. T6: Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications
6. T7: Majumdar & Bhattacharya, "Database Management System", TMH (14)
7. T8: Ramkrishnan, Gehrke, " Database Management System", McGraw Hill

Unit I: Introduction	**9 lecture hours**
Introduction: An overview of database management system, database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML, Overall Database Structure.	
Module II: Relational data Model and Language	**9 lecture hours**
Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. Introduction on SQL: Characteristics of SQL, advantage of SQL. SQl data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL	
Module III: Data Base Design & Normalization	**10 lecture hours**
Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	
Module IV: Transaction Processing Concept	**6 lecture hours**
Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling. Distributed Database: distributed data storage, concurrency control, directory system.	
Module V: Concurrency Control Techniques	**6 lecture hours**
Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Data Structures and Algorithms			
Course Code	CSE212			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Introduce the fundamentals and abstract concepts of Data Structures.
2. Introduce searching, sorting techniques
3. Learn how concepts of data structures are useful in problem solving.

Course Outcomes

CO1	Understand the comparison and use of Recursion and Loops
CO2	Understand the application of linear data structure(s) to solve various problems
CO3	Understand the application of non linear data structure(s) to solve various problems

CO4	Understand the shortest path algorithms involving complicated data structures like Graphs.
CO5	Become expert in calculating and comparing complexities of various searching and sorting algorithms.

Text Books

1. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication

Reference Books

1. Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI
2. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill
3. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
4. Lipschutz, "Data Structures" Schaum's Outline Series, TMH
5. G A V Pai, "Data Structures and Algorithms", TMH
6.

Unit I:Introduction: Basic Terminology **9 lecture hours**
Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT)Arrays: Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.Linked lists: Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List
Unit II: Stacks and Queues: Abstract Data Type **8 lecture hours**
Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion
Unit III: Trees: Basic terminology **8 lecture hours**

Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: Inorder, Preorder and Postorder, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.
Unit IV: Graphs **7 lecture hours**
Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Dijikstra Algorithm
Unit V: Sorting and Searching **8 lecture hours**
Sequential search, Binary Search, Comparison and Analysis Internal Sorting: Insertion Sort, Selection, Bubble Sort, Shell sort

7.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100
Name of The Course	Digital Design and Computer Architecture		

CSE218	**Introduction to IT infrastructure Landscape**	**L**	**T**	**P**	**C**
Version No. 1.0	Date of Approval: May 2015	2	0	0	2
Prerequisite	Basic Computer Knowledge				
co-requisites					

Course Objectives

The objective of this course is to:

1. To understand the Datacentre.
2. To understand the Databases.
3. To introduce the Application and Middleware along with System Server hardware.
4. Introduce Directory Services.

Course Outcomes

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

1. Define IT infrastructure and describe its components.
2. Learn the core activities in the systems development process.
3. Describe about Databases.
4. Understand Application and middleware software.
5. Identify System Hardware and networking requirement.
6. Describe how effective IT Infrastructure Management requires strategic planning with alignment from the IT perspective in an organisation.

Catalog Description

The purpose of this course is to provide basic concepts of database. The main goal of the course is to teach the Application and Middleware along with System Server hardware that are appropriate for problems that they might encounter. This course is also to learn Directory Services and Directory Services.

Text Books

1. Introduction to IT infrastructure Landscape by IBM ICE Publication

Course Content

Unit I: Database Overview **6 lecture hours**

Understanding Database types SQL, JDBC, Indexing, Database clustering replication

Unit II: Storage Overview **4 lecture hours**

Storage Networking Technology, Types of storage system, FC-AL, FABRIC, Storage Area Networks,

Zones, Storage virtualization

Unit III: Systems Overview **5 lecture hours**

Server Technology (Rack, Blades ,Enterprise, HPC), Operating systems, Virtualization (Hypervisors,

Partitioning, VMs, I/O Virtualization), Server Deployment (Physical and Virtual), Server Management Console, Server Availability concepts and techniques. Server workloads.

Unit IV: Directory Services overview **5 lecture hours**

Directory Server concepts, LDAP protocol, LDAP replication topologies, LDIF data exchange.

Unit V: Network& Security overview **5 lecture hours**

Networking overview - Topologies, Switching and Routing concepts, Firewalls and security zones, VLANs. Security basics, Cryptography & PKI basics, Identity & Access Management, Data security, Storage Security,

Network Security (Firewalls, IDS / IPS), Server security – Configuration control & patch management, Firewalls, Physical Security, Security Operations Center concepts, Virtualization Security.

Unit VI: Application and Middleware Overview **5 lecture hours**

Introduction to common Messaging Systems (MQ Series) ,Web tiered deployment, Application Servers & Clustered deployment, E-mail (Lotus Notes/exchange). Understanding Data warehouse concepts, Data Warehouse Architectures, Logical Design, Physical Design

Mode of Evaluation: Tutorials / Class Tests / Lab Exam

	Theory	
Components	**Internal**	**SEE**
Marks	50	50
Total Marks	100	

Course Code	CSE216 DIGITAL DESIGN			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. To explore the fundamentals of digital logic design.
2. To understand the concepts of computer architecture.
3. To implement the core concepts in the real scenario.

Course Outcomes

CO1	Understand the basics of logic gates, K-map, various circuit designing models.

CO2	Understand the concepts of designing of combinational circuits.
CO3	Understand the concepts of designing of sequential circuits.
CO4	Understand the architecture of digital system by using machine language.
CO5	Identify core concepts of Memory and I/O systems.

Text Book (s)

1. David Harris, Sarah Harris, Digital Design and Computer Architecture,2nd Edition ISBN: 978-0-12-394424-5, ISBN10:0123944244, Elsevier Science &Technology , 2013.
2. 2. M. Morris Mano and Michael D. Ciletti, "Digital Design", IV Edition, Pearson Education, 2008.

Reference Book (s):

1. John F. Wakerly, "Digital Design Principles and Practices", Fourth Edition, Pearson Education, 2007.
2. Charles H. Roth Jr, "Fundamentals of Logic Design", Fifth Edition – Jaico Publishing House, Mumbai, 2003.
3. Donald D. Givone, "Digital Principles and Design", Tata MCGraw Hill, 2003.
4. G. K. Kharate, "Digital Electronics", Oxford University Press, 2010.
5. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Fourth Edition, Morgan Kaufmann / Elsevier, 2009.
6. Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.

Unit 1: Introduction	**9 lecture hours**
Introduction, Logic Gates, Digital Abstraction. Combinational Logic Design-Boolean Equations, Boolean Algebra, From Logic to Gates, Multilevel Combinational Logic, X's and Z's, Oh My, Karnaugh Maps .	
Unit 2: Combinational Logic	**9 lecture hours**
Combinational Circuits – Analysis and Design Procedures – Binary Adder-Subtractor – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – Multiplexers – Introduction to HDL – HDL Models of Combinational circuits.	
Unit 3: Synchronous Sequential Logic	**9 lecture hours**

Sequential Circuits – Storage Elements: Latches , Flip-Flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Design Procedure – Registers and Counters .
Unit 4: Basic structure of Computer System **9 lecture hours**
Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.
Unit 5: Memory and I/O Systems **9 lecture hours**
Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access.

Name of The Course	English Proficiency and Aptitude Building -2			
Course Code	LLL213			
Prerequisite	Completion of semester 2			
Corequisite				
Antirequisite				
24 sessions of 100 minutes each, 12 hours of online tests	**L**	**T**	**P**	**C**
	3	0	4	2

Course Objectives:

1. Enhance formal writing skills
2. To understand soft-skills pertaining to industry

Course Outcomes

CO1	To further enhance grammar skills
CO2	To enhance the analytical, logical and quantitative skills of students.
CO3	Get overall personality enhancement

Text Book (s)

SLLL own text book

Reference Book (s):

1. CommunicationSkillsforEngineers, Mishra,Sunita&C.Muralikrishna,,Pearson
2. CorporateSoftskills,SarveshGulati,2006.
3. Effective Communication,JohnAdair,MacmillanLtd.1997.
4. DevelopingCommunicationSkills,KrishnaMohanandMeeraBannerji,Macmillan IndiaLtd.1990

Name of The Course	**Data Structures and Algorithms Lab**
Course Code	CSE252
Prerequisite	
Corequisite	

Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	**2**	**1**

Course Objectives:

Understand the data structure shortest path algorithms involving complicated data structures like Graphs.

Course Outcomes

CO1	Understand the comparison and use of Recursion and Loops.
CO2	Understand the application of linear data structure(s) to solve various problems.
CO3	Understand the application of non-linear data structure(s) to solve various problems.
CO4	Understand the shortest path algorithms involving complicated data structures like Graphs.
CO5	Become expert in calculating and comparing complexities of various searching and sorting algorithms.

Text Book

1. Cormen T.H., Leiserson, C.E., Rivest, R.L., and C. Stein. Introduction to Algorithms, MIT Press, Second Edition (Indian reprint: Prentice-Hall), 2013.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson, 4th Edition, 2014.

References

1. "Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein “Data StructuresUsing C and C++” , PHI, 1996."
2. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill, 2007.

List of Experiments
1. a) Write a Program to implement linear search algorithm. b) Write a Program to implement binary search algorithm.
2. Write a Program to Implement Singly Linked List and its operations.
3. a) Write a Program to Implement Stack Operations by using Array. b) Write a Program to Implement Stack Operations by using Linked List.
4. a) Write a program that uses stack operations to convert a given infix expression into its postfix. b) Write a program that uses stack operations to evaluate given postfix expression.
5. a) Write a Program to implement the operations of Queue using array. b) Write a Program to implement the operations of Queue using linked list.
6. Write a Program to Implement Circular Queue Operations by using Array.
7. Write a Program to Sort the set of elements by using Quick Sort. iii) Merge Sort.
8. Write a Program to Implement All functions of a Dictionary by using Hashing.
9. Write a Program to Implement the Binary Search Tree Operations.
10. Write a Program to Perform the Tree Traversal Techniques by using Iterative Method
11. Write a Program to Perform the Tree Traversal Techniques by using recursion.
12. Write a program to Implement Insertion and Deletion Operations on AVL Trees
13. Write a program for implementing the following graph traversal algorithms: Depth First Search b) Breadth First Search.

3. R. Kruse, "Data Structures and Program Design in C++", Pearson Education, 2000.

Name of The Course	Digital Design Lab			
Course Code	CSE256			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**

Course Objectives:

Understand the architecture of digital system by using machine language.

Course Outcomes

CO1	Understand the basics of logic gates, K-map, various circuit designing models.
CO2	Understand the concepts of combinational circuits and sequential circuits.
CO3	Understand the concepts of sequential circuits.
CO4	Understand the architecture of digital system by using machine language.
CO5	Identify core concepts of Memory and I/O systems

SPECIFICATION OF APPARATIUS USED:
➢Power Supply, Digital Trainer Kit., Connecting Leads, IC's (7400, 7402, 7404, 7408, 7432, and 7486)

Title of Lab Experiments

- Introduction to Digital Electronics lab- nomenclature of digital ICS, specifications, studyof the data sheet, concept of vcc and ground, verification of the truth tables of logic gates using TTL ICS.
- To study and verify NAND and NOR as a universal gate.

- Implementation of the given Boolean function using logic gates in both sop and pos forms.
- Design and Implementation of Half Adder and Full Adder circuits using logic gates.
- Design and Implementation of Half Subtractor and Full Subtractor circuits using logic
- gates.
- Design and Implementation of One bit and Two bit Comparators.
- Design and Implementation of 3x8 Decoder.
- Design and Implementation of 8x3 Encoder.
- Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

Name of The Course	Object Oriented Programming Lab			
Course Code	CSE141			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Teach efficient storage mechanisms of data for an easy access.
2. Design and implementation of various basic and advanced C++ Programming.
3. Introduce various techniques for representation of the programming in the real world.
4. Learn to design user defined Program.

Course Outcomes

CO1	Understand variety of OOPS characteristic.
CO2	Understand wide variety of keywords and use them appropriately to write program
CO3	Understand and implement of fundamental terminology & their applications, namely function, string and simple pointer etc.
CO4	Design and implementation of various basic and advanced C++ Programming.
CO5	

Text Book (s) / Reference Book (s):

List of Experiment:

1. Write a simple C++ program to print **"Hello World!".**
2. WAP that generates the following table:

1990 135
1991 7290
1992 11300
1993 16200

3. Create a Union called student with the following details as variables within it.

1. Name of the student
2. Age
3. Year of study
4. Semester
5. different subject marks in array

Write a C++ program to create object for the union to access these and print the Name, age, year, semester and grade according to their percentage of marks scored.

90 % and above – S grade
80% to 89% -- A grade
70% to 79% -- B grade
60% to 69% -- C grade
50% to 59% -- D grade
<50% -- F grade

4 . Write a C++ program to perform different arithmetic operation such as addition, subtraction, division, modulus and multiplication using inline function

5. Create a class for counting the number of objects created and destroyed within various block using constructor and destructors.

6. Write a C++ program to calculate the area of triangle and square.

7. Write a program in C++ to check whether the string is palindrome or not.

8. Write a program to evaluate the following investment equation: $V = P(1+r)^n$. Test your program for following values:- P: 1000, 2000, 3000, r: 0.10,0.11,0.12,.....0.20, n=1,2,3.....10.

9. A cricket team has the following table of batting figures. Write a program to read the figures in the given format and calculate the batting averages and print the complete table along with the batting averages.

Player's Name	**Runs Scored**	**Innings Played**	**Times Not Out**
Sachin	8530	230	18
Saurav	4200	130	9
Rahul	3350	105	11

10. An electricity board charges the following rates to domestic users to discourage the wastage of electricity. For the first 100 units: 60 P/unit. For the next 200 units: 80 P/unit. Beyond 300 units: 90 P/units. All users are charged a minimum of Rs.50. If the total amount is more than Rs 300 then additional surcharge of 15% is added. Write a program to read the names of users and number of units consumed and print the total charges with names of consumers.

11. A phone number, such as (212) 767- 8900, can be thought of having three parts: the area code (212), the exchange (767), and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure **phone**. Create two structure variables of type **phone**. Initialize

one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this:

Enter your area code, exchange, and number: 415 555 1212

My number is (212) 767-8900

Your number is (415) 555-1212

12. A point in the two-dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis, and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of X coordinates of the two points, and whose Y coordinate is the sum of their Y coordinates.

WAP that uses a structure called **point** to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point. Interaction with program might look like this:

Enter coordinates for p1: 3 4

Enter coordinates for p2: 5 7

Coordinate for p1 + p2 are: 8, 11

13. Create a structure called **Volume** that uses three variables of type **Distance** to model the volume of a room. Initialize a variable of type **Volume** to specific dimensions, then calculate the volume it represents and printout the result. To calculate the volume, convert each dimension from a **Distance** variable to a variable of type **float** representing feet and fractions of a foot, and then multiply the resulting three numbers.

FUNCTIONS:

14. Write a function called **circarea()** that finds the area of the circle. It should take an argument of type **float** and return an argument of same type. Write a **main()** function that gets a radius value from the user, calls**circarea()**, and displays the result.

15. Raising a number **n** to a power **p** is the same as multiplying **n** by itself **p** times. Write a function called **power()** that takes a **double** value for **n** and an int value for **p**, and returns the result as **double** value. Use a default argument of 2 for **p**, so that if this argument is omitted, the number will be squared. Write a **main()** function that gets values from the user to test this function.

16. Write a program in C++ to find the factorial of a given number using the class **fact**.

17. Write a program in C++ to find Fibonacci series using class.

18. Construct a class named **account** with member functions deposit and withdraw. Test this in a C++ program.

19. Write a C++ program to implement **flight** class with data member as flight no., source, destination and fare. Write a copy constructor and a member function to display the flight information.

20. Write a C++ program to implement a **sphere** class with appropriate data member and member functions to find the surface area and the volume.

(Surface area = $4 \pi r^2$ and Volume = $4/3 \pi r^3$)

21. Define a class "BankAccount". Include the following members. Data members: Name of depositor, Account number, Account type, Balance amount in the account. Member Functions: To assign initial values, To deposit an amount, To withdraw an amount after checking the balance, To display name and balance. Write a program in C++ to test.

22. Create a class that imitates part of the functionality of the basic data type **int**. Call the class **Int** (note different spelling). The only data in this class is an **int** variable. Include member functions to initialize an Int to 0, to initialize it to an **int** value, to display it(it looks just like an int), and to add two **Int** values.

WAP that exercises this class by creating two initialized and one uninitialized Int values, adding these two initialized values and placing the response in the uninitialized value, and then displaying this result.

23. Imagine a toolbooth at a bridge. Cars passing by the booth are expected to pay a fifty-cent toll. Mostly they do, but sometimes a car goes by without paying. The tollbooth keeps track of the number of cars that have gone by, and of the total amount of money collected.

Model this tollbooth with a class called **tollbooth**. The two data items are a type **unsigned int** to hold the total numbers of cars, and a type **double** to hold the total amount of money collected. A constructor initializes both these to 0. A member function called **payingCar()** increments the car total and adds 0.50 to cash total. Another function called **nopayCar()**, increments the car total but adds nothing to the cash total. Finally, a member function called **display()** displays the two totals.

Include a program to test this class. This program should allow the user to push one key to count a nonpaying car. Pushing the ESC key should cause the program to print out the total cars and total cash and then exit.

24. Create a class time that has separate int member data for hours, minutes, and seconds. One constructor should initialize this data to 0, and another should initialize it to fixed values. A member function should display it, in 11:59:59 format. The final member function should add two objects of type time passed as arguments.

A**main()** program should create two initialized time objects, and one that is not initialized. Then it should add the two initialized values together, leaving the result in the third time variable. Finally it should display the value of this third variable.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

Name of The Course	Database Management Systems Lab			
Course Code	CSE352			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

To understand design of ER Dirgrams and represent using Relational model
To understand the concept of normal forms in the design of databases.
To comprehend the structure of SQL Queries to retrieve data from the databases

Course Outcomes

CO1	Apply ER concepts to design databases.
CO2	Apply programming concepts using DDL and DML commands in SQL.
CO3	Design simple database using a tool and implement it using SQL.
CO4	Apply all constrains to develop a business application using cursors, triggers and stored procedures.
CO5	Design the storage structures and indexed structures

Text Book (s)

"Data base System Concepts", Silberschatz, Korth, McGraw Hill, V editionThe UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India, Sixth Edition, 2013.

List of Experiments
Write the queries for Data Definition and Data Manipulation Language.
Write SQL queries using Comparison operators (=,<,>,etc).
Write SQL queries using Logical operators.
Write SQL query using SQL Operators.
Write SQL queries for relational algebra.
Write SQL queries for extracting data from more than one table.
Write SQL queries for sub queries, nested queries.
Write programme by the use of PL/SQL.
Concepts for ROLL BACK, COMMIT & CHECK POINTS.
Create VIEWS, CURSORS and TRGGERS & write ASSERTIONS.
Create FORMS and REPORTS

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

CSE251P	DYNAMIC PARADIGM Lab 1	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure	CSE215				
co-requisites					

Course Objective(s)

Course Objectives

The objective of this course is:

1. The focus is towards students getting skilled on current-futuristic technology (Cloud computing, Business Analytics, IT Infrastructure Management, Open Source Software) .
2. Hands-on & continuous learning on current Industry tools/platform.
3. Elementary level of learning strengthening the knowledge in cloud computing, open source, business analytics, big data, security on cloud environment and emerging technologies.

Course Outcomes

At the end of this course students would be able to:

1. Wider acceptability in the Industry, due to students having applied skills on technology / industry domain.
2. Students getting skilled on current-futuristic technology (Cloud computing, Business Analytics, IT Infrastructure Management, Open Source Software)
3. Understand the cloud computing architecture
4. Understand open standard and open source software.
5. Understand the business analytics, that will match with the industry.
6. Understand the use of Big Data and its concepts on Cloud Computing.
7. Understand the importance of Security in Cloud.
8. To understand and strengthening the knowledge in cloud computing and it's emerging technologies.

Catalog Description

This course introduces the emerging technologies in computing and Cloud computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources. Open-source software (OSS) is computer software with its source code made available. Open-source software is the most prominent example of open-source development. Business analytics (BA) refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business analytics focuses on developing new insights and understanding of

business performance based on data and statistical methods. In contrast, business intelligence traditionally focuses on using a consistent set of metrics to both measure past performance and guide business planning, which is also based on data and statistical methods.

Text Books

Cloud Computing by IBM ICE Publications

Opens Source Software by IBM ICE Publications

Business Analytics by IBM ICE Publications

LIST OF EXPERIMENTS

1. Introduction about a tablet OS. How to select Tablet OS.
2. Introduction to mobile Application.
3. Introduction to Open Source Development Process.
4. Introduction to Business Intelligence.
5. Introduction to Cloud Computing.
6. Introduction to Big Data.
7. Applying Big Data concepts on Cloud Computing.
8. Introduction to Security in Cloud.

Value Added List of Experiments

1. Open Account in known IAAS, PAAS, SAAS Vendor /service providers
2. Compare and discuss different flavor of IBM, Microsoft, Google and Amazon cloud services.

Mode of Evaluation: Written Examinations, Quizzes, Assignments.

	Theory	
Components	**Internal**	**ETE**
Marks	50	50
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To learn, cloud computing and its architecture	**1,2**
2	To understand open standard and open source software	**2,3,5,9**

3	To understand the business analytics, that will match with the industry.	**3,4**
4	To learn the use of Big Data and its concepts on Cloud Computing.	**4,5, 13**
5	To learn and understand the importance of Security in Cloud.	**9,15**
6	To understand and strengthening the knowledge in cloud computing, open source, business analytics, big data, security on cloud environment and emerging technologies.	**16**

IV semester

CSE213	**Computer Architecture & Organization**	**L**	**T**	**P**	**C**
Version No. 1.0	Date of Approval: Jun XX, 2013	3	0	0	4
Prerequisite	CSE216				
co-requisites					

Course Objectives

The objective of this course is to:

1. Explain the organization of the classical von Neumann machine and its major functional Modules.
2. Explain how an instruction is executed in a classical von Neumann machine.
3. Provide knowledge of computer system organization and structure through instruction cycles.
4. Provide knowledge of system interconnection and the different I/O techniques.
5. Explain the basic concepts of interrupts and how interrupts are used to implement I/Ocontrol and data transfers.
6. Identify various types of buses in a computer system and illustrate how data transfers is performed.

Course Outcomes

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

1. Understand the organization of basic computer.
2. Use various arithmetic representation and operations.
3. Understand the operation of modern CPUs and use of Pipelining.
4. Apply memory hierarchy to achieve efficient memory system.
5. Analyze different I/O Techniques.
6. Evaluate the design of a computer system.

Catalog Description

This course begins with an introduction to organizational Basic building block diagram of a digital computer system. As the course progresses each major block ranging from Processor to I/O will be discussed in their full architectural detail. The course talks primarily about Computer Organization and Architecture issues, Architecture of a typical Processor, Memory Organization, I/O devices and their interface and System Bus organization etc

Text Books

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill, 2002.

Reference Books

1. Patterson, Computer Organisation and Design, Elsevier Pub. 2009
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th Edition, Pearson Education, 2003.
3. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 2nd Edition, Morgan Kaufmann, 2002.
4. John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill, 1998.

Course Content

Unit I: BASIC STRUCTURE OF COMPUTERS **8 lecture hours**

Functional Modules - 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 MODULE **9 lecture hours**

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 MODULE **8 lecture hours**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Microprogrammed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

Unit IV: MEMORY SYSTEM **7 lecture hours**

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.

Unit V: PLD, Memories and Logic Families **8 lecture hours**

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

Mode of Evaluation: Quiz/Assignment/ Seminar/Written Examination

	Theory						
Components	**Internal (50)**						**SEE**
Marks	Cat-1 (15)	Cat-2 (15)	Quiz (5)	Assignment (5)	Class Discussion (5)	Attendance (5)	Semester End Exam (50)
Total Marks	100						

Course Outcomes Assessment

The theory part of this course strongly contributes towards the program outcomes **Problem analysis-PO (2) and Design/development of solutions-PO(3)**, and program specific outcome **PSO(1) and PSO(2)** and laboratory component strongly contributes towards the program outcomes **Problem analysis-PO (2) and Design/development of solutions-PO(3)**. Two evaluation methods will be used for the evaluation of course and program outcomes of this course.

The outcomes will be measured based on student performance on specific questions that will be part of the **End Term Examination (ETE).** *Outcome based Questions* will test the ability of the student for **Problem analysis-PO(2) and Design/development of solutions-PO(3)** and program specific outcome **PSO(1)**. The design questions is put in question paper. The entire question is compulsory so all students will be expected to attempt it.

Direct Measurement Report

CSE213 Outcome (PO2,PO3) and PSO1 Report Form

1. **Measure**– percent of students scoring at least 60% marks.
   Rubric - none
   Target – 60% of students
2. **Besides that various assignments and all CAT-1 / CAT-2 questions will also be mapped to one of the outcomes associated with the course. The attainment level of the outcomes associated with the course may also be calculated with the performance of the students in respective assignments and all CAT-1 / CAT-2 questions.**

Indirect Measurement

In end term survey, the questions are asked from the students about the attainment of course outcomes associated with a particular course.

Name of The Course	THEORY OF AUTOMATA AND FORMAL LANGUAGES			
Course Code	CSE221			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Course is designed to make the student familiar with the working of the FSM, PDA and TM.
2. This course helps the student to understand how a high level program is converted into a low level program by the compiler so that it becomes easy to understand the programming capabilities and function of the compiler.
3. To enable the student to differentiate between Regular and Non regular languages.
4. To enable the student to pursue R&D activities in Computational Theory.
5. To prepare the students for career in Software industry and academic

Course Outcomes

CO1	Understand basic principles of compiler.
CO2	Develop Deterministic Finite Automata and Non-Deterministic Finite Automata.
CO3	Develop Regular Expression for regular languages. Analyses difference between regular and non regular languages
CO4	Understand Context Free Grammar and its normalization
CO5	Able to draw and develop working model of Push Down Automata.

Text Book (s)

1. Opcroft, Ullman, “Introduction to Automata Theory, Languages and Computation”,Pearson Education

Reference Book (s):

1. Hopcroft, Ullman, “Introduction to Automata Theory, Languages and Computation”,Pearson Education

2. Languages and Computation”, PHI

3. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH

4. Papadimitrou, C. and Lewis, C.L., “Elements of the Theory of Computation”, PHI

Unit I: Introduction **9 lecture hours**
IAlphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition tabl e, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transit ion, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem
Module II: Regular expression (RE) **9 lecture hours**
Regular expression (RE) Definition, Operators of regular expression and their precedence,Algebraic laws for Regular expressions, Kleen’s Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages . Application of Pumping Lemma, Closure properties of Regu lar Languages, Decision properti es of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.
Module III:Context free grammar (CFG) and Contex t Freee Languages CFL): **10 lecture hours**
Definition, Examples, Derivation , Derivation trees, Am biguity in Grammer, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Memership, Pumping lemma for CFLs,
Module IV: Push Down Automata (PDA): **6 lecture hours**
TDescription and definition, Instantaneous Description,Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA,Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA
Module V: Turing machines (TM): **6 lecture hours**

Basic model, definit ion and representatio n, Instantaneous Description,Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Chur ch's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs.Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**Operating Systems**			
Course Code	CSE222			
Prerequisite	Data SData structures			
Corequisite	C- Programming			
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Learn fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
2. Learn how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions.
3. Learn the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software,

4. Learn basic resource management techniques (scheduling, time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection to various examples and real life applications.

Course Outcomes

CO1	Remember the classification and diversification of Operating system.
CO2	Understand the classical problems in Concurrent Processes and their solutions.
CO3	Learn and implement different types of CPU Scheduling Algorithm along with the understanding of the concept of Deadlock in system and its methods of handling deadlocks.
CO4	Analyze the concept of memory management and paging concept in operating system.
CO5	Able to apply various scheduling techniques.

Text Book (s)

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition.

Reference Book (s):

1. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
2. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
3. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition.

Unit I: Introduction	**8 lecture hours**
Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multi process Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems	
Unit II: Concurrent Processes	**8 lecture hours**

Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.
Unit III: CPU Scheduling **8 lecture hours**
Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.
Unit IV: Memory Management **8 lecture hours**
Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.
Unit V: Input/ Output **8 lecture hours**
I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

CSE381		Data Communication & Computer Networks								
Version		School	SCSE	Date of Approval		9-May-18				
						L	T	P	C	
						3	0	0	3	
Total Number of Contact Hours					L 40	T	0	P	0	
Pre-requisites										
Alternate Exposure		NA								
Co-requisites		NA								
Course Outcomes	1	Understand the basics of various transmission media and networks.								
	2	Compare and analyze various types of signals and conversion.								
	3	Analyze the various Data Link layer protocols and IEEE standards.								
	4	Analyze the network-layer, transport layer protocols, compression and security mechanism.								
	5	Use various application layer protocols								

Specific Instructional Objectives	1	Learn Data communication.
	2	Know different transmission medium used in communication and computer network.
	3	Learn protocols used for data transmission in computer network
	4	Understand basic concept about IP addressing and address allocation.
Catalog Description	This course is designed to help organizations understand Data communication in computer network and learn working of different networking protocols. Student can also have understanding about various routing protocols and how they used in different types of computer network. This course also describe basic idea about security concern in computer network	
Text Books	1	Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, 4th edition, 2007.
	2	Andrew S. Tanenbaum, Computer Networks, Pearson, Fifth Edition, 2011.
Reference	1	William Stallings, Data and Computer Communications, Pearson,8th Edition, 2007.
Unit 1		
Pedagogy		
Unit 2		
Pedagogy		
Unit 3		
Pedagogy		
Unit 4		
Pedagogy		
Unit 5		
Pedagogy		

CSE227	Introduction to Virtualization and Cloud Computing	L	T	P	C
Version No. 1.0	Date of Approval: 23/12/2016	3	0	0	3
Prerequisite	Computer fundamentals and IT infrastructure knowledge				

co-requisites	Basic computer H/W and S/W Knowledge

Course Objectives:

The objective of this course is to:

1. To study the importance of virtualization.
2. To study the cloud delivery models
3. To study the cloud deployment models.
4. To study Various organization to implement Cloud

Course Outcomes:

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

1. Understand importance of virtualization in details.
2. Understand importance of Server, Storage, Network and Application Virtualization. .
3. Understand importance of Cloud Computing
4. Understand cloud computing delivery models in details.
5. Understand cloud computing deployment models in details.
6. Understand briefly cloud computing Cloud Workloads and various scenario by a case study
7. Understand briefly Enterprise Cloud-Based High Performance Computing

Catalog Description

This graduate-level course investigates cloud computing models, techniques, and architectures. Cloud computing has evolved as a very important computing model, which enables information, software, and other shared resources to be provisioned over the network as services in an on-demand manner. Students will be exposed to the current practices in cloud computing. Topics includes distributed computing models and technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), virtualization, security and privacy issues, performance and systems issues, challenges in implementing clouds, data centers, hypervisor CPU and memory management, cloud hosted applications, and other advanced and research topics in cloud computing. Course work will include homework assignments, presentations, and a term project that will provide exposure to scientific research in cloud computing

Text Books

Introduction to Virtualization and Cloud Computing by IBM ICE Publication, Edition 1.1, Dec-2013

Reference Books

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
2. Gruman, Galen (2008-04-07). "What cloud computing really means". InfoWorld.
3. "What is Cloud Computing?". Amazon Web Services. 2013-03-19.
4. "Baburajan, Rajani, "The Rising Cloud Storage Market Opportunity Strengthens Vendors," infoTECH, August 24, 2011". It.tmcnet.com. 2011-08-24. Retrieved 2011-12-02.

Course Content

Unit No. 1	**Introduction to Virtualization**	**6 Hours**

Traditional IT Infrastructure, Benefits of Virtualization, Types of Virtualization, History of Virtualization.		
Unit No. 2	**Server, Storage, Network and Application Virtualization**	**6 Hours**
Types of Server Virtualization, Hypervisors, Anatomy of Server Virtualization, Benefits of Storage Virtualization, Types of Storage Virtualization, VPN, VLAN, Benefits of Application Virtualization		
Unit No. 3	**Introduction to Cloud Computing**	**6 Hours**
History, Importance of Virtualization in Cloud, Anatomy of Cloud, Cloud deployment models, Cloud delivery models, Stepping stones for the development of cloud, Grid Computing, Cloud Computing, basic SOA		
Unit No. 4	**: Cloud Implementations / Cloud Deployment Models Cloud Delivery Models,**	**8 Hours**
Decision Factors for Cloud Implementations, Public, Private and Hybrid Cloud, Overview, Infrastructure as a Service (IaaS) Cloud Delivery Model, Platform as a Service (PaaS) Cloud Delivery. SAAS and BPAAS		
Unit No. 5	**Case Study On Virtualization, Cloud Workloads**	**6 Hours**
Customer IT Landscape, Triggers of Virtualization, Preparation for Virtualization, Transition Tools for Virtualization, Cost savings , Cloud workload Overview, Workloads most suitable for Cloud, Workloads not suitable for Cloud.		
Unit No. 6	**Enterprise Cloud-Based High Performance Computing**	**8 Hours**
Data centers for Cloud Computing, Software-Defined Data Center(SDDC), Overview of High Performance Computing (HPC) on Cloud, Enterprises HPC applications (high-performance grid computing, high-performance big data computing /analytics, high performance reasoning), Business Analysis on Cloud.		

Mode of Evaluation: Tutorials / Class Tests / Lab Exam

	Theory without PBL	
Components	**Internal (50)**	**SEE**

Marks	Cat-1 (15)	Cat-2 (15)	Quiz (6)	Assignment (5)	Class Discussion (5)	Attendance (4)	Semester End Exam (50)
Total Marks	100						

	Theory with PBL								
Components	**Internal (50)**								**SEE**
Marks	Update Cat-1 (15)		Update Cat-2 (15)		Quiz (6)	Assignment (5)	Class Discussion (5)	Attendance (4)	Semester End Exam (50)
	CAT-1 (Scaled to 9)	PBL-1 (Scaled to 6)	CAT-2 (Scaled to 9)	PBL-2 (Scaled to 6)					
Total Marks	100								

MGT302	INDUSTRIAL ECONOMICS AND MANAGEMENT	3	0	0	3
Version No.	1.0				
Prerequisite	-				

Course Description: The course describes the basics of demand and demand forecasting. It explains cost functions, cost control, cost reduction and pricing techniques.

Expected Outcome: On completion of this course, the students will be able to

1. Apply the concept of demand.
2. Estimate production and cost function.
3. Formulate appropriate pricing strategies.

Unit I Introduction

Introduction: The Scope and Method of Managerial economics – Fundamental Economics concepts – Managerial Economics with other subjects - Objectives of the Firm

Unit II Demand and Supply Analysis

Meaning, Types and Determinants – Demand estimation- Demand elasticities for decision making – Business and Economic forecasting: Qualitative and Quantitative methods – Supply analysis: Meaning, elasticities and determinants – Market equilibrium and price determination

Unit III Production Economics

Production and Production function – Types – Estimation – Returns to Scale – Economies and Diseconomies of Scale and Economies of Scope. Factor Inputs - Input-Output Analysis

Unit IV Market Structure

Perfect Competition – Imperfect Competition: Monopoly – Monopolistic – Oligopolistic Strategy, Cartels, Cournot, Kinked Demand and Price Leadership. Oligopolistic Rivalry & Theory of Games – Measurement of economic concentration – Policy against monopoly and restrictive trade practices - Competition Law – Pricing Practices: Objectives – Determinants – Pricing Methods – Government Policies and Pricing.

Unit V Introduction to Macroeconomics

Circular Flow of Income and Expenditures – Components of National Income and its significance - Measuring Gross Domestic Product (GDP) – Inflation and Business Cycles – Government Fiscal and Monetary Policy - Balance of payments – Foreign exchange markets

Text Books

1. P.L. Mehta – Managerial Economics Analysis, Problems and cases, Sultan Chand & Co. Ltd., 2001

References:

Mode of Evaluation

Components	Theory	
	Internal	SEE
Marks	50	50
Total Marks	100	

Name of The Course	Operating Systems Lab

Course Code	CSE242			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

To understand the services provided by and to design an operating system
To understand what a process is and how processes are scheduled
To understand different approaches to memory management.

Course Outcomes

CO1	Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks
CO2	Understand the classical problems in Concurrent Processes and their solutions.
CO3	Implement different types of CPU Scheduling Algorithm along with the understanding of the concept of Deadlock in system and its methods of handling deadlocks.
CO4	Produce algorithmic solutions to process synchronization problems
CO5	

Text Book (s)

1.Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley, Ninth Edition, 2013.

2.D M Dhamdhere, “Operating Systems: A Concept based Approach”, McGraw Hill Education, 3 edition, 2012.

List of Experiments	
1	Introduction to basis Linux commands and application development through C on Linux environment.
2	Program to report the behaviour of the OS to get the CPU type and model, kernel version.
3	Program to get the amount of memory configured into the computer, amount of memory currently available.
4	Create a process using fork, where one parent process generates Fibonacci series for ‘n’ terms and child calculates no of vowels in a file. The values of ‘n’ and file name are taken as command line arguments.
5	Write a program using P-thread, where main thread calculates number of lines in a file and child calculates number of words.
6	Write a program to implement the FCFS, SJRF, Priority, Round – Robin process scheduling algorithms.
7	Write a program to implement Inter Process Communication (IPC) using Message Queues.
8	Write a program to implement IPC using pipes.
9	Implementation of wait and signal using counting semaphores.
10	Implementation of wait and signal using binary semaphores.
11	Implement the solution for reader – writer’s problem.
12	Implement the solution for dining philosopher’s problem.

13	Implement banker’s algorithm.
14	Implement the first fit; best fit and worst fit file allocation strategy.
15	Implementation of page replacement algorithms.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

Name of The Course	COMPUTER NETWORK **Lab**				
Course Code	**CSE354**				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	0	0	2	1	

Course Objectives:

This course is designed to help organizations understand Data communication in computer network and learn working of different networking protocols. Student can also have understanding about various routing protocols and how they used in different types of computer network. This course also describe basic idea about security concern in computer network

Course Outcomes

CO1	Understand the basics of various transmission media and networks.
CO2	Compare and analyze various types of signals and conversion.
CO3	Analyze the various Data Link layer protocols and IEEE standards.
CO4	Analyze the network-layer, transport layer protocols, compression and security mechanism.
CO5	Use various application layer protocols

Text Book (s)

1	Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, 4th edition, 2007.
2	Andrew S. Tanenbaum, Computer Networks, Pearson, Fifth Edition, 2011.

Reference Book (s)

1	William Stallings, Data and Computer Communications, Pearson,8th Edition, 2007.
2	Simon Haykin, Michael Moher, Introduction to Analog and Digital Communications, Wiley Publications, Second Edition, 2007.

List of Experiment	
1	Introduction to basic Linux networking commands. (Commands like ipconfig, getmac, tracert, pathping, arp, ping, netstat, finger etc.)
2	Implement bit stuffing and de-stuffing
3	Write a program for hamming code generation for error detection and correction.
4	Implement cyclic redundancy check (CRC).
5	Write a program for congestion control using the leaky bucket algorithm.
6	Implement Dijkstra's algorithm to compute a shortest path through graph.
7	Take a 64-bit plain text and encrypt the same using DES algorithm.
8	Using RSA algorithm encrypts a text data and decrypts the same.
9	Implementation of the link state routing protocols.
10	Implementation of LZW compression and decompression algorithms.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		**50**	**100**

CSE247- INTRODUCTION TO VIRTUALIZATION AND CLOUD COMPUTING LAB

LIST OF EXPERIMENTS

Lab	Contents
Lab-1	Installation of VMWare Workstation
Lab-2	Creation of VM image of Windows XP
Lab-3	Creation of VM image of base operating system
Lab-4	Installation of QEMU on Ubuntu 12.10
Lab-5	Creating and Using Virtual Machine Using QEMU
Lab-6	KVM on Ubuntu 12.10 and managing a VM on it.
Lab-7	KVM and guest operating system on CentOS6.3
Lab-8	Installing Guest OS in KVM using Command Line
Lab-9	Installation of VMware ESX Server

Value Added List of Experiments

1. Case study of Cytrix Xen server.
2. Case study of Amazon S3

Name of The Course	**English Proficiency and Aptitude Building -3**				
Course Code	LLL222				
Prerequisite	Completion of semester 2				
Corequisite					
Antirequisite					
24 sessions of 100 minutes each, 12 hours of online tests		**L**	**T**	**P**	**C**
		3	0	4	2

Course Objectives:

- Enhance formal writing skills
- To understand soft-skills pertaining to industry

Course Outcomes

CO1	Improve arithmetic aptitude
CO2	Learn tricks to solve aptitude questions faster, thereby saving time during competitive exams
CO3	Improve arithmetic aptitude

Text Book (s)

SLLL own text book

Reference Book (s):

1. CommunicationSkillsforEngineers, Mishra,Sunita&C.Muralikrishna,,Pearson
2. CorporateSoftskills,SarveshGulati,2006.
3. Effective Communication,JohnAdair,MacmillanLtd.1997.
4. DevelopingCommunicationSkills,KrishnaMohanandMeeraBannerji,Macmillan IndiaLtd.1990

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**

20	30	50	100

CSE241	DYNAMIC PARADIGM Lab II	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure	CSE215				
co-requisites					

Course Objective(s)

Course Objectives

The objective of this course is:

4. The focus is towards students getting skilled on current-futuristic technology (Cloud computing, Business Analytics, IT Infrastructure Management, Open Source Software) .
5. Hands-on & continuous learning on current Industry tools/platform.
6. Elementary level of learning strengthening the knowledge in cloud computing, open source, business analytics, big data, security on cloud environment and emerging technologies.

Course Outcomes

At the end of this course students would be able to:

9. Wider acceptability in the Industry, due to students having applied skills on technology / industry domain.
10. Students getting skilled on current-futuristic technology (Cloud computing, Business Analytics, IT Infrastructure Management, Open Source Software)
11. Understand the cloud computing architecture
12. Understand open standard and open source software.
13. Understand the business analytics, that will match with the industry.
14. Understand the use of Big Data and its concepts on Cloud Computing.
15. Understand the importance of Security in Cloud.
16. To understand and strengthening the knowledge in cloud computing and it's emerging technologies.

Catalog Description

This course introduces the emerging technologies in computing and Cloud computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources. Open-source software (OSS) is computer software with its source code made available. Open-source software is the most prominent example of open-source development. Business analytics (BA) refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business analytics focuses on developing new insights and understanding of

business performance based on data and statistical methods. In contrast, business intelligence traditionally focuses on using a consistent set of metrics to both measure past performance and guide business planning, which is also based on data and statistical methods.

Text Books

Cloud Computing by IBM ICE Publications

Opens Source Software by IBM ICE Publications

Business Analytics by IBM ICE Publications

LIST OF EXPERIMENTS

9. Introduction about a tablet OS. How to select Tablet OS.
10. Introduction to mobile Application.
11. Introduction to Open Source Development Process.
12. Introduction to Business Intelligence.
13. Introduction to Cloud Computing.
14. Introduction to Big Data.
15. Applying Big Data concepts on Cloud Computing.
16. Introduction to Security in Cloud.

Value Added List of Experiments

3. Open Account in known IAAS, PAAS, SAAS Vendor /service providers
4. Compare and discuss different flavor of IBM, Microsoft, Google and Amazon cloud services.

Mode of Evaluation: Written Examinations, Quizzes, Assignments.

	Theory	
Components	**Internal**	**ETE**
Marks	50	50
Total Marks	100	

V semester

Name of The Course	**Design & Analysis of Algorithms**
Course Code	CSE311
Prerequisite	

Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	0	3

Course Objectives:

The primary objective of this course is to introduce the topic of algorithms as a precise mathematical concept, and study how to design algorithms, establish their correctness, study their efficiency and memory needs. The course consists of a strong mathematical component in addition to the design of various algorithms.

Course Outcomes

CO1	Analyze the complexity of the algorithms and use technique divide and conquer to solve the problems
CO2	Identify feasible solutions for different problems through greedy method and minimize the solutions space and to solve the problems through dynamic programming.
CO3	Solve the problems through graph algorithms.
CO4	Justify that a certain problem is NP-Complete
CO5	Understand and apply linear programming concepts to real time applications.

Text Book (s)

1	Micheal T. Goodrich and Roberto Tamassia: Algorithm Design: Foundations, Analysis and Internet examples (John Wiley &Sons, Inc., 2002).
2	Ellis Horowitz, Sartaj Sahni, SanguthevarRajasekaran. Fundamentalas of Computer
3	Algorithms Algorithms, MIT Press, Second Edition (Indian reprint: Prentice-Hall), 2008.

Reference Book (s)

1	Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", The MIT Press, 3rd edition, 2009.
2	RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of Algorithms", Mc Graw Hill, 2005.
3	Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education.

Course Contents:

Unit-1: Introduction **9 hours**
Introduction : Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Sorting and order Statistics - Shell sort, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time.
Unit II: Tree **9 hours**
Advanced Data Structures: Red-Black trees, B – trees, Binomial Heaps, Fibonacci Heaps.
Unit III : Algorithm **9 Hours**
Divide and Conquer with examples such as Sorting, Matrix Multiplication, Convex hull and Searching. Greedy methods with examples Huffman Coding, Knapsack, Minimum Spanning trees – Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.
Unit IV : Dynamic Programming **9 Hours**
Dynamic programming with examples such as Knapsack, All pair shortest paths – Warshal'sandFloyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.
Unit V : Computations **9 Hours**

Selected Topics: Algebraic Computation, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**Compiler Design**			
Course Code	CSE313			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	0	3

Course Objectives:

The goal of the course is to provide an introduction to the system software like assemblers, compilers, and macros. It provides the complete description about inner working of a compiler. This course focuses mainly on the design of compilers and optimization techniques. It also includes the design of Compiler writing tools. This course also aims to convey the language specifications, use of regular expressions and context free grammars behind the design of compiler.

Course Outcomes

CO1	Use language specifications behind the design of compiler.

CO2	Construct LL, SLR, CLR and LALR parsing table.
CO3	Evaluate different intermediate codes.
CO4	Implement different data structure and allocation schemes for symbol table.
CO5	Apply modern tools and technologies for designing new compiler.

Text Book (s)

1	Alfred V Aho, Jeffrey D. Ullman, “Principles of Compiler Design”, Narosa Publishing House, 2002.
2	Aho, Sethi& Ullman, "Compilers: Principles, Techniques and Tools”, Addison Wesley; 2nd edition, 2006.

Reference Book (s)

1	V Raghvan, “Principles of Compiler Design”, TMH, 2011.
2	[illegible]
3	[illegible]

Contents:

Unit-1: Introduction **9 hours**
Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Optimization of DFA-Based Pattern Matchers, implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.
Unit II: Basic Parsing Techniques **9 hours**

Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR (0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, and implementation of LR parsing tables.
Unit III :Syntax Directed Translation 9 Hours
Syntax-directed Translation schemes, Implementation of Syntax directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declaration sand case statements.
Unit IV : Symbol Table 9 Hours
Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.
Unit V : Code Generation 9 Hours
Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator. Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

CSE314	Computer Network	L	T	P	C
Version No. 1.0	Date of Approval: Jun XX, 2013	3	0	1	4
Prerequisite	---				
co-requisites					

Course Content

Unit I: Introduction Concepts **8 lecture hours**

Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

Unit II: Medium Access sub layer **8 lecture hours**

Medium Access sub layer - Channel Allocations, LAN protocols -ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

Unit III: Network Layer **8 lecture hours**

Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP, IP packet, IP address, IPv6.

Unit IV: Transport Layer **8 lecture hours**

Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

Unit V: Application Layer **8 lecture hours**

File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

Text Books

1. A.S. Tanenbaum, Computer Networks(2003), 4 ed, Pearson Education/ PHI. New Delhi, india.
2. Behrouz A. Forouzan(2006), Data communication and Networking, Tata McGraw-Hill, India.

Reference Books

1. Micheal A Gallo, Bill Hancock , (2001),Computer Communications and Networking Technologies, Thomson Fitz Gerald , Dennis(2009), Business Data Communications & Networking, 10 ed, john willeysons, USA.
2. William stallings(2006), Cryptography and network security, 4th edition, Pearson Education, india

Name of The Course	Software Engineering			
Course Code	CSE322			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**

	0	**0**	2	1

Course Outcomes

CO1	Understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.
CO2	Discuss the distinctions between validation testing and defect testing.
CO3	Understand the principles and need for various types of testing.
CO4	Describe strategies for generating system test cases.
CO5	Understand the essential characteristics of tool used for test automation.

Text Book (s)

Reference Book (s)

1. S. Desikan and G. Ramesh, “Software Testing: Principles and Practices”, Pearson Education.
2. Aditya P. Mathur, “Fundamentals of Software Testing”, Pearson Education.
3. Naik and Tripathy, “Software Testing and Quality Assurance”, Wiley
4. K. K. Aggarwal and Yogesh Singh, “Software Engineering”, New Age International Publication.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

CSE461	Introduction to Cloud Computing	L	T	P	C
Version No. 1.2	Date of Approval: Dec XX, 2016	3	0	0	3
Prerequisite	" Computer fundamentals and IT infrastructure knowledge "				
co-requisites					
Course Coordinator	N. Arul				

Course Objectives

The objective of this course is to:

1. Understand the Importance of Virtualization in Cloud.
2. Gain knowledge on Cloud Computing
3. Understands Cloud Delivery and Cloud Deployment models

Course Outcomes

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

1. To Understand the Importance of Virtualization in Cloud.
2. To Introduce the Cloud deployment models and Cloud delivery models
3. To Learn the stepping stones for the development of cloud
4. To Learn the Decision Factors for Cloud Implementations
5. To Understands the Public, Private and Hybrid Cloud
6. To Learn about the workloads most suitable and not suitable for Cloud

Catalog Description

This course covers a series of current cloud computing technologies, including technologies for Virtualization like server virtualization, storage virtualization, network virtualization and application virtualization. The cloud introduction part also covered as the part of this course

Text Books

1. Introduction to Virtualization and Cloud Computing by IBM ICE Publication
2. IBM Redbooks | System x Virtualization Strategies
3. PowerVM Virtualization on IBM System p: Introduction and Configuration Fourth Ed.

Reference Books

1. Gruman, Galen (2008-04-07). "What cloud computing really means". InfoWorld.
2. "What is Cloud Computing?". Amazon Web Services. 2013-03-19.
3. "Baburajan, Rajani, "The Rising Cloud Storage Market Opportunity Strengthens Vendors," infoTECH, August 24, 2011". It.tmcnet.com. 2011-08-24. Retrieved 2011-12-02.

Course Content

Unit I: Introduction to Virtualization **7 lecture hours**

Traditional IT Infrastructure, Benefits of Virtualization, Types of Virtualization, History of Virtualization.

Unit II: Server, Storage, Network and Application Virtualization **8 lecture hours**

Types of Server Virtualization, Hypervisors, Anatomy of Server Virtualization, Benefits of Storage Virtualization, Types of Storage Virtualization, VPN, VLAN, Benefits of Application Virtualization

Unit III: Introduction to Cloud **8 lecture hours**

History, Importance of Virtualization in Cloud, Anatomy of Cloud, Cloud deployment models, Cloud delivery models, Stepping stones for the development of cloud, Grid Computing, Cloud Computing.

Unit IV: Cloud Implementations / Cloud Deployment Models, **9 lecture hours**

Cloud Delivery Models Decision Factors for Cloud Implementations, Public, Private and Hybrid Cloud, Overview,Infrastructure as a Service (IaaS) Cloud Delivery Model, Platform as a Service (PaaS) Cloud Delivery Model, Software as a Service (SaaS) Cloud Delivery Model

Unit V : Case Study On Virtualization, Cloud Workloads **8 lecture hours**

Customer IT Landscape, Triggers of Virtualization, Preparation for Virtualization, Transition Tools for Virtualization, Cost savings , Cloud workload Overview, Workloads most suitable for Cloud, Workloads not suitable for Cloud.

Mode of Evaluation: Class Quiz / Class Assignment / Group-Class Discussion

	Theory without PBL						
Components	**Internal (50)**						**SEE**
Marks	Cat-1 (15)	Cat-2 (15)	Quiz (3)	Assignment (3)	Class Discussion (5)	Attendance (5)	Semester End Exam (50)
Total Marks	100						

CSIO101	Introduction to Internet of Things	L	T	P	C
Version No. 1.0	Date of Approval: Jun XX, 2016	3	0	0	3
Prerequisite					
co-requisites					

Course Objectives

The objective of this course is to:

1. Explain in a concise manner how the general Internet as well as Internet of Things work.
2. The focus will be more on the possibilities offered by the different technologies, and on the creative thinking techniques.
3. To find innovative applications of combinations of such technologies in real-life scenarios.

Course Outcomes

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

1. To introduce the terminology, technology and its applications.
2. To introduce the concept of M2M (machine to machine) with necessary protocols.
3. Understand constraints and opportunities of wireless and mobile networks for IoT.
4. Use basic needs of IoT with respect to recent advancement.
5. Understand the implementation of web based services on IoT devices along with ethical challenges and privacy requirement in IoT .
6. Understanding the need of IoT, deployment challenges and characteristics of the IoT.

Catalog Description

The scope of the course is to describe the recent development of IoT and major application areas. The objective is to understand various levels of IoT. Why IoT will be the integral part of our life in coming days as well today. The emphasis is given on various application areas. The course designed as foundation course of IoT, which comprises the basic concepts essential to understand advance courses.

Text Books

1. Internet of Things (A Hands-on-Approach) , Vijay Madisetti , Arshdeep Bahga, University Press, First Edition, 2014.

Reference Books

1. Internet of Things: Principles and Paradigms edited by Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufmann, First Edition, 2016.
2. Recent research/white papers.

Course Content

Unit I: INTRODUCTION **8 lecture hours**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels

and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and lifestyle.

Unit II: IoT & M2M **8 lecture hours**

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, and SNMP NETOPEER.

Unit III: WIRELESS SENSOR NETWORKS AND THE INTERNET OF THINGS **8 lecture hours**

Introduction of wireless sensor networks, wireless sensor network applications, security integration challenges, integration approaches, the TCP/IP solution issues.

Unit IV: ENABLING TECHNOLOGIES, PROTOCOLS, AND APPLICATIONS **8 lecture hours**

Market opportunity, IOT architecture, IoT Elements, IoT common standards, QoS criteria, IoT challenges and future directions.

Unit V: IoT Ethics and Privacy **8 lecture hours**

Ethical Challenges of the Internet of Things, Privacy matters in the 'internet of things, The Importance of the Internet of Things (IoT) in Society, Does Privacy Exist on the Internet of Things? 80% of consumers fear privacy invasion in the Internet of Things revolution

Mode of Evaluation: Quiz/Assignment/ Seminar/Written Examination

	Theory without PBL						
Components	**Internal (50)**						**SEE**
Marks	Cat-1 (15)	Cat-2 (15)	Quiz (6)	Assignment (5)	Class Discussion (5)	Attendance (4)	Semester End Exam (50)
Total Marks	100						

CSE200	Programming in Python	L	T	P	C
Version1.0	Date of Approval:	2	0	0	2
Pre-requisites//Exposure	Programming in C				
co-requisites					
Course Coordinator	R. S. Kohli				

Unit I: Introduction **8 Lecture hours**

History , Features , Working with Python, Installing Python, basic syntax, interactive shell, editing, saving, and running a script.

The concept of data types; variables, assignments; immutable variables; numerical types; Arithmetic and Logical operators and Boolean expressions. Debugging, comments in the program; understanding error messages; Catching exceptions using try and except. Built-in functions – type(), id(), eval(), random, chr(), ord(); Conditional Statements : If, If-else, Nested if-else; Looping: For, While, Nested loops; Control Statements: Break, Continue, Pass;

Unit II: Function and Strings **6 Lecture hours**

Functions in Python: Defining a function, Calling a function, Types of functions, Function Arguments – default arguments, keyword arguments, variable/arbitrary arguments. Global and local variables. Recursive functions.

String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. String functions: len(), upper(), lower(), casefold(),find(),replace(),split(),join(). Formatting using % (string modulo) and format operators

Unit III: Lists, Tuples and Dictionaries **8 lecture hours**

Basic List operators, List methods, iterating over a list, replacing, inserting, removing an element; searching and sorting lists, calculating the sum and average of items in a list ; Tuples - sequence of values , immutability, Comparing tuples, Tuple assignment, tuple methods: Dictionary- Store data as key-value pairs in dictionaries, dictionary methods, search for values, change existing values, add new, key-value pairs, and delete key-value pairs, nesting objects, sorting, dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

Unit IV : Files and Regular Expressions **7 lecture hours**

Manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; regular expressions

Unit V: Object Oriented Programming and Database Connectivity **8 Lecture hours**

Class, Objects, Class variables, Instance variables, Types of methods, Inheritance, Database connection, Use of queries to retrieve data from database

Name of The Course	**Design & Analysis of Algorithms Lab**			
Course Code	CSE351			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	2	1

Course Objectives:

To identify and apply the concept of computational intractability.

Course Outcomes

CO1	To analyze the running time of asymptotic algorithm.
CO2	To develop algorithms for sorting, searching, insertion and matching.
CO3	To identify and apply the concept of computational intractability.
CO4	Apply the algorithms and design techniques to solve problems
CO5	Analyze the complexities of various problems in different domains.

Text Book (s)

Reference Book (s)

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Printice Hall of India.
2. RCT Lee, SS Tseng, RC Chang and YT Tsai, “Introduction to the Design and Analysis of Algorithms”, Mc Graw Hill, 2005.

3. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
4. Berman, Paul," Algorithms", Cengage Learning.
5. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

List of Experiments:

1. Write a program to sort given set of numbers in ascending/descending order using Bubble sort and also search a number using binary search.
2. Write a program to sort given set of numbers in ascending/descending order using Insertion sort and also search a number using linear search.
3. Write a program to sort given set of numbers in ascending/descending order using Quick sort and any other sorting algorithm. Also record the time taken by these two programs and compare them.
4. Write a program to sort given set of numbers using Heap sort.
5. Write a program to sort given set of numbers Merge Sort.
6. Write a program to sort given set of numbers Counting Sort.
7. Write a program to implement Strassen's Matrix Multiplication by Divide and Conquer
8. Write a program to implement Knapsack using Greedy technique.
9. Write a program to implement Knapsack using Dynamic programming.
10. Write a program to implement Dijkstra's Algorithm.
11. Write a program to implement n-Queen Problem using backtracking.
12. Write a program to implement String Matching using Rabin-Karp algorithm.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

Name of The Course	**Compiler Design Lab**			
Course Code	CSE353			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	2	1

Course Objectives:

The goal of the course is to provide an introduction to the system software like assemblers, compilers, and macros. It provides the complete description about inner working of a compiler. This course focuses mainly on the design of compilers and optimization techniques. It also includes the design of Compiler writing tools. This course also aims to convey the language specifications, use of regular expressions and context free grammars behind the design of compiler.

Course Outcomes

CO1	Understand how to design a compiler.
CO2	Construct LL, SLR, CLR and LALR parsing table.
CO3	Evaluate different intermediate codes.
CO4	Implement different data structure and allocation schemes for symbol table.
CO5	Apply modern tools and technologies for designing new compiler.

Text Book (s) / Reference Book (s)

1	V Raghvan, “Principles of Compiler Design”, TMH, 2011.

2	Kenneth Louden," Compiler Construction", Cengage Learning, 2002.
3	Charles Fischer and Ricard LeBlanc," Crafting a Compiler with C", Pearson Education,1991.

List of Experiments	
1	Design a Lexical analyzer for identifying different types of token used in C language.
2	Write a program to find first and follow of a given string.
3	Write a program to implement left recursion of a given grammar.
4	Write a program to implement left factoring.
5	Write a program to implement 3 address code.
6	Write a program to implement Predictive Parser. Write a C program
7	Write a Program to Design Lexical Analyzer.
8	Write a program to Design LALR Bottom up Parser.
9	Convert The BNF rules into Yacc form and write code to generate abstract syntax tree.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

Name of The Course	COMPUTER NETWORK **Lab**				
Course Code	**CSE354**				
Prerequisite					
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	0	0	2	1	

Course Objectives:

This course is designed to help organizations understand Data communication in computer network and learn working of different networking protocols. Student can also have understanding about various routing protocols and how they used in different types of computer network. This course also describe basic idea about security concern in computer network

Course Outcomes

CO1	Understand the basics of various transmission media and networks.
CO2	Compare and analyze various types of signals and conversion.
CO3	Analyze the various Data Link layer protocols and IEEE standards.
CO4	Analyze the network-layer, transport layer protocols, compression and security mechanism.
CO5	Use various application layer protocols

Text Book (s)

1	Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, 4th edition, 2007.
2	Andrew S. Tanenbaum, Computer Networks, Pearson, Fifth Edition, 2011.

Reference Book (s)

1	William Stallings, Data and Computer Communications, Pearson,8th Edition, 2007.
2	Simon Haykin, Michael Moher, Introduction to Analog and Digital Communications, Wiley Publications, Second Edition, 2007.

List of Experiment	
1	Introduction to basic Linux networking commands. (Commands like ipconfig, getmac, tracert, pathping, arp, ping, netstat, finger etc.)
2	Implement bit stuffing and de-stuffing
3	Write a program for hamming code generation for error detection and correction.
4	Implement cyclic redundancy check (CRC).
5	Write a program for congestion control using the leaky bucket algorithm.
6	Implement Dijkstra's algorithm to compute a shortest path through graph.
7	Take a 64-bit plain text and encrypt the same using DES algorithm.
8	Using RSA algorithm encrypts a text data and decrypts the same.
9	Implementation of the link state routing protocols.
10	Implementation of LZW compression and decompression algorithms.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		**50**	**100**

Name of The Course	**Software Engineering Lab**			
Course Code	**CSE342**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	2	1

Course Objectives:

Course Outcomes

CO1	Understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.
CO2	Discuss the distinctions between validation testing and defect testing.
CO3	Understand the principles and need for various types of testing.
CO4	Describe strategies for generating system test cases.
CO5	Understand the essential characteristics of tool used for test automation.

Text Book (s)

Reference Book (s)

1. S. Desikan and G. Ramesh, “Software Testing: Principles and Practices”, Pearson Education.
2. Aditya P. Mathur, “Fundamentals of Software Testing”, Pearson Education.
3. Naik and Tripathy, “Software Testing and Quality Assurance”, Wiley
4. K. K. Aggarwal and Yogesh Singh, “Software Engineering”, New Age International Publication.

Sr. No.	Title of Lab Experiments
1.	Demonstration on Manual testing a. Write Programs in „C‟ Language to demonstrate the working of the following constructs: i)do…while ii) while…do iii)if…else iv)switch v)for b. Write a program in "C" language to demonstrate the working of palindrome using do…while.
2.	Demonstration on Unit testing a. Create a test plan document for any application (e.g. Library Management System). b. Study of any testing tool (e.g. Win runner). c. Create a test plan document for cellular phone.
3.	Demonstration on Integration testing Take a mini project (e.g. University admission, Placement Portal) and execute it. During the life cycle of the mini project create the various testing documents and final test report document.
4.	Demonstration on System testing a. Take any system (e.g. ATM system) and study its system specifications and report the various bugs. b. Write down the test cases for any known applications (e.g. Banking Application).
5.	Demonstration on Blackbox testing a. Design a usecase diagram for an ATM system. b. Design a class diagram for an ATM system. c. Design a usecase diagram for Library system.

6.	Demonstration on WhiteBox testing a.Create various testing document for robot control system. b.“A Program written in „C‟ Language for Matrix Multiplication fails” Introspect the causes for its failure and write down the possible reasons for its failure. c. Write a Program in „C‟ Language to demonstrate the working of Addition of diagonal elements in a matrix.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

LLL 312	**English Proficiency and Aptitude Building -4**	L	T	P	C
Version 1.0	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 4				
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

1. Skill development related to classification of numbers
2. Implementing logical approach in decision making

Course Outcomes

At the end of this course, the learner will be:

1. Able to develop a logical thought process related to every aspect of life
2. Able to widen the horizon of one's thought process and data analysis skill
3. Able to interpret data and convert it into information

Text Books

SLLL own text book

Course Catalogue

It is imperative for a student to develop interpretation and analysis skills to be able to hold onto his own in this competitive world. The course thus, focuses on aptitude at the next level of reasoning and data interpretation.

Reference Books

1. Quicker Maths , M Tyra
2. Quantitative Aptitude, Abhijeet Guha

VI semester

Name of The Course	**Microprocessor & Interfacing**			
Course Code	CSE220			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	0	3

Course Objectives:

1. To Familiarize the students with the architecture of 8086
2. To introduce the concepts of Assembly language programming of 8086.
3. To make the students familiar with ICs required for interfacing 8086 with I/O devices

Course Outcomes

CO1	To understand architecture of 8086 processor
CO2	To design Assembly language program for 8086
CO3	To use advanced features of 8086
CO4	To interface 8086 with various devices and memory
CO5	To understand the architecture and principles of USART 8245

Text Book (s)

1. D.V. Hall, Microprocessors & Interfacing, TMH, 3rd edition

2. Barry B Brey, The intel microprocessor: architecture, programming and interfacing, Prentice hall of India, New Delhi, 2003.ISBN-0138027455, 4th Edition

Reference Book (s)

1. Alan Clements, "Principles of Computer Hardware", Oxford University Press, 3rd Edition, 2003, ISBN-9780198564539

Course Contents:
History of microprocessors, Introduction of 8086, Functional diagram of 8086, Register Organization, Memory Segmentation, Programming Model, Memory addresses. Physical memory organization, signal descriptions of 8086- common function signals. Minimum and Maximum mode signals, Timing diagrams.
Unit II: Assembly Language Programming (Part-I) 9 hours
Instruction formats, addressing modes, instruction set, assembler directives, simple programs involving logical, branch and arithmetic expressions
Unit III :Assembly Language Programming (Part-II) 9 Hours
Procedures: Near and Far procedures, Macros, String Manipulations, searching and sorting programs, Advanced features of Assembly language programming
Unit IV : I/O Interface 9 Hours
8255 PPI, various modes of operation and interfacing to 8086, Interfacing keyboard, display, stepper motor interfacing, D/A and A/D converter, 8251 USART architecture and interfacing, RS-232.
Unit V : Interfacing with memory & Interrupts 9 Hours
Memory interfacing to 8086, Interrupt structure of 8086, Vector interrupt table, Interrupt service routine. Introduction to DOS and BIOS interrupts, Interfacing 8259 Interrupt Controller, DMA Controller 8257.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**DATA MINING & PREDICTIVE MODELING**				
Course Code	**CSE321**				
Prerequisite					
Co-requisite					
Anti-requisite					
	L	**T**	**P**	**C**	
	3	0	0	3	

Course Objectives

To learn, how to develop models to predict categorical and continuous outcomes, using such techniques as neural networks, decision trees, logistic regression, support vector machines, and Bayesian network models.

Course Outcomes

CO1	Select appropriate predictive modelling approaches to identify particular cases to progress
CO2	Apply predictive modelling approaches to identify particular cases.s
CO3	Compare and contrast the underlying predictive modeling techniques.
CO4	Select appropriate predictive modelling approaches to identify particular cases to progress

CO5	Apply predictive modelling approaches using a suitable package such as SPSS Modeler

Text Book (s)

1. JamesWuandStephenCoggeshall,FoundationsofPredictiveAnalytics,CRCPress,2012.

Reference Book (s)

2. BruceRatner,StatisticalandMachine-LearningDataMining,CRCPress,2011
3. EricSiegel&ThomasH.Davenport,PredictiveAnalytics,WileyPublications,2013

Course Content

Unit I: Data Understanding & preparation **8lecture hours**
Identifyingbusinessobjectives,Translatingbusinessobjectivestodatamininggoals,Readingdatafromvariou ssources–Database/Excel/Text/others,datavisualization–tabular&graphic, distributionsandsummarystatistics,fieldreordering,Reclassifydata
Unit II: Data Transformations **9lecture hours**
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Computer Graphics**			
Course Code	**CSE323**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

This course focuses on 2D and 3D interactive and non-interactive graphics. This course studies the principles underlying the generation and display of 2D and 3D computer graphics. In this course topics include geometric modeling, 3D viewing and projection, lighting and shading, color, and the use of one or more technologies and packages such as OpenGL, and Blender. Course requirements usually include exam and several programming or written homework assignments.

Course Outcomes

CO1	To understand the principles, commonly used paradigms and techniques of computer graphics. e.g. the graphics pipeline, and Bresenham's algorithm for speedy line and circle generation.
CO2	Be able to understand 2D graphics concepts in the development of computer games, information visualization, and business applications.
CO3	To develop a facility with the relevant mathematics of 3D graphics like projection, clipping and transformation
CO4	Be able to understand the representation of non linear shapes. E. g. Curves, hidden surfaces.
CO5	Be able to develop animations like motion sequence, morphing and illustrating models for lighting/shading.

Text Book (s)

1	Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education, India; 2 edition 2002.
2	Computer Graphics Principles and Practice, Second Edition in C, James D.Foley, Andries Van Dam, Steven K.Feiner, JhonF.Hughes, Addison Wesley, Third Edition, 2014.

Reference Book (s)

1	Steven Harrington, “Computer Graphics: A Programming Approach” , McGraw-Hill Inc.,US; 2nd Revised edition edition, 1983.
2	David Rogers, “ Procedural Elements of Computer Graphics”, McGraw Hill Education; 2 edition, 2017.

Unit-1 Introduction **9 hours**
Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Midpoint circle generating algorithm, and parallel version of these algorithms.
Unit-2Transformations **9 hours**
Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms-Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.
Unit-3Three Dimensional **9 hours**
3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.
Unit-4Curves and Surfaces **9 hours**

Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductory concepts of Spline, Bspline and Bezier curves and surfaces.
Unit-5Hidden Lines and Illumination models **9 hours**
Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A-buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**Software Testing Methodologies**			
Course Code	CSE411			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	0	3

Course Objectives:

The scope of the course is concerns with the stages of the software engineering process, including requirements gathering, specification, design, implementation, and testing. Students will learn the various the testing techniques.

Course Outcomes

CO1	Understand the key concerns that are common to all software development processes.
CO2	Able to select appropriate process models, approaches and techniques to manage a given software development process.
CO3	Able to elicit requirements for a software product and translate these into a documented design.
CO4	Recognize the importance of software reliability and how we can design dependable software, and what measures are used.
CO5	Understand the principles and techniques underlying the process of inspecting and testing software and making it free of errors and tolerable.

Text Book (s)

1	Software Engineering: A practitioner's Approach, Roger S Pressman, Sixth Edition. McGrawHill International Edition, 2005.
2	Software Engineering: Ian Sommerville, Seventh Edition, Pearson Education, 2004.

Reference Book (s)

1	Fundamentals of Software Engineering: Rajib Mall, PHI, 2005.
2	Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
3	Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008.

Unit-1: Introduction to Software Engineering	**9 hours**

Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.
Unit II: Software Requirement Specifications (SRS) and Design 9 hours
Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design Data Flow Diagrams, Entity Relationship Diagrams.
Unit III : Software Testing Methods and Selection 9 Hours
Testing Objectives ,Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and correctness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.
Unit IV :Software Testing Methods and Selection 9 Hours
Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Integration Testing, , Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up, Acceptance Testing ,Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Regression testing, Regression test process, Initial Smoke or Sanity test, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.
Unit V : Software Project and Test Management 9 Hours
Software as an Evolutionary Entity, Need for Maintenance, Categories of maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Constructive Cost Models (COCOMO). Test Planning, Management, Execution and Reporting, Software Test Automation: Testing in Object Oriented Systems.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks

20	30	50	100

Name of The Course	**Industry Oriented Java-4**			
Course Code	EMPS3012			
Prerequisite	Industry oriented Java 1 EMPS3003			
Corequisite	Industry oriented Java 2 BCSE3071			
Antirequisite				
	L	**T**	**P**	**C**
	0	0	4	2

Course Objectives:

1. Learn logical building with java programming as the application of a set of methodologies and technologies.
2. Learn how the java programmimg can be used in developing user interface design and development .
3. Learn the how java technologies can be used for design and development of application using servlet.
4. Learn the how java technologies can be used for design and development of application using jsp.
5. Learn how to establish database connectivity using JDBC, servlet and JSP technologies.

Course Outcomes

CO1	Implement logical building programmes based on java 2 and java 3.
CO2	Apply user interface design using key technologies in JEE.
CO3	Apply servlet and session handling technologies used for java application development.
CO4	Apply JSP technologies java application development.
CO5	Implement the Database connectivity using JDBC by means of Servlet and JSP.

Text Book (s)

1.JDBC 4.2, Servlet 3.1, and JSP 2.3 Includes JSF 2.2 and Design Patterns, Black Book

Wiley India; 2nd edition (January 1, 2016)

2. Kathy Sierra & Bert Bates, “Head First Java”, O’Reilly, 2nd Edition.

3. R. Naughton and H. Schildt –Java2 (The Complete Reference) –Fifth Edition –TMH –2004.

Reference Book (s):

1. Kathy Sierra and Bert Bates- Head First Java-O’Really Publication

2. K. Arnold and J.Gosling –The Java Programming Language –3rd Edition., Pearson Edu,2005.

3. E Balagurusamy, “Programming with Java A Primer”, TMH, 4th edition.

4. David Flanagan –Java in a Nutshell: A Desktop Quick Reference for Java Programmers– O’Reilly & Associates, Inc. 1999.

Course Contents:

Unit-1 REVISION OF INDUSTRY ORIENTED JAVA 1 AND INDUSTRY ORIENTED JAVA 2 9 Hours
Basic Programming Concepts Control Statements OOPs String Arrays Exception Handling Assessment IO Serialization Multithreading Collection SQL JDBC Assessment
Unit-2: USER INTERFACE 9 Hours
Introduction to web development. What is JEE, Key technologies in JEE, JEE application architecture Basic code of HTML,CSS Validations with Java scripts Assessment
Unit-3 : Servlet 9 Hours
What is a servlet Servlet Lifecycle classes for handling request and response Simple servlet example Working with form data Initialization in init Initialization through Servlet Config Initialization through Servlet Context send Redirect()Servlet communication forward() and include() Request Attributes Assessment Session Introduction Ways to maintain state HttpSession, Session Destruction Internal working Session tracking API Assessment
Unit-4 : JSP 9 Hours
JSP introduction MVC JSP lifecycle Syntactic Elements of a JSP Page JSP scripting elements Implicit objects JSP directives Assessment Scriptlets JSP JSP Standard Action tags Java Bean , , Assessment
Unit-5 : Database Connectivity using JSP and Servlet 9 Hours
JSP,Servlet, JDBC

Name of The Course	**Digital Image Processing**			
Course Code	**CSE473**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Imparts knowledge in the area of image and image processing.
2. Understand fundamentals of digital image processing.
3. Provide knowledge of the applications of the theories taught in Digital Image Processing. This will be achieved through the project and some selected lab sessions.
4. Knowledge of advanced topics in digital image processing and skill base that would allow them to carry out further study.

Course Outcomes

CO1	Understand Basics of Image formation and transformation using sampling and quantization.
CO2	Understand different types signal processing techniques used for image sharpening and smoothing.
CO3	Perform and apply compression and coding techniques used for image data.
CO4	Detect and verify an image properly.
CO5	Understand the practical application on implementation of the image.

Text Book (s)

1.Ganzalez and Wood, "Digital Image Processing", Addison Wesley, 1993.

2. Anil K.Jain, "Fundamental of Image Processing", Prentice Hall of India.

Reference Book (s):

1. Rosenfeld and Kak, "Digital Picture Processing" vol.I & vol.II, Academic,1982
2. Ballard and Brown, "Computer Vision", Prentice Hall, 1982
3. Wayne Niblack, "An Introduction to Digital Image Processing", Prentice Hall, 1986
4. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis and Machine Vision",

Course Contents:

Unit I: Introduction to Image processing	**8 lecture hours**

Image formation, image geometry perspective and other transformation, stereo imaging elements of visual perception. Digital Image-sampling and quantization serial & parallel Image processing.
Module II: Signal Processing **8lecture hours**
Signal Processing - Fourier, Walsh-Hadmard discrete cosine and Hotelling transforms and their properties, filters, correlators and convolvers. Image enhancement-Contrast modification, Histogram specification, smoothing, sharpening, frequency domain enhancement, pseudo-colour
Module III: Image Restoration **8lecture hours**
Image Restoration-Constrained and unconstrained restoration Wiener filter , motion blur remover, geometric and radiometric correction Image data compression-Huffman and other codes transform compression, predictive compression two tone Image compression, block coding, run length coding, and contour coding.
Module IV: Segmentation Techniques **8 lecture hours**
Segmentation Techniques-thresh holding approaches, region growing, relaxation, line and edge detection approaches, edge linking, supervised and unsupervised classification techniques, remotely sensed image analysis and applications
Module V: Shape Analysis **8 lecture hours**
Shape Analysis – Gestalt principles, shape number, moment Fourier and other shape descriptors, Skelton detection, Hough transform, topological and texture analysis, shape matching. Practical Applications – Finger print classification, signature verification, text recognition, map understanding, bio-logical cell classification.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Artificial Intelligence**			
Course Code	CSE360			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Learn and possess a firm grounding in the existing techniques and component areas of Artificial Intelligence
2. Apply this knowledge to the development of Artficial Intelligent Systems and to the exploration of research problems.

Course Outcomes

CO1	Understand the principles of problem solving and be able to apply them successfully.
CO2	Be familiar with techniques for computer-based representation and manipulation of complex information, knowledge, and uncertainty.
CO3	Gain awareness of several advanced AI applications and topics such as intelligent agents, planning and scheduling, machine learning, etc.

Text Book (s)

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill

Reference Book (s):

1. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education
2. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India,

Course Contents:

Unit I: Introduction **8 lecture hours**
Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.
Module II: Introduction to Search **8lecture hours**
Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.
Module III: Knowledge Representation & Reasoning 8lecture hours
Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.
Module IV: Machine Learning **8 lecture hours**
Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning
Module V: Pattern Recognition **8 lecture hours**
Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test**	**Total Marks**

		(ETE)	
20	30	50	100

Name of The Course	**Machine Learning**			
Course Code	**CSE608**			
Prerequisite				
Co requisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	0	3

Course Objectives

The objective of this course is to introduce the students about the knowledge of basic concepts of machine learning systems, types of learning etc.

Course Outcomes

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

1. Understand learning systems.
2. Apply learning and classification algorithms.
3. Use regression techniques.
4. Apply unsupervised learning algorithms.
5. Understand reinforcement learning techniques.

Text Books

1. Tom M Mitchell, Machine Learning, McGraw Hill Education, McGraw Hill Education; First edition, 2017.
2. Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.
3. Duda, Richard, Peter Hart, and David Stork. Pattern Classification. 2nd ed. New York, NY: Wiley-Inderscience, 2000. ISBN: 9780471056690.

Reference Books

1. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646.
2. Introduction to Machine Learning - EthemAlpaydin, MIT Press, Prentice hall of India.
3.
4. Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999.
5. Elaine Ric, Kevin Knight and Shiv Shankar B. Nair, Artificial Intelligence, 3rd edition, Tata McGraw Hill, 2009.

Course Content

Unit I: Introduction **8Lecture hours**

Basic concepts: Definition of learning systems, Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation

Unit 2 Learning and Classification **8Lecture hours**

Types of Learning: Supervised learning and unsupervised learning. Overview of classification: setup, training, test, validation dataset, over fitting. Classification Families: linear discriminative, non-linear discriminative, decision trees, probabilistic (conditional and generative), nearest neighbor.

Unit 3 Regression **8Lecture hours**

Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines: Optimal hyper plane, Kernels. Model selection and feature selection. Combining classifiers: Bagging, boosting (The Ada boost algorithm), Evaluating and debugging learning algorithms, Classification errors.

UNIT4 Unsupervised learning **9 Lecture hours**

Clustering, K-means, EM Algorithm, Mixture of Gaussians, Factor analysis, PCA (Principal components analysis), ICA (Independent components analysis), latent semantic indexing, Spectral clustering, Markov models Hidden Markov models (HMMs).

UNIT-5 Reinforcement Learning **9 Lecture hours**

MDPs. Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR). LQG, Q-learning, Value function approximation, Policy search, Reinforce, POMDPs

Theory			**Practical**		
Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**(Continuous Assessment) IA**	**ETE**	**Total Marks**

20	15	30	15	20	100

Subject Code **CSE374**	**Software Project Management**	**L**	**T**	**P**	**C**
	Total Contact Hours : 45Hours	**3**	**0**	**0**	**3**
	Prerequisite: Software Engineering				

Course Objectives:

- This course helps us learning of project management.
- To recognize the key concepts of project management Analysis.
- To prepare a sample project for analysis a software project management.

Course Outcomes:

1		To learn about Categorizing and Software project.
2		To learn about summarizing Software project Tools and Their working Paradigm
3		To learn and understand working of different libraries and analysis on Software project
4		To analyze making Software project.
5		To analyze health of making it Software project.

COURSE CONTENTS

Unit 1: Software Development Organization and Roles: The Management Spectrum; Organizational Structure; Types of Organizational Structures – Hierarchical Organizational Structure, Flat Organizational Structure, Matrix Organizational Structure, Networked Organizational Structure, T-form Organization; Job Roles in Software Development.

Unit 2: Overview of Project Management: Project Management – Definitions; Factors Influencing Project Management – Project Manager, Project Management Activities, Stakeholders; Project Communication; Project Development Phases; Project Charter; Statement of Work (SoW); Project Management Associations.

Unit 3: Project Planning: Tasks in Project Planning; Work Breakdown Structures (WBS); Planning Methods; Development Life Cycle Models; A Generic Project Model. Estimation and Budgeting of Projects: Software Cost Estimation; COCOMO Model; Budgeting.

Unit 4: Project Scheduling: Scheduling Techniques – Program Evaluation and Review Technique (PERT), Gantt Chart, Critical Path Method (CPM), Automated Tools. Project Monitoring and Controlling: Project Status Reporting; Project Metrics; Earned Value Analysis (EVA); Project Communication Plan & Techniques; Steps for Process Improvement.

Unit 5: Risk Management: Concepts of Risks and Risk Management; Risk Management Activities; Effective Risk Management; Risk Categories; Aids for Risk Identification; Potential Risk Treatments; Risk Components and Drivers; Risk Prioritization. Configuration Management: Software Configuration Management (SCM) – Baselines, Software Configuration Items (SCI); SCM Process; Identification of Objects in the Software Configuration; Version Control; Change Control; Configuration Audit; Status Reporting; Goals of SCM.

Reference books

1. **Peopleware: Productive Projects and Teams**
2. **Rapid Development: Taming Wild Software Schedules**
3. **Software Estimation: Demystifying the Black Art**
4. **Agile Estimating and Planning 1st Edition**

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Wireless and Mobile Communication**			
Course Code	CSE372			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. Introduce of wireless communication and mobile communication standards.
2. Provide understanding of advanced multiple access techniques, Mobile radio Propagation Models and modulation techniques
3. Provide understanding of digital cellular systems (GSM, CDMA, GPRS, W-CDMA etc.)

Course Outcomes

CO1	Understand principles of wireless communication and, various mobile network architecture.
CO2	Understand various Modulation techniques for Mobile Radio.
CO3	Understand the information theoretical aspects (such as the capacity) of wireless channels
CO4	Realize various wireless and mobile cellular communication systems
CO5	Implement practical mobile applications

Text Book (s)

1. T. S. Rappaport, Wireless digital communications; Principles and practice, Prentice Hall, NJ, 1996.
2. Schiller, Mobile Communications; Pearson Education Asia Ltd., 2000.

Reference Book (s)

1. K. Feher, Wireless digital communications, PHI, New Delhi, 1999.
2. W. C. Y. Lee, Mobile communications engineering: Theory and Applications, Second Edition, McGraw Hill, New York.1998.

Course Content

Unit I:Introduction to Wireless Communications 6 lecture hours
History and evolution of mobile radio systems. Types of mobile wireless services/systems- Cellular, WLL, Paging, Satellite systems, Standards, Future trends in personal wireless systems.
Unit II: Cellular Concepts and System Design Fundamentals 6 lecture hours
Cellular concept and frequency reuse, Multiple Access Schemes, channel assignment and handoff, Interference and system capacity, Trunking and Erlang capacity calculations.

Unit III: Mobile radio Propagation Models **8 lecture hours**
Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading and Base band impulse respond models, parameters of mobile multipath channels, Antenna systems in mobile radio.
Unit IV: Modulation Techniques **8 lecture hours**
Overview analog and digital modulation techniques, Performance of various modulation techniques-Spectral efficiency, Error-rate, Power Amplification, Equalizing Rake receiver concepts, Diversity and space-time processing, Speech coding and channel coding.
Unit V: System Examples and Design Issues **6 lecture hours**
Multiple Access Techniques-FDMA, TDMA and CDMA systems, operational systems, Wireless networking, design issues in personal wireless systems

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Course Code CSE517	Distributed System			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

- To provide hardware and software issues in modern distributed systems.
- To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
- To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.

Course Outcomes

CO1: To provide hardware and software issues in modern distributed systems.

CO2: To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.

CO3: To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.

CO4: To know about Shared Memory Techniques.

CO5: Have Sufficient knowledge about file access. Have knowledge of Synchronization and Deadlock.

Contents

Unit 1

Distributed Systems: Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model of distributed systems, Types of Operating systems: Centralized Operating System, Network Operating Systems, Distributed Operating Systems and Cooperative Autonomous Systems, design issues in distributed operating systems. Systems Concepts and Architectures: Goals, Transparency, Services, Architecture Models, Distributed Computing Environment (DCE). Theoretical issues in distributed systems: Notions of time and state, states and events in a distributed system, time, clocks and event precedence, recording the state of distributed systems.

Unit 2

Concurrent Processes and Programming: Processes and Threads, Graph Models for Process Representation, Client/Server Model, Time Services, Language Mechanisms for Synchronization, Object Model Resource Servers, Characteristics of Concurrent Programming Languages (Language not included).Inter-process Communication and Coordination: Message Passing, Request/Reply and Transaction Communication, Name and Directory services, RPC and RMI case studies

Unit 3

Distributed Process Scheduling: A System Performance Model, Static Process Scheduling with Communication, Dynamic Load Sharing and Balancing, Distributed Process Implementation. Distributed File Systems: Transparencies and Characteristics of DFS, DFS Design and implementation, Transaction Service and Concurrency Control, Data and File Replication. Case studies: Sun network file systems, General Parallel file System and Window's file systems. Andrew and Coda File Systems

Unit 4

Distributed Shared Memory: Non-Uniform Memory Access Architectures, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems. Models of Distributed Computation: Preliminaries, Causality, Distributed Snapshots,

Modelling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, Distributed termination detection.

Unit 5

Distributed Agreement: Concept of Faults, failure and recovery, Byzantine Faults, Adversaries, Byzantine Agreement, Impossibility of Consensus and Randomized Distributed Agreement. Replicated Data Management: concepts and issues, Database Techniques, Atomic Multicast, and Update Propagation. CORBA case study: Introduction, Architecture, CORBA RMI, CORBA Services.

Text Book (s)

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "working of Distributed system", Wiley, ISBN: 9788126551071, 2015.
2. Tom Plunkett, Brian Macdonald et al, "Distributed system Handbook", Oracle Press, 2014.

Reference Book (s)

1. Chris Eaton, Dirk derooset al. , "Distributed system ", McGraw Hill, 2012.
2. Tom White, "Distributed System: The definitive Guide" , O Reilly 2012. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term T	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Software Testing Methodologies Lab**			
Course Code	CSE451			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	2	1

Course Objectives:

Course Outcomes

CO1	Understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry.
CO2	Discuss the distinctions between validation testing and defect testing.
CO3	Understand the principles and need for various types of testing.
CO4	Describe strategies for generating system test cases.

CO5	Understand the essential characteristics of tool used for test automation.

Text Book (s)

Reference Book (s)

1. S. Desikan and G. Ramesh, “Software Testing: Principles and Practices”, Pearson Education.
2. Aditya P. Mathur, “Fundamentals of Software Testing”, Pearson Education.
3. Naik and Tripathy, “Software Testing and Quality Assurance”, Wiley
4. K. K. Aggarwal and Yogesh Singh, “Software Engineering”, New Age International Publication.

Sr. No.	Title of Lab Experiments
1.	Demonstration on Manual testing a. Write Programs in „C“ Language to demonstrate the working of the following constructs: i)do…while ii) while…do iii)if…else iv)switch v)for b. Write a program in “C“ language to demonstrate the working of palindrome using do…while.
2.	Demonstration on Unit testing a. Create a test plan document for any application (e.g. Library Management System). b. Study of any testing tool (e.g. Win runner). c. Create a test plan document for cellular phone.
3.	Demonstration on Integration testing Take a mini project (e.g. University admission, Placement Portal) and execute it. During the life cycle of the mini project create the various testing documents and final test report document.

4.	Demonstration on System testing a. Take any system (e.g. ATM system) and study its system specifications and report the various bugs. b. Write down the test cases for any known applications (e.g. Banking Application).
5.	Demonstration on Blackbox testing a. Design a usecase diagram for an ATM system. b. Design a class diagram for an ATM system. c. Design a usecase diagram for Library system.
6.	Demonstration on WhiteBox testing a.Create various testing document for robot control system. b.“A Program written in „C‟ Language for Matrix Multiplication fails” Introspect the causes for its failure and write down the possible reasons for its failure. c. Write a Program in „C‟ Language to demonstrate the working of Addition of diagonal elements in a matrix.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
50		50	100

CSE343		Computer Graphics Lab			
Version		School	SCSE	Date of Approval	

	L	T	P	C
	0	0	2	1

Total Number of Contact Hours	L	45	T	0	P	30

Pre-requisites	CPPS in C				
Alternate Exposure	NA				
Co-requisites	NA				

Course Outcomes	1	To develop a facility with the relevant mathematics of computer graphics, e.g., 3D rotations are using vector algebra, geometrical transformations and projections using homogeneous co-ordinations.
	2	Apply principles and techniques of computer graphics, e.g., the graphics pipeline, and Bresenham algorithm for speedy line and circle generation.
	3	Apply computer graphics concepts in the development of computer games, information visualization, and business applications.
Specific Instructional Objectives	1	To provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
	2	To understand computer graphics techniques (2-D/3-D), focusing on 3D modeling, image synthesis, and rendering.
	3	Introduce geometric transformations, geometric algorithms, software systems (OpenGL), 3D object models (surface, volume and implicit), visible surface algorithms, image synthesis, shading and mapping, ray tracing, radiosity, global illumination, photon mapping, and anti-aliasing.
	4	To explore the interdisciplinary nature of computer graphics this is emphasized in the wide variety of examples and applications.
Catalog Description	This course focuses on 2D and 3D interactive and non-interactive graphics. This course studies the principles underlying the generation and display of 2D and 3D computer graphics. In this course topics include geometric modeling, 3D viewing and projection, lighting and shading, color, and the use of one or more technologies and packages such as OpenGL, and Blender. Course requirements usually include exam and several programming or written homework assignments.		
Text Books	1	Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education, India; 2 edition 2002.

Name of The Course	**Microprocessor & Interfacing Lab**			
Course Code	**CSE240**			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	0	**0**	2	1

Course Objectives:

This course facilitates the students to familiar with Micro Processor (MP) based system design which includes hardware, software and interfacing. After completing this course, the student should be able to design a complete Microprocessor based system for a real-world application. Course covers the introduction to basic digital devices and microcomputer components, Architecture and programming of 8086 Microprocessors, Interrupts, peripheral interfacing and direct memory access.

Course Outcomes

CO1	Write assembly language program for basic mathematical and logical operations.
CO2	Explain the interrupts of 8086 microprocessor
CO3	Explain the 8086 based system with programmable peripheral interface, programmable timer interface and Programmable interrupt controller interface.
CO4	Summarize the concept of peripheral / interfacing
CO5	Analyze the 8086 based system with DMA.

Text Book (s)

1	Brey Barry B. & C R Sarma The Intel Microproc,: Arch, Prog. & Interfacing Pearson Edu.,8thEdition, 2008.

List of experiment

1	Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
2	Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3	By using string operation and Instruction prefix: Move Block, Reverse string, Sorting,
4	Inserting, Deleting, Length of the string, String comparison.
5	Reading and Writing on a parallel port.
6	Timer in different modes.
7	Serial communication implementation.
8	8259 – Interrupt Controller: Generate an interrupt using 8259 timer.
9	8279 – Keyboard Display: Write a small program to display a string of characters.
10	Traffic Controller Interface.
11	ADC & DAC Interface.
12	8255- Interface.
13	8251- UART Interfacing

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50		50	100

LLL 322	**Campus to Corporate**	L	T	P	C
Version 1.0	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 5				
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

1. To assess the current level of students.
2. To give a real time GD, Interview practice to the students.
3. To prepare students for technical interviews
4. To prepare the students for the placement process and future career prospects

Course Outcomes

At the end of this course, the learner will be:

1. Able to analyze self and make necessary corrections
2. Able to recognize and make use of the strengths
3. Able to structure and express their thoughts during interviews , GD and presentations
4. Able to develop skills for career enhancement

Course Catalogue

Practice makes a man perfect – so says the wise man. The course in this semester hence, focuses on the practice of company sample papers along with mock interviews – general, technical and HR. It aims to give a holistic approach to a student's final preparation.

Text Book

SLLL own text book

Reference Books

1. Delivering Employability Skills in the Lifelong Learning Sector by Ann Gravells, ISBN-10: 1844452956
2. Sample Papers of Various companies

Real world HR interviews from companies across various sectors like IT, ITES, Manufacturing, etc. in and around NCR region.

LLL 322	**Campus to Corporate**	L	T	P	C
Version 1.0	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 5				
Duration	24 sessions of 100 minutes each, 12 hours of online tests				

Course Objectives

1. To assess the current level of students.
2. To give a real time GD, Interview practice to the students.
3. To prepare students for technical interviews
4. To prepare the students for the placement process and future career prospects

Course Outcomes

At the end of this course, the learner will be:

5. Able to analyze self and make necessary corrections
6. Able to recognize and make use of the strengths
7. Able to structure and express their thoughts during interviews , GD and presentations
8. Able to develop skills for career enhancement

Course Catalogue

Practice makes a man perfect – so says the wise man. The course in this semester hence, focuses on the practice of company sample papers along with mock interviews – general, technical and HR. It aims to give a holistic approach to a student's final preparation.

Text Book

SLLL own text book

Reference Books

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4. Sample Papers of Various companies

Real world HR interviews from companies across various sectors like IT, ITES, Manufacturing, etc. in and around NCR region.

VII semester

Name of The Course	**Web Technologies**

Course Code	CSE412			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's. Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

Course Outcomes

CO1	Understand basic web concepts and Internet protocols.
CO2	Understand CGI Concepts & CGI Programming.
CO3	Analyze Scripting Languages.
CO4	Analyze Scripting Languages.
CO5	Design SERVELETS AND JSP.

Text Book (s)

1	IvanBayross -Web Enabled Commercial Application Development Using HTML, DHTML, Java Script, Perl, CGI-2000
2	Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of India, 2011.
3	Paul Dietel and Harvey Deitel,”Java How to Program”, Prentice Hall India Learning Private Limited

Reference Book (s)

1	Mahesh P. Matha, "Core Java A Comprehensive study", Prentice Hall of India, 2011.
2	UttamK.Roy, "Web Technologies", Oxford University Press, 2011.

Unit I: **8 lecture hours**
Introduction to web, protocols governing the web, web development strategies, web applications, web project, web team.
Unit II: **8 lecture hours**
HTML: list, table, images, frames, forms, CSS;XML: DTD, XML schemes, presenting and using XML
Unit III: **8 lecture hours**
Java script: Introduction, documents, forms, statements, functions, objects; Event and event handling; introduction to AJAX.
Unit IV: **8 lecture hours**
Java server pages (JSP), JSP application design, declaring variables and methods, debugging, sharing data between JSP pages, JSP objects, Session, development of java beans in Jsp, data base action with JSP.
Unit V: **8 lecture hours**
Unit V: PHP (Hypertext Preprocessor): Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form ,mail, file upload, session, error, exception, filter, PHP-ODBC.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	**Mobile Computing**			
Course Code	CSE522			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives

1. To introduce the basic concepts and principles in mobile computing. This includes the major techniques involved, and networks & systems issues for the design and implementation of mobile computing systems and applications.
2. To explore both theoretical and practical issues of mobile computing.
3. To provide an opportunity for students to understand the key components and technologies involved in building mobile applications.
4. To Understand the concept of Wireless LANs, PAN, Mobile Networks.

Course Outcomes

CO1	Grasp the concepts and features of mobile computing technologies and applications.

CO2	Understand how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support.
CO3	Identify the important issues of developing mobile computing systems and applications.
CO4	Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools.
CO5	Acquire the knowledge to administrate and to maintain a Wireless LAN.

Text Book (s)

1. Jochen, M Schiller, "Mobile Communications, 2nd Edition Pearson Education, India, 2009

Reference Book (s)

1. Charles Perkins, Ad hoc Networks, Addison Wesley.
2. Upadhyaya, "Mobile Computing", Springer
3. Kurnkum Garg "Mobile Computing",Pearson 2010

Course Content

Unit I:Introduction	**8 lecture hours**
Introduction of mobile computing, overview of wireless telephony: cellular concept, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, Multiple access techniques like Frequency division multiple access (FDMA), Time division multiple access (TDMA), Code division multiple access (CDMA), Space division multiple access (SDMA).	
Unit II: Wireless Networking	**8 lecture hours**
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.	
Unit III: Global System for Mobile Communications	**8 lecture hours**

GSM Architecture, GSM Entities ,Call Routing in GSM, GSM Addresses and Identifiers ,Network Aspects in GSM , GSM Frequency Allocation, Authentication and Security, Mobile Computing over SMS, Short Message (SMS) , Value Added Services through, MS, Accessing the SMS Bearer, GPRS and packet Architecture GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS ,Application for GPRS, Limitation of GPRS, Billing and Charging in GPRS, WAP , MMS , GPRS Applications, Spread – Spectrum Technology.
Unit IV: Data Management **8 lecture hours**
Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system, disconnected operations. Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.
Unit V: Routing Ad Hoc Network & Security Issues **8 lecture hours**
Routing Protocols: Ad Hoc Network Routing Protocols, Destination Sequenced Distance Vector Algorithm, Cluster Based Gateway Switch Routing, Dynamic Source Routing, Ad Hoc on-demand Routing, Location Aided Routing, Zonal Routing Algorithm. Mobile Computing Security Issues, Authentication, Encryption, Cryptographic Tools: Hash, Message Authentication Code (MAC), Digital Signature, Certificate. Secure Socket Layer (SSL). Characteristics of SIM, Equipment Identification.

CSE401	Network Security	L	T	P	C
Version No. 1.0	Date of Approval:	3	0	0	3
Prerequisite	CSE 214/314				
co-requisites	CSE 211				

Course Objectives

- Analyze, implement and maintain security requirements and mechanisms in various computer systems and networks.
- Explain networking protocols and their hierarchical relationship hardware and software. Compare protocol models and select appropriate protocols for a particular design.
- Explain common network vulnerabilities and attacks, defense mechanisms against network attacks, and cryptographic protection mechanisms
- Explain the requirements of real-time communication security and issues related to the security of web services.

Course Outcome

Upon completion of their academic work student will be able:

1. To identify network security threats and determine efforts to counter them
2. To write code for relevant cryptographic algorithms.
3. To write a secure access client for access to a server.
4. To send and receive secure mails.
5. To determine firewall requirements, and configure a firewall.

Catalogue Description

Network security utilizes proactive techniques, including defense-in-depth and layered security, to mitigate or eliminate vulnerabilities in information systems and to protect against potential exploitation. The Network Security degree reflects the application of theory and is aligned with industry standards and guidelines. It provides students with the opportunity to synthesize and apply the vital skills and knowledge necessary to succeed in the workforce.

Text Books

1) Stallings, W.,.Cryptography and Network Security: Principles and Practice, 4th ed., Prentice Hall PTR.,2006

Reference books:

1) Kaufman, c., Perlman, R., and Speciner, M., Network Security, Private Communication in a public world, 2nd ed., Prentice Hall PTR., 2002.
2) Cryptography and Network Security; McGraw Hill; Behrouz A Forouzan.
3) AtulKahate, Cryptography and Network Security, McGraw Hill.
4) Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.

Course Content

Unit 1

Introduction [8 lecture hrs]

Introduction to network security, Basic Concepts of Number Theory- Divisibility and Division Algorithm, Euclidean Algorithm, Modular Arithmetic, OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Model for Network Security, Steganography.

Unit 2

Symmetric Key Encryption [8 lecture hrs]

Classical Encryption Techniques – Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Traditional Block Cipher Structure, SDES, DES, Key generation, DES Encryption, DES Decryption, S-Boxes, Strength of DES, Block Cipher Design Principles.

Unit 3

Public Key Encryption and Hash Functions [10 lecture hrs]

Public Key Cryptography , Principles of Public Key Cryptosystems , The RSA Algorithm , Key Management , Diffie Hellman Key Exchange , Message Authentication and Hash Functions- Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions , Security of Hash Functions

Unit 4

Hash and Mac Algorithms [8 lecture hrs]

MD5 Message Digest Algorithm, Secure Hash Algorithms, RIPEMD, HMAC , Digital Signatures, Authentication Protocols -Digital Signature Standard.

Unit 5

Network Security Applications [6 lecture hrs]

Electronic mail security, IP security, Network management security, Security for electronic commerce: SSL, SET, Intruders and Viruses, Firewalls, Intrusion Detection.

Mode of Evaluation: Tutorials / Class Tests / Lab Exam

	Theory	
Components	**Internal**	**SEE**
Marks	50	50
Total Marks	100	

Subject Code	**Big Data Analytics for IOT**	**L**	**T**	**P**	**C**
CSE606	Total Contact Hours : 45Hours	**3**	**0**	**0**	**3**
	Prerequisite: Big Data Basics and Open Source Tools				

	Course Objectives: • This course helps us learning NoSQL, Scala, Spark Libraries. • To recognize the key concepts of Lambda Architecture, Data Streaming and TimeSeries Analysis. • To prepare a sample project in Hadoop API.	
	Course Outcomes:	
1		To learn about Categorizing and Big Data and IOT.
2		To learn about summarizing Big Data Tools and Their workingParadigm with IOT
3		To learn and understand working of different libraries and analysis on streamingdata with IOT
4		To analyze making cluster using IoT
5		To analyze health of making it healthier using IoT

Unit-1 (UNIT I)
Chapter -1 (Reviewing Big Data and concepts)
Big Data and hadoop; Hadoop 1 & Hadoop 2; Introduction to Hadoop 3 alpha
Chapter -2 (Threats And Security)
Threats on Data; Security disciplines
Unit-2 (UNIT II)
Chapter -3 (Exploring and classification of data)
Identifying data for down streaming process; Integrating processing and generation of data
Chapter -4 (Security Management)

Security parameters; Access Management
Unit-3 (UNIT III)
Chapter -5 (Protection laws for Big data)
HIPAA; ISO 27000 Series; Other Security Laws
Chapter -6 (Introduction to Guardium)
History and use of Guardium
Unit-4 (UNIT IV)
Chapter -7 (Guardium Architecture)
Guardium architecture
Chapter -8 (Data activity Monitoring)
Enforcing data with Guardium; Monitoring data with Guardium; Auditing data with Guardium
Unit-5 (UNIT V)
Chapter -9 (Data protection Laws and Guardium)
Guardium data protection compliance

Learning Material(s)

Title	Author Name	Publisher	Publication Year	Edition
ReferenceBooks				
Getting started with Guardium	ICE	IBM	2017	10.5
TextBook				
Deployment guide for InfosphereGuardium	ICE	IBM	2014	9.1

Subject Code **BCSE9003**		**Big Data Technology**	**L**	**T**	**P**	**C**
		Total Contact Hours : 45Hours	**3**	**0**	**0**	**3**
		Prerequisite: Big Data Basics and Open Source Tools				
	Course Objectives: • This course helps us learning NoSQL, Scala, Spark Libraries. • To recognize the key concepts of Lambda Architecture, Data Streaming and TimeSeries Analysis. • To prepare a sample project in Hadoop API.					
	Course Outcomes:					
1		To learn about Categorizing and Big Data.				
2		To learn about summarizing Big Data Tools and Their workingParadigm				

3		To learn and understand working of different libraries and analysis on streamingdata
4		To analyze making cluster.
5		To analyze health of making it healthier.

Contents of the Syllabus

Unit 1:-

NoSQL databases for Big Data Storage Applications , Introduction to Scala and Spark , Analytics using Spark SQL

Unit 2:-

Introduction to all spark libraries with their working (Spark core ,Spark MLlib , spark Graph x , Spark streaming and Spark SQL) , Apache Storm

Unit 3:-

Lambda Architecture in Big Data , Batch processing and speed processing in Lambda architecture Mining Big Data, data streams and analysis of time series, recommender systems, and social network analysis.

Unit 4:-

Introduction to Data storage and processing, Defining Hadoop Cluster Requirements, Configuring a cluster.

Unit 5

Maximizing HDFS Robustness ,Managing Resources and cluster Health , Maintaining a cluster, Implementing Data Ingress and Egress .

Learning Material(s)				
Title	**Author Name**	**Publisher**	**Publication Year**	**Edition**
ReferenceBooks				
Getting started with Guardium	ICE	IBM	2017	10.5
TextBook				
Deployment guide for InfosphereGuardium	ICE	IBM	2014	9.1

CSIO101	Introduction to Internet of Things	L	T	P	C
Version No. 1.0	Date of Approval: Jun XX, 2016	3	0	0	3
Prerequisite					
co-requisites					

Course Objectives

The objective of this course is to:

4. Explain in a concise manner how the general Internet as well as Internet of Things work.
5. The focus will be more on the possibilities offered by the different technologies, and on the creative thinking techniques.
6. To find innovative applications of combinations of such technologies in real-life scenarios.

Course Outcomes

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

7. To introduce the terminology, technology and its applications.
8. To introduce the concept of M2M (machine to machine) with necessary protocols.
9. Understand constraints and opportunities of wireless and mobile networks for IoT.
10. Use basic needs of IoT with respect to recent advancement.
11. Understand the implementation of web based services on IoT devices along with ethical challenges and privacy requirement in IoT .
12. Understanding the need of IoT, deployment challenges and characteristics of the IoT.

Catalog Description

The scope of the course is to describe the recent development of IoT and major application areas. The objective is to understand various levels of IoT. Why IoT will be the integral part of our life in coming days as well today. The emphasis is given on various application areas. The course designed as foundation course of IoT, which comprises the basic concepts essential to understand advance courses.

Text Books

2. Internet of Things (A Hands-on-Approach) , Vijay Madisetti , Arshdeep Bahga, University Press, First Edition, 2014.

Reference Books

3. Internet of Things: Principles and Paradigms edited by Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufmann, First Edition, 2016.
4. Recent research/white papers.

Course Content

Unit I: INTRODUCTION **8 lecture hours**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and lifestyle.

Unit II: IoT & M2M **8 lecture hours**

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, and SNMP NETOPEER.

Unit III: WIRELESS SENSOR NETWORKS AND THE INTERNET OF THINGS 8 lecture hours
Introduction of wireless sensor networks, wireless sensor network applications, security integration challenges, integration approaches, the TCP/IP solution issues.

Unit IV: ENABLING TECHNOLOGIES, PROTOCOLS, AND APPLICATIONS
8 lecture hours

Market opportunity, IOT architecture, IoT Elements, IoT common standards, QoS criteria, IoT challenges and future directions.

Unit V: IoT Ethics and Privacy **8 lecture hours**

Ethical Challenges of the Internet of Things, Privacy matters in the 'internet of things, The Importance of the Internet of Things (IoT) in Society, Does Privacy Exist on the Internet of Things? 80% of consumers fear privacy invasion in the Internet of Things revolution

Mode of Evaluation: Quiz/Assignment/ Seminar/Written Examination

	Theory without PBL						
Components	**Internal (50)**						**SEE**
Marks	Cat-1 (15)	Cat-2 (15)	Quiz (6)	Assignment (5)	Class Discussion (5)	Attendance (4)	Semester End Exam (50)

Total Marks	100

Course Code: BCSE9004	**Programming for Data Analytics**	**L**	**T**	**P**	**C**
Version No. XXX	**Date of Approval: XXX**	3	0	0	3
Prerequisite/Exposure	Python, DBMS, Java and C				
Co-requisites					

Course Objectives:

The objective of this course is to:

1. Understanding basic network and distributed programming.
2. Constructing a real world application with data storage and retrieval
3. Leveraging the benefits of reusable components
4. Analyzing basic file modes and operations
5. Applying Map Reduce paradigm to solve problems

Course Outcomes:

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

1. Understand network programming.
2. Design and execute queries in database.
3. Use Javabeans in creating applications.
4. Implement streams and memory mapped files.
5. Write mapreduce program in Java.

Catalog Description:

This covers describes the rate in which data is exponentially growing has led to the evolvement of many technologies to better utilize this data for timely and accurate decision making. Such data with huge variety, volume and velocity is coined as big data. The big data platform such as Hadoop is programmed in Java. This course aims at discussing the technical concepts which are the basic building blocks for most of the big data platforms.

Text Books:

1. Y. Daniel Liang, Introduction to Java Programming, Tenth Edition, Pearson, 2015.

2. White, “Hadoop: The Definitive Guide”, Third Edition - 2012 – O’Reilly – ISBN: 9789350237564.

Reference Books:

1. Cay S. Horstmann, Gary Cornell, “Core Java™ 2: Volume II–Advanced Features”, Prentice Hall, 9th edition, ISBN: 978-0137081608.
2. Jean Dollimore, Tim Kindberg, George Coulouris, “Distributed Systems Concepts and Design”, 4th Edition, Jun 2005, Hardback, 944 pages, ISBN: 9780321263544.

Course Content

Unit I: Network Programming & Distributed Objects **8 lecture hours**

Connecting to a Server-Implementing Servers and Clients-Advanced Socket Programming- InetAddress-URL Connections-RMI Programming.

Unit II: Connecting to Database **8 lecture hours**

The Design of JDBC-Basic Concepts-Executing Queries–Prepared Statemets-Result Sets– Metadata-Transactions.

Unit III: Javabeans **8 lecture hours**

The Bean-Writing Process-Using Beans to Build an Application-Bean Property Types-Property Editors-Customizers.

Unit IV: Streams and Files **8 lecture hours**

Streams-Text Input and Output-Reading and Writing Binary Data-Zip Archives-Object Streams and Serialization-Memory Mapped Files.

Unit V: Programming Map Reduce **8 lecture hours**

MapReduce program in Java-Map Reduce API-Progamming Examples- Combiner Functions - Distributed MapReduce Job.

Mode of Evaluation: Class Quiz, Assignment and EEP.

	Laboratory evaluation scheme

Components	Internal Exam Practical (IEP) (50) = [(60% of M1) + (40% of M2)]		EEP (50)
Max Marks	Mid Term Lab Exam (**M1** = 50)	End Term Lab Internal Exam (**M2** = 50)	50
Marks Distribution	CA(30) + Viva Voce(10) + Lab Question(10)	CA(30) + Viva Voce(10) + Lab Question(10	
Total Marks	**100**		

Name of The Course	**Cloud Application Development**			
Course Code	**BCSE9002**			
Prerequisite				
Co requisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives:

The primary objective of this course is to introduce the topic of algorithms as a precise mathematical concept and studies how to design algorithms establish their correctness study their efficiency and memory needs. The course consists of a strong mathematical component in addition to the design of various algorithms.

Course Outcomes

CO1	**Develop cloud based applications**
CO2	**To analyze and trouble shoot the problems while deploying application on cloud**
CO3	**Use web application based technologies for developing application using cloud**
CO4	**Use public cloud like IBM Blue mix, Amazon AWS, Google cloud platform or Microsoft Azure for developing an application**
CO5	**Deploy the application on real cloud**

Text Book (s)

1	**Chris Hay, Brian Prince, "Azure in Action" Manning Publications [ISBN: 978-1935182481], 2010.**
2	**Henry Li, "Introducing Windows Azure" Apress; 1 edition [ISBN: 978-1- 4302-2469-3],2009**

3	**Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski, Developing Applications for the Cloud on the Microsoft Windows Azure Platform [ISBN: 9780735656062]**

Reference Book (s)

1	**Eugene Ciurana, Developing with Google App Engine [ISBN: 978-1430218319]**
2	**Charles Severance, Using Google App Engine [ISBN: 978-0596800697]**

Course Contents:

Unit-1: Cloud Based Applications 9 hours
Introduction, Contrast traditional software development and development for the cloud. Public v private cloud apps. Understanding Cloud ecosystems – what is SaaS/PaaS, popular APIs, mobile.
Unit II: Designing Code For The Cloud 9 hours
Class and Method design to make best use of the Cloud infrastructure; Web Browsers and the Presentation Layer: Understanding Web browsers attributes and differences. Building blocks of the presentation layer: HTML, HTML5, CSS, Silverlight, and Flash.
Unit III : Web Development Techniques And Frameworks 9 Hours
Building Ajax controls, introduction to JavaScript using JQuery, working with JSON, XML, REST. Application development Frameworks e.g. Ruby on Rails , .Net, Java API's or JSF; Deployment Environments – Platform As A Service (PAAS) ,Amazon, vmForce, Google App Engine, Azure, Heroku, AppForce
Unit IV : USE CASE 1 9 Hours

CSE452	Web Technology Lab	L	T	P	C
Version No. 1.0	Date of Approval: Jun XX, 2013	0	0	2	1
Prerequisite	CSE314				
co-requisites					

Course Objectives

The objective of this course is to:

1. Enable the students to understand web based site planning, management and maintenance.
2. Explain the concept of developing advanced HTML, ASP, Java Script, XML Pages.
3. This course enables students to develop web sites which are secure and dynamic in nature.
4. Design and implement an internet based application using existing tools and techniques.

Course Outcomes

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

1. Demonstrate the ability to create web pages using various elements lists, links, images etc.
2. Work with different variables, statements, forms, validations and functions of Java Script.
3. Using various validations of Java script in HTML.
4. Using various HTML tags Tables, CSS and creating links between documents.
5. Examine and assess the effectiveness of a web design system in a real time environment.

Mode of Evaluation: Continuous assessment of the progress will be done week followed by a ETE Laboratory Exam.

	Laboratory	
Components	**Internal**	**ETE**
Marks	50	50
Total Marks	100	

List of Experiment:

1. To create a basic informative web page about Galgotias University consisting of basic HTML tags.
2. To create HTML links and changing the colors of links.
3. To create HTML Tables using various attributes.
4. To create various types of list in HTML.
5. To insert the images in HTML. Using images as link.
6. Using internal, inline and external CSS in HTML.
7. Defining CSS using various types of selectors.
8. To create Student Registration Form that include following information about student:

- Name
- Father Name
- Mother Name
- Course (Radio buttons)
- Subjects (Check Boxes)
- Address (Text area)
- Pin code
- Email
- Mobile Number
- Submit Button

9. Design Front end for University Management System.
10. Using Java Script variables, dialog boxes (alert, prompt, confirm).
11. Creating Array objects in Java Script. Using various function associated with arrays.
12. Using various types of events (onclick, onsubmit, onmouseover, onmouseout) in Java Script.
13. Validate Student Registration Form using various validations in java script:

- Email validation
- Mobile no validation
- Pin Code Validation
- Name, Father Name, Mother Name must not be NULL.

14. Creating and defining various elements, entities of DTD in XML.
15. Creating and defining different types of DTD: Internal, External and Combined

CSE453	Project 1 (Domain Based)	L	T	P	C
Version No. 1.0		0	0	10	5
Prerequisite					
co-requisites					

RUBRICS DEVELOPED FOR PROJECT EVALUATION

RUBRICS FOR ASSESSMENT OF MAJOR PROJECT 1

Review	Agenda	Description	Assessment	Marks
First review	Project scopes and Proposal **(Rubric# P1R1)**	Identification of Problem Domain and detailed Analysis	P1R1	10
		Problem Statement and feasibility of project proposed		10
Second review	Literature Review **(Rubric# P1R2)**	Identify and acquire information needed for the design	P1R2	15
		Review based comparison of existing system		15
Final review	Methodology and expected outcome of the proposed work	Originality of the project Idea	P1R3	10

	(Rubric# P1R3)	Methodology and design process - Proposed		20
	Project Report Evaluation **(Rubric# P1R4)**	Quality of Project Report	P1R4	10
		Description of concepts and Knowledge of contemporary issues		10
			Total Marks	100

Rubric # P1R1: Project Scopes and Proposal (Maximum Marks: 20)

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (10)	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
a	**Identification of Problem Domain and detailed Analysis**	Detailed and extensive explanation of the purpose and need of the project with Commendable Domain Knowledge	Good explanation of the purpose and need of the project with good domain knowledge	Moderate explanation of the purpose and need of the Project with average domain knowledge	Marginal explanation of the purpose and need of the project with marginal domain knowledge	Minimal explanation of the Purpose and need of the Project with poor domain knowledge
	Assessment Parameter	**Excellent (10)**	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
b	**Problem Statement and feasibility of project proposed**	Problem Statement is defined. Project idea is creative and Original. First-rate understanding of the problem and relevant materials.	Problem Statement is defined. Project idea is creative and Original. Good understanding of the problem and relevant materials.	Problem Statement is moderately defined. Project idea is creative and original. Understanding of the problem and relevant materials are not clear	Problem Statement is marginally defined. Project idea is creative. Understanding of the problem with marginal knowledge of the relevant materials	Problem Statemer is not clear. Creativity and Originality – lacking. Understanding of the problem with no knowledge of relevant materials

Rubric # P1R2: Literature Review (Maximum Marks: 30)

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (15)	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Poor (3)**
a	**Review based comparison of existing system**	Detailed and extensive explanation of the specifications and the limitations of the existing systems	Collects a great deal of information and good study of the existing systems	Moderate study of the existing systems; collects some basic information	Explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information	Minimal explanation of the specifications and the limitations of the existing systems; incomplete information
	Assessment Parameter	**Excellent (15)**	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Poor (3)**
b	**Identify and acquire information needed for design**	All relevant data were obtained and information sources were valid. Analysis and design considerations are defined and well supported by the data acquired	Relevant data were obtained and information sources were valid. Analysis and design considerations are well supported by the data acquired	Relevant data were obtained and information sources were moderately valid. Analysis and design considerations are moderately supported by the data acquired	Relevant data were obtained and information sources were marginally valid. Analysis and design considerations are marginally supported by the data acquired	Relevant data were lacking and information sources were not valid. Analysis and design considerations are scarcely supported by the data acquired

Rubric # P1R3: Methodology and expected outcome of the proposed work (Maximum Marks: 30)

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (10)	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
a	**Originality of the project**	The deliverable offered new information or approach to the project proposed. Likewise, the application is purely based on stated criteria, analysis and constraints.	The deliverable offered new information or approach to the project proposed. Likewise, the application almost is based on stated criteria, analysis and constraints.	The deliverable offered an enhanced version of an existing approach to the project proposed. The application is reasonable; further analysis of some of the alternatives or constraints may have led to a different recommendation.	The deliverable offered a marginal modification of an existing approach to the project proposed. Likewise, the application is marginally based on stated criteria, analysis and constraints.	The deliverable offered is an existing approach to the project proposed. Likewise, the application is based not on stated criteria, analysis and constraints.

	Assessment Parameter	Excellent (20)	Good (16)	Average (12)	Acceptable (8)	Poor (4)
b	**Methodology and design process**	Conceptual Framework is accomplished and excellent justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is accomplished and good justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is utilized and average justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is utilized and marginal justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is no done and lacking in justification of methodological approach in relation to Projec design & objectives.

Rubric # P1R4: Project Report Evaluation (Maximum Marks: 20)

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (10)	Good (8)	Average (6)	Acceptable (4)	Poor (2)
a	**Quality of Project Report**	Excellent layout. Conforms to all technical specifications. References and citations are appropriate and well mentioned.	Good layout. Conforms to almost all technical specifications. References and citations are appropriate and well mentioned.	Average layout. Conforms to technical specifications. References and citations are done and mentioned	Layout is in acceptable Level. Further recommendations on technical specifications are expected. References and citations are not done.	Unacceptable layout in terms o structure and logical argument
	Assessment Parameter	**Excellent (10)**	**Good (8)**	**Average (4)**	**Acceptable (4)**	**Poor (2)**
b	**Description of concepts and Knowledge**	Complete explanation of the key concept. Strong description of the technical requirements of the project.	Complete explanation of the key concept. In-sufficient description of the technical requirements of the project.	Complete explanation of the key concept but little relevance to literature In-sufficient description of the technical requirements of the project.	All key concepts are not explained and very little relevance to literature. In-sufficient description of the technical requirements of the project	Inappropriate explanation of th key concepts. Poor description of the technical requirements of the project.

RUBRICS FOR ASSESSMENT OF MAJOR PROJECT 2

Review #	Agenda	Description	Marks
First review	Project Design **(Rubric# P2R1)**	Design process	15
		Proposed tools and their relevance to implement the project	5
Second review	Technical Achievement **(Rubric # P2R2)**	Innovation & Quality Contribution to the field / impact on the society	15
		Usage of proper tools and Demonstration of Project	15
Final review (External Evaluation)	Overall achievement **(Rubric # P2R3)**	Discussion and Validation of results	15
		Presentation and Communications	10
		Team work and leadership	5
	Project Report Evaluation **(Rubric # P2R4)**	Quality of Project Report	5

		Description of concepts and Knowledge of contemporary issues	10
		Conclusion and future scopes	5
Total			**100**

Rubric # P2R1: Project Design (Maximum marks: 20**)**

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (15)	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Unacceptable (3)**
a	**Design process**	Time frame properly specified and being followed Modular Approach is followed and excellent selection of Computing Framework. Appropriate design methodology and proper justification	Time frame properly specified and being followed Distribution of project work inappropriate. Modular Approach is followed and good selection of Computing Framework.	Time frame properly specified, but not being followed. Odd distribution of project work. Modular Approach is not followed properly and average selection of Computing Framework.	Time frame properly specified, but not being followed. Odd distribution of project work and average selection of Computing Framework	Time frame not properly specified In-appropriate selection of computing framework and distribution of works
	Assessment Parameter	**Excellent (5)**	**Good (4)**	**Average (3)**	**Acceptable (2)**	**Unacceptable (1)**
b	**Proposed tools and their relevance to implement the project**	Appropriate Selection of project design tool with high design flexibility, extensively supports modular approach, Produces apt results, and negligible task	Good Selection of project design tool with design flexibility, supports modular approach, Produces apt results, and minimum task dependencies	Average Selection of project design tool with little design flexibility, supports moderately to modular approach, Produces results with average task dependencies	Selection of project design tool needs further recommendations Supports moderately to modular approach, Produces results with high task dependencies	Inappropriate selection of Project design tool with high risk of task dependencies

		dependencies				

Rubric # P2R2: Technical Achievement (Maximum marks: 30**)**

Sl. No	Assessment Parameter	Level of Achievement				
		Excellent (10)	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
a	**Innovation & Quality Contribution**	Specific and generous explorations of limits and strengths with strong impact on society or field of study	Substantial exploration of limits & strengths with significant contribution with little impact on society	Explores limits of current knowledge in some areas, Moderate contribution	Suitable review of current knowledge, with demonstrated awareness of limits in some areas	Weak / No review of current knowledge for development of theory, research or practice
	Assessment Parameter	**Excellent (20)**	**Good (16)**	**Average (12)**	**Acceptable (8)**	**Poor (4)**
b	**Usage of proper tools and Demonstration of Project**	All defined objectives are achieved Each module working well and properly demonstrated All modules of project are well integrated and system working is accurate	All defined objectives are achieved Each module working well and properly demonstrated Integration of all modules not done and system working is not very satisfactory	All defined objectives are achieved Module are working well in isolation and properly demonstrated Modules of project are not properly integrated	Some of the defined objectives are achieved Modules are working well in isolation and properly demonstrated Modules of project are not properly integrated	Defined objectives are not achieved Modules are not in proper working form that further leads to failure of integrated system

Rubric # P2R3: Overall Achievement (Maximum marks: 30)

Sl. No	Assessment Parameters	Level of Achievement				
		Excellent (15)	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Poor (3)**
a	**Discussion and Validation of results**	Performed high-level analysis using appropriate techniques with strong evidence base. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is achieved.	Performed competent analysis with evidence of ability to evaluate results. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is achieved.	Performed appropriate analysis but with limited evidence. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is achieved.	Performed limited or logically inconsistent analysis with limited evidence. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is initiated.	Performed Weak and unacceptable analysis with inadequate use of evidence for discussion. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is not done.
	Assessment Parameter	**Excellent (10)**	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**

b	**Presentation and Communications**	The presentation contained an abundance of material which clearly related to the main arguments. External research sources were used to justify arguments or solutions. The presentation of the material was original and presented in a creative way.	The presentation contained good number of material to support the main arguments, Good external research were used to justify the solutions; the presentation of the material was appropriate and creative	The presentation contained material to support the main arguments, but: not all material clearly related to the main arguments; limited external research was used to justify or solutions; the presentation of the material was appropriate, but moderately creative	The presentation contained less number of materials to support the main arguments. No external research was used to justify the solutions; the presentation of the material was moderately appropriate.	Major aspects of the analysis or recommendatio ns were absent. No external research was used to justify arguments or solutions. The presentation lacked creativity
	Assessment Parameter	**Excellent (5)**	**Good (4)**	**Average (3)**	**Acceptable (2)**	**Poor (1)**
c	**Team work and leadership**	The individual contributed in a valuable way to the project. The individual is also able to articulate the key performance criteria of successful teams and evaluate the group performance accordingly.	The individual did contribute in a good way to the project. The individual is also able to articulate some of the key performance criteria of successful teams and evaluate the group performance accordingly.	The individual did not contribute as heavily as others but did meet all responsibilities. The individual is also able to identify some key performance criteria of successful teams.	The individual did a marginal contribution to the project. but did meet some responsibilities. The individual is also able to identify very few key performance criteria of successful teams.	The individual did not contribute to the project and failed to meet responsibilities. The individual does not identify key performance criteria of successful teams.

Rubric # P2R4: Project report Evaluation (Maximum marks: 20)

Sl. No	**Assessment Parameter**	**Level of Achievement**				
		Excellent (5)	**Good (4)**	**Average (3)**	**Acceptable (2)**	**Poor (1)**
a	**Quality of Project Report**	Excellent layout. Conforms to all technical specifications. References and citations are	Good layout. Conforms to almost all technical specifications. References and	Average layout. Conforms to technical specifications. References and citations are done and	Layout is in acceptable Level. Further recommendations on technical specifications are	Unacceptable layout in terms of structure and logical argument. Argument and

		appropriate and well mentioned. Argument and solution were clearly stated and examples were appropriate. The transitions and flow were easy to follow	citations are appropriate and well mentioned. Argument and solution were stated. The transitions and flow were easy to follow	mentioned. Argument and solution were stated, but not all examples were supportive illustrations the transitions and /or flow were little bit difficult to follow	expected. References and citations are not done. Argument and solution were stated, but examples were not supportive the transitions and flow were difficult to follow.	solution were not stated.
	Assessment Parameter	**Excellent (10)**	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
b	**Description of concepts and Knowledge of contemporary issues**	Complete explanation of the key concept. Strong description of the technical requirements of the project. An efficient analysis of results obtained and validation of results were done extensively.	Complete explanation of the key concept. In-sufficient description of the technical requirements of the project. Analysis and validation of results were done	Complete explanation of the key concept but little relevance to literature In-sufficient description of the technical requirements of the project. Analysis of results obtained was done. Validation of results was limited.	All key concepts are not explained and very little relevance to literature. In-sufficient description of the technical requirements of the project. Analysis of results obtained was limited.	Inappropriate explanation of the key concepts. Poor description of the technical requirements of the project. Analysis and validation of results were lacking.
	Assessment Parameter	**Excellent (5)**	**Good (4)**	**Average (3)**	**Acceptable (2)**	**Poor (1)**
c	**Conclusion and future scopes**	Project work is well summarized and concluded. Future enhancements in the project are well specified.	Project work summary and conclusion not very appropriate. Future enhancements in the project are specified.	Project work summary and conclusion not very appropriate. Future enhancements in the project are specified.	Project work summary and conclusion not very appropriate. Future enhancements in the project are not specified.	Project work is not summarized and concluded Future enhancements in the project are not specified

Annexure 1

Galgotias University

COMPLETE EVALUATION SUMMARY OF RUBRICS BASED ASSESSMENT OF MAJOR PROJECT - 1

Session…….. **Class……** **Subject Code……**

Rubric P1R1: Project scopes and proposal **Maximum Marks: 20**

Rubric P1R2: Literature Survey **Maximum Marks: 30**

Rubric P1R3: methodology and expected outcome of the proposed work **Maximum Marks: 30**

Rubric P1R4: Project Report Evaluation **Maximum Marks: 20**

S No.	Enrollment Number	Name of the student	Date of Exam	Assessment based on Rubrics								Total
				P1R1 (20)		P1R2 (30)		P1R3 (30)		P1R4 (20)		
				(a) 10	(b) 10	(a) 15	(b) 15	(a) 10	(b) 20	(a) 10	(b) 10	100

Signature of Evaluator(s): 1, ……
2, ……
3, ……

Annexure 2

Galgotias University

COMPLETE EVALUATION SUMMARY OF RUBRICS BASED ASSESSMENT OF MAJOR PROJECT - 2

Session…….. **Class……** **Subject Code……**

Rubric P2R1: Project Design **Maximum Marks: 20**

Rubric P2R2: Technical achievement **Maximum Marks: 30**

Rubric P2R3: Overall Achievement **Maximum Marks: 30**

Rubric P2R4: Project Report Evaluation **Maximum Marks: 20**

S No.	Enrollment Number	Name of the student	Date of Exam	Assessment based on Rubrics										T
				P2R1 (20)		P2R2 (30)		P2R3 (30)			P2R4 (20)			
				(a) 15	(b) 5	(a) 15	(b) 15	(a) 15	(b) 10	(c) 5	(a) 5	(b) 10	(c) 5	1

Signature of Evaluator(s): 1, ……

2, ……

3, ……

VIII semester

CSE421	Project 2	L	T	P	C
Version No. 1.0		0	0	30	15
Prerequisite					
co-requisites					

RUBRICS DEVELOPED FOR PROJECT EVALUATION

RUBRICS FOR ASSESSMENT OF MAJOR PROJECT 1

Review	Agenda	Description	Assessment	Marks
First review	Project scopes and Proposal **(Rubric# P1R1)**	Identification of Problem Domain and detailed Analysis	P1R1	10
		Problem Statement and feasibility of project proposed		10
Second review	Literature Review **(Rubric# P1R2)**	Identify and acquire information needed for the design	P1R2	15
		Review based comparison of existing system		15

Final review	Methodology and expected outcome of the proposed work **(Rubric# P1R3)**	Originality of the project Idea	P1R3	10
		Methodology and design process - Proposed		20
	Project Report Evaluation **(Rubric# P1R4)**	Quality of Project Report	P1R4	10
		Description of concepts and Knowledge of contemporary issues		10
			Total Marks	100

Rubric # P1R1: Project Scopes and Proposal (Maximum Marks: 20)

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (10)	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
a	**Identification of Problem Domain and detailed Analysis**	Detailed and extensive explanation of the purpose and need of the project with Commendable Domain Knowledge	Good explanation of the purpose and need of the project with good domain knowledge	Moderate explanation of the purpose and need of the Project with average domain knowledge	Marginal explanation of the purpose and need of the project with marginal domain knowledge	Minimal explanation of the Purpose and need of the Project with poor domain knowledge
	Assessment Parameter	**Excellent (10)**	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**

b	**Problem Statement and feasibility of project proposed**	Problem Statement is defined. Project idea is creative and Original. First-rate understanding of the problem and relevant materials.	Problem Statement is defined. Project idea is creative and Original. Good understanding of the problem and relevant materials.	Problem Statement is moderately defined. Project idea is creative and original. Understanding of the problem and relevant materials are not clear	Problem Statement is marginally defined. Project idea is creative. Understanding of the problem with marginal knowledge of the relevant materials	Problem Statemer is not clear. Creativity and Originality – lacking. Understanding of the problem with no knowledge of relevant materials

Rubric # P1R2: Literature Review (Maximum Marks: 30)

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (15)	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Poor (3)**
a	**Review based comparison of existing system**	Detailed and extensive explanation of the specifications and the limitations of the existing systems	Collects a great deal of information and good study of the existing systems	Moderate study of the existing systems; collects some basic information	Explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information	Minimal explanation of the specifications and the limitations of the existing systems; incomplete information
	Assessment Parameter	**Excellent (15)**	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Poor (3)**
b	**Identify and acquire information needed for design**	All relevant data were obtained and information sources were valid. Analysis and design considerations are defined and well supported by the data acquired	Relevant data were obtained and information sources were valid. Analysis and design considerations are well supported by the data acquired	Relevant data were obtained and information sources were moderately valid. Analysis and design considerations are moderately supported by the data acquired	Relevant data were obtained and information sources were marginally valid. Analysis and design considerations are marginally supported by the data acquired	Relevant data were lacking and information sources were not valid. Analysis and design considerations are scarcely supported by the data acquired

Rubric # P1R3: Methodology and expected outcome of the proposed work (Maximum Marks: 30)

Sl. No.	Assessment Parameter	Level of Achievement

		Excellent (10)	Good (8)	Average (6)	Acceptable (4)	Poor (2)
a	**Originality of the project**	The deliverable offered new information or approach to the project proposed. Likewise, the application is purely based on stated criteria, analysis and constraints.	The deliverable offered new information or approach to the project proposed. Likewise, the application almost is based on stated criteria, analysis and constraints.	The deliverable offered an enhanced version of an existing approach to the project proposed. The application is reasonable; further analysis of some of the alternatives or constraints may have led to a different recommendation.	The deliverable offered a marginal modification of an existing approach to the project proposed. Likewise, the application is marginally based on stated criteria, analysis and constraints.	The deliverable offered is an existing approach to the project proposed. Likewise, the application is based not on stated criteria, analysis and constraints.
	Assessment Parameter	**Excellent (20)**	**Good (16)**	**Average (12)**	**Acceptable (8)**	**Poor (4)**
b	**Methodology and design process**	Conceptual Framework is accomplished and excellent justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is accomplished and good justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is utilized and average justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is utilized and marginal justification of methodological approach in relation to Project design & objectives.	Conceptual Framework is not done and lacking in justification of methodological approach in relation to Projec design & objectives.

Rubric # P1R4: Project Report Evaluation (Maximum Marks: 20)

Sl. No.	Assessment Parameter	Level of Achievement				
		Excellent (10)	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
a	**Quality of Project Report**	Excellent layout. Conforms to all technical specifications. References and citations are appropriate and well mentioned.	Good layout. Conforms to almost all technical specifications. References and citations are appropriate and well mentioned.	Average layout. Conforms to technical specifications. References and citations are done and mentioned	Layout is in acceptable Level. Further recommendations on technical specifications are expected. References and citations are not done.	Unacceptable layout in terms o structure and logical argument

	Assessment Parameter	Excellent (10)	Good (8)	Average (4)	Acceptable (4)	Poor (2)
b	**Description of concepts and Knowledge**	Complete explanation of the key concept. Strong description of the technical requirements of the project.	Complete explanation of the key concept. In-sufficient description of the technical requirements of the project.	Complete explanation of the key concept but little relevance to literature In-sufficient description of the technical requirements of the project.	All key concepts are not explained and very little relevance to literature. In-sufficient description of the technical requirements of the project	Inappropriate explanation of th key concepts. Poor description of the technical requirements of the project.

RUBRICS FOR ASSESSMENT OF MAJOR PROJECT 2

Review #	Agenda	Description	Marks
First review	Project Design **(Rubric# P2R1)**	Design process	15
		Proposed tools and their relevance to implement the project	5
Second review	Technical Achievement **(Rubric # P2R2)**	Innovation & Quality Contribution to the field / impact on the society	15
		Usage of proper tools and Demonstration of Project	15

Final review (External Evaluation)	Overall achievement **(Rubric # P2R3)**	Discussion and Validation of results	15
		Presentation and Communications	10
		Team work and leadership	5
	Project Report Evaluation **(Rubric # P2R4)**	Quality of Project Report	5
		Description of concepts and Knowledge of contemporary issues	10
		Conclusion and future scopes	5
Total			**100**

Rubric # P2R1: Project Design (Maximum marks: 20**)**

Sl. No.	**Assessment Parameter**	**Level of Achievement**				
		Excellent (15)	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Unacceptable (3)**
a	**Design process**	Time frame properly specified and being followed Modular Approach is followed and excellent selection of Computing Framework. Appropriate design methodology and proper justification	Time frame properly specified and being followed Distribution of project work inappropriate. Modular Approach is followed and good selection of Computing Framework.	Time frame properly specified, but not being followed. Odd distribution of project work. Modular Approach is not followed properly and average selection of Computing Framework.	Time frame properly specified, but not being followed. Odd distribution of project work and average selection of Computing Framework	Time frame not properly specified In-appropriate selection of computing framework and distribution of works

	Assessment Parameter	Excellent (5)	Good (4)	Average (3)	Acceptable (2)	Unacceptable (1)
b	**Proposed tools and their relevance to implement the project**	Appropriate Selection of project design tool with high design flexibility, extensively supports modular approach, Produces apt results, and negligible task dependencies	Good Selection of project design tool with design flexibility, supports modular approach, Produces apt results, and minimum task dependencies	Average Selection of project design tool with little design flexibility, supports moderately to modular approach, Produces results with average task dependencies	Selection of project design tool needs further recommendations Supports moderately to modular approach, Produces results with high task dependencies	Inappropriate selection of Project design tool with high risk of task dependencies

Rubric # P2R2: Technical Achievement (Maximum marks: 30**)**

Sl. No	Assessment Parameter	Level of Achievement				
		Excellent (10)	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
a	**Innovation & Quality Contribution**	Specific and generous explorations of limits and strengths with strong impact on society or field of study	Substantial exploration of limits & strengths with significant contribution with little impact on society	Explores limits of current knowledge in some areas, Moderate contribution	Suitable review of current knowledge, with demonstrated awareness of limits in some areas	Weak / No review of current knowledge for development of theory, research or practice
	Assessment Parameter	**Excellent (20)**	**Good (16)**	**Average (12)**	**Acceptable (8)**	**Poor (4)**

b	**Usage of proper tools and Demonstration of Project**	All defined objectives are achieved Each module working well and properly demonstrated All modules of project are well integrated and system working is accurate	All defined objectives are achieved Each module working well and properly demonstrated Integration of all modules not done and system working is not very satisfactory	All defined objectives are achieved Module are working well in isolation and properly demonstrated Modules of project are not properly integrated	Some of the defined objectives are achieved Modules are working well in isolation and properly demonstrated Modules of project are not properly integrated	Defined objectives are not achieved Modules are not in proper working form that further leads to failure of integrated system

Rubric # P2R3: Overall Achievement (Maximum marks: 30)

Sl. No	**Assessment Parameters**	**Level of Achievement**				
		Excellent (15)	**Good (12)**	**Average (9)**	**Acceptable (6)**	**Poor (3)**

a	**Discussion and Validation of results**	Performed high-level analysis using appropriate techniques with strong evidence base. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is achieved.	Performed competent analysis with evidence of ability to evaluate results. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is achieved.	Performed appropriate analysis but with limited evidence. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is achieved.	Performed limited or logically inconsistent analysis with limited evidence. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is initiated.	Performed Weak and unacceptable analysis with inadequate use of evidence for discussion. Appraisal through Presentation in Conferences / Publication in peer reviewed journals / Project Contests is not done.
	Assessment Parameter	**Excellent (10)**	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
b	**Presentation and Communications**	The presentation contained an abundance of material which clearly related to the main arguments. External research sources were used to justify arguments or solutions. The presentation of the material was original and presented in a creative way.	The presentation contained good number of material to support the main arguments, Good external research were used to justify the solutions; the presentation of the material was appropriate and creative	The presentation contained material to support the main arguments, but: not all material clearly related to the main arguments; limited external research was used to justify or solutions; the presentation of the material was appropriate, but moderately creative	The presentation contained less number of materials to support the main arguments. No external research was used to justify the solutions; the presentation of the material was moderately appropriate.	Major aspects of the analysis or recommendatio ns were absent. No external research was used to justify arguments or solutions. The presentation lacked creativity
	Assessment Parameter	**Excellent (5)**	**Good (4)**	**Average (3)**	**Acceptable (2)**	**Poor (1)**
c	**Team work and leadership**	The individual contributed in a valuable way to the project. The individual is also able to articulate the key performance criteria of successful teams and evaluate the group performance accordingly.	The individual did contribute in a good way to the project. The individual is also able to articulate some of the key performance criteria of successful teams and evaluate the group performance accordingly.	The individual did not contribute as heavily as others but did meet all responsibilities. The individual is also able to identify some key performance criteria of successful teams.	The individual did a marginal contribution to the project. but did meet some responsibilities. The individual is also able to identify very few key performance criteria of successful teams.	The individual did not contribute to the project and failed to meet responsibilities. The individual does not identify key performance criteria of successful teams.

Rubric # P2R4: Project report Evaluation (Maximum marks: 20)

Sl. No	Assessment Parameter	Level of Achievement				
		Excellent (5)	**Good (4)**	**Average (3)**	**Acceptable (2)**	**Poor (1)**
a	**Quality of Project Report**	Excellent layout. Conforms to all technical specifications. References and citations are appropriate and well mentioned. Argument and solution were clearly stated and examples were appropriate. The transitions and flow were easy to follow	Good layout. Conforms to almost all technical specifications. References and citations are appropriate and well mentioned. Argument and solution were stated. The transitions and flow were easy to follow	Average layout. Conforms to technical specifications. References and citations are done and mentioned. Argument and solution were stated, but not all examples were supportive illustrations the transitions and /or flow were little bit difficult to follow	Layout is in acceptable Level. Further recommendations on technical specifications are expected. References and citations are not done. Argument and solution were stated, but examples were not supportive the transitions and flow were difficult to follow.	Unacceptable layout in terms of structure and logical argument. Argument and solution were not stated.
	Assessment Parameter	**Excellent (10)**	**Good (8)**	**Average (6)**	**Acceptable (4)**	**Poor (2)**
b	**Description of concepts and Knowledge of contemporary issues**	Complete explanation of the key concept. Strong description of the technical requirements of the project. An efficient analysis of results obtained and validation of results were done extensively.	Complete explanation of the key concept. In-sufficient description of the technical requirements of the project. Analysis and validation of results were done	Complete explanation of the key concept but little relevance to literature In-sufficient description of the technical requirements of the project. Analysis of results obtained was done. Validation of results was limited.	All key concepts are not explained and very little relevance to literature. In-sufficient description of the technical requirements of the project. Analysis of results obtained was limited.	Inappropriate explanation of the key concepts. Poor description of the technical requirements of the project. Analysis and validation of results were lacking.

	Assessment Parameter	Excellent (5)	Good (4)	Average (3)	Acceptable (2)	Poor (1)
c	**Conclusion and future scopes**	Project work is well summarized and concluded. Future enhancements in the project are well specified.	Project work summary and conclusion not very appropriate. Future enhancements in the project are specified.	Project work summary and conclusion not very appropriate. Future enhancements in the project are specified.	Project work summary and conclusion not very appropriate. Future enhancements in the project are not specified.	Project work is not summarized and concluded Future enhancements in the project are not specified

Annexure 1

Galgotias University

COMPLETE EVALUATION SUMMARY OF RUBRICS BASED ASSESSMENT OF MAJOR PROJECT - 1

Session…….. **Class……** **Subject Code……**

Rubric P1R1: Project scopes and proposal **Maximum Marks: 20**

Rubric P1R2: Literature Survey **Maximum Marks: 30**

Rubric P1R3: methodology and expected outcome of the proposed work **Maximum Marks: 30**

Rubric P1R4: Project Report Evaluation **Maximum Marks: 20**

S No.	Enrollment Number	Name of the student	Date of Exam	Assessment based on Rubrics								Total
				P1R1 (20)		P1R2 (30)		P1R3 (30)		P1R4 (20)		
				(a) 10	(b) 10	(a) 15	(b) 15	(a) 10	(b) 20	(a) 10	(b) 10	100

Signature of Evaluator(s): 1, ……
2, ……
3, ……

Annexure 2

Galgotias University
COMPLETE EVALUATION SUMMARY OF RUBRICS BASED ASSESSMENT OF MAJOR PROJECT - 2

Session…….. **Class……** **Subject Code……**

Rubric P2R1: Project Design **Maximum Marks: 20**

Rubric P2R2: Technical achievement **Maximum Marks: 30**

Rubric P2R3: Overall Achievement **Maximum Marks: 30**

Rubric P2R4: Project Report Evaluation **Maximum Marks: 20**

S No.	Enrollment Number	Name of the student	Date of Exam	Assessment based on Rubrics										T
				P2R1 (20)		P2R2 (30)		P2R3 (30)			P2R4 (20)			
				(a) 15	(b) 5	(a) 15	(b) 15	(a) 15	(b) 10	(c) 5	(a) 5	(b) 10	(c) 5	1

Signature of Evaluator(s): 1, ……
2, ……
3, ……