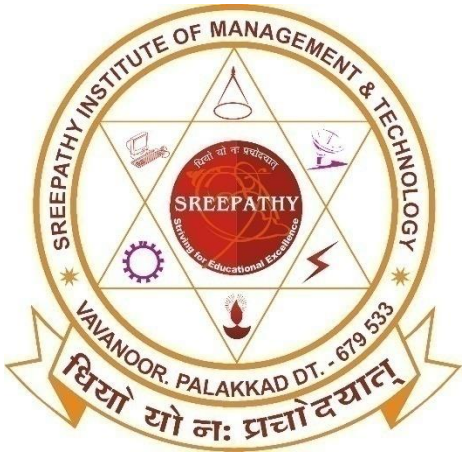
SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY



COURSE HANDBOOK

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SEMESTER 3

MA201 LINEAR ALGEBRA AND COMPLEX ANALYSIS

COURSE INFORMATION SHEET:

Program: **Computer science & Engineering**	Degree :**B-Tech**
Course**: Linear Algebra and Complex Analysis**	Course code**: MA201**
L-T-P**:3-0-1**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Complex differentiation Text 1[13.3,13.4] Limit, continuity and derivative of complex functions Analytic Functions Cauchy–Riemann Equation(Proof of sufficient condition of analyticity & C R Equations in polar form not required)-Laplace's Equation Harmonic functions, Harmonic Conjugate	9	15
II	Conformal mapping: Text 1[17.1-17.4] Geometry of Analytic functions Conformal Mapping, Mapping $w = z^2$ conformality of $w = e^z$. The mapping z w z 1 Properties of z w 1 Circles and straight lines, extended complex plane, fixed points Special linear fractional Transformations, Cross Ratio, Cross Ratio property-Mapping of disks and half planes Conformal mapping by w sinz& w cos z (Assignment: Application of analytic functions in Engineering	9	15
III	Complex Integration. Text 1[14.1-14.4] [15.4&16.1] Definition Complex Line Integrals, First Evaluation Method, Second Evaluation Method Cauchy's Integral Theorem(without proof), Independence of path(without proof), Cauchy's Integral Theorem for Multiply Connected Domains (without proof) Cauchy's Integral Formula- Derivatives of Analytic Functions(without proof)Application of derivative of Analytical Functions Taylor and Maclaurin series(without proof), Power series as Taylor series, Practical methods(without proof) Laurent's series (without proof)	10	15
IV	Residue Integration Text 1 [16.2-16.4] Singularities, Zeros, Poles, Essential singularity, Zeros of analytic functions Residue Integration Method, Formulas for Residues, Several singularities inside the contour Residue Theorem. Evaluation of Real Integrals (i) Integrals of rational functions of sinT and cosT (ii)Integrals of the type ³ f ff (x)dx (Type I, Integrals from 0 to f) (Assignment : Application of Complex	10	15

	integration in Engineering)		
V	Linear system of Equations Text 1(7.3-7.5) Linear systems of Equations, Coefficient Matrix, Augmented Matrix Gauss Elimination and back substitution, Elementary row operations, Row equivalent systems, Gauss elimination-Three possible cases, Row Echelon form and Information from it. Linear independence-rank of a matrix Vector Space-Dimension-basis-vector spaceR3 Solution of linear systems, Fundamental theorem of nonhomogeneous linear systems(Without proof)-Homogeneous linear systems (Theory only	9	20
VI	Matrix Eigen value Problem Text 1.(8.1,8.3 &8.4) Determination of Eigen values and Eigen vectors-Eigen space Symmetric, Skew Symmetric and Orthogonal matrices –simple properties (without proof) Basis of Eigen vectors- Similar matrices Diagonalization of a matrixQuadratic forms- Principal axis theorem(without proof) (Assignment-Some applications of Eigen values(8.2))	9	20

TEXT BOOKS:

1	Erwin Kreyszig: Advanced Engineering Mathematics, 10th ed. Wiley

REFERENCES:

1	Dennis g Zill&Patric D Shanahan-A first Course in Complex Analysis with Applications-Jones&Bartlet Publishers
2	B. S. Grewal. Higher Engineering Mathematics, Khanna Publishers, New Delhi
3	Lipschutz, Linear Algebra,3e (Schaums Series)McGraw Hill Education India 2005
4	Complex variables introduction and applications-second edition-Mark.J.Owitz-Cambridge Publication

PREREQUISITE:NIL

COURSE OBJECTIVES:

1	To equip the students with methods of solving a general system of linear equations
2	To familiarize them with the concept of Eigen values and diagonalization of a matrix which have many applications in Engineering
3	To understand the basic theory of functions of a complex variable and conformal Transformations

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	**Solve** any given system of linear equations
2	**Find** the Eigen values of a matrix and how to diagonalise a matrix
3	**Identify** analytic functions and harmonic functions
4	**Evaluate** real definite Integrals as application of Cauchy integral theorem
5	**Evaluate** real definite Integrals as application of ResidueTheorem
6	**Identify** conformal mappings(vi) find regions that are mapped under certainTransformations

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	3														
CO2	3	3														
CO3	3	3														
CO4	3	3														
CO5	3	3														
CO6	3	3														

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
CO2	PO1	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
CO3	PO1	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering

		problems
	PO2	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
CO4	**PO1**	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
CO5	**PO1**	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
CO6	**PO1**	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences

CS201 DISCRETE COMPUTATIONAL STRUCTURES

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Discrete Computational Structures**	Course code**: CS201**
L-T-P**:3-1-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Review of elementary set theory: Algebra of sets – Ordered pairs and Cartesian products – Countable and Uncountable sets. Relations: - Relations on sets –Types of relations and their properties – Relational matrix and the graph of a relation – Partitions – Equivalence relations - Partial ordering- Posets – Hasse diagrams - Meet and Join – Infimum and Supremum. Functions: - Injective, Surjective and Bijective functions - Inverse of a function- Composition	10	15
II	Review of Permutations and combinations, Principle of inclusion exclusion, Pigeon Hole Principle. Recurrence Relations: Introduction- Linear recurrence relations with constant coefficients– Homogeneous solutions – Particular solutions – Total solutions. Algebraic systems: - Semigroups and monoids - Homomorphism, Sub-semigroups and sub-monoids	9	15
III	Algebraic systems: - Groups, definition and elementary properties, subgroups, Homomorphism and Isomorphism, Generators - Cyclic Groups, Cosets and Lagrange's Theorem. Algebraic systems with two binary operations- rings, fields-sub rings, ring homomorphism.	8	15
IV	Lattices and Boolean algebra: - Lattices –Sub lattices – Complete lattices – Bounded Lattices - Complemented Lattices – Distributive Lattices – Lattice Homomorphism. Boolean algebra – sub algebra, direct product and homomorphism.	10	15
V	Propositional Logic: - Propositions – Logical connectives – Truth tables Tautologies and contradictions – Contra positive – Logical equivalences and implications Rules	8	20

	of inference: Validity of arguments.		
VI	Predicate Logic: - Predicates – Variables – Free and bound variables – Universal and Existential Quantifiers – Universe of discourse. Logical equivalences and implications for quantified statements – Theory of inference: Validity of arguments. Proof techniques: Mathematical induction and its variants – Proof by Contradiction – Proof by Counter Example – Proof by Contra positive.	9	20

TEXT BOOKS:

1	Trembly J. P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill, New Delhi, 2003.
2	Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4/e, Pearson Education Asia, Delhi, 2002

REFERENCES:

1	Liu C. L., "Elements of Discrete Mathematics", 2/e, McGraw–Hill Int. editions, 1988.
2	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Pearson Education Pvt Ltd., New Delhi, 2003.
3	Kenneth H.Rosen, "Discrete Mathematics and its Applications", 5/e, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2003.
4	Richard Johnsonbaugh, "Discrete Mathematics", 5/e, Pearson Education Asia, New Delhi, 2002.
5	Joe L Mott, Abraham Kandel, Theodore P Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", 2/e, Prentice-Hall India, 2009.

PREREQUISITE: Mathematics studied at school level.

COURSE OBJECTIVES:

1	To introduce mathematical notations and concepts in discrete mathematics that is essential for computing.
2	To train on mathematical reasoning and proof strategies.

3	To cultivate analytical thinking and creative problem solving skills

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to identify and apply operations on discrete structures such as sets, relations and functions in different areas of computing.
2	Students will be able to verify the validity of an argument using propositional and predicate logic.
3	Students will be able to construct proofs using direct proof, proof by contraposition, proof by contradiction and proof by cases, and by mathematical induction.
4	Students will be able to solve problems using algebraic structures.
5	Students will be able to solve problems using counting techniques and combinatorics.
6	Students will be able to apply recurrence relations to solve problems in different domains.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	2	3	1										1	2	
CO2	3	3	1	2										1	2	
CO3	3	3												1	2	
CO4	3	2												1	2	
CO5	3	2	2											1	2	
CO6	3													1	2	

CO-PO MAPPING JUSTIFICATION:

CO1	PO1	The concepts of discrete structures can be used to solve various complex engineering problems
	PO2	The knowledge about the discrete computational structures will help them to reach conclusions about the complexity and methodologies for solving real life problems
	PO3	Discrete structures can aid in the representation of various real life
	PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

CO2	**PO1**	The validity of facts can be verified using predicate and propositional logic
	PO2	The real life events can be represented and verified using Mathematical logic
	PO3	Reasoning is made possible for designing engineering problems
	PO4	Conduct investigations of complex problems using propositional and predicate logic.
CO3	**PO1**	The reasoning and inferences made by them can be substantiated by the various proof techniques
	PO2	The proof techniques can be used to verify the complex engineering solutions
CO4	**PO1**	Algebraic structures can be used to visualize the complex engineering problems involving sets of data
	PO2	The similarity and characteristics of data can be analyzed using algebraic principles
CO5	**PO1**	The arrangement and combinations of data to be taken for different problems can be identified
	PO2	Counting techniques can be used to reach conclusions in the problems involving huge data
CO6	**PO1**	It can be used to compare and contrast the complexity of algorithms that were developed.
	PO2	It helps to analyze the complexity and choose the best method for the particular problem
	PO3	All algorithms can be compared using a single measure to identify the amount of computations involved in them so that the optimal one can be identified

CO-PSO MAPPING JUSTIFICATION:

CO1 CO2 CO3 CO4 CO5 CO6	**PSO2**	**2**	use mathematical methodologies to crack problems using suitable mathematical analysis, data structure and suitable algorithms.
CO1 CO2 CO3 CO4 CO5 CO6	**PSO1**	**1**	Design and develop software based system and provide creative solutions

CS 205 DATA STRUCTURES

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Circuits & Networks**	Course code**: CS 205**
L-T-P**: 3-1-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to programming methodologies – structured approach, stepwise refinement techniques, programming style, documentation – analysis of algorithms: frequency count, definition of Big O notation, asymptotic analysis of simple algorithms. Recursive and iterative algorithms	9	15
II	Abstract and Concrete Data Structures- Basic data structures – vectors and arrays. Applications, Linked lists:- singly linked list, doubly linked list, Circular linked list, operations on linked list, linked list with header nodes, applications of linked list: polynomials,.	9	15
III	Applications of linked list (continued): Memory management, memory allocation and de-allocation. First-fit, best-fit and worst-fit allocation schemes, Implementation of Stacks and Queues using arrays and linked list, DEQUEUE (double ended queue). Multiple Stacks and Queues, Applications.	9	15
IV	String: - representation of strings, concatenation, substring searching and deletion. Trees: - m-ary Tree, Binary Trees – level and height of the tree, complete-binary tree representation using array, tree traversals (Recursive and non-recursive), applications. Binary search tree – creation, insertion and deletion and search operations, applications.	10	15
V	Graphs – representation of graphs, BFS and DFS (analysis not required) applications. Sorting techniques – Bubble sort, Selection Sort, Insertion sort, Merge sort, Quick sort, Heaps and Heap sort. Searching algorithms (Performance comparison expected. Detailed analysis not required)	9	20
VI	Linear and Binary search. (Performance comparison expected. Detailed analysis not required)Hash Tables – Hashing functions – Mid square, division, folding, digit analysis, collusion resolution and Overflow handling techniques	10	20

TEXT BOOKS:

1.	Samanta D., Classic Data Structures, Prentice Hall India, 2/e, 2009.
2.	Richard F. Gilberg, Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, 2/e, Cengage Learning, 2005.

REFERENCES:

1.	Horwitz E., S. Sahni and S. Anderson, Fundamentals of Data Structures in C, University Press (India), 2008.
2.	Aho A. V., J. E. Hopcroft and J. D. Ullman, Data Structures and Algorithms, Pearson Publication,1983.
3.	Tremblay J. P. and P. G. Sorenson, Introduction to Data Structures with Applications, Tata McGraw Hill, 1995.
4.	Peter Brass, Advanced Data Structures, Cambridge University Press, 2008 Lipschuts S., Theory and Problems of Data Structures, Schaum's Series, 1986. Wirth N., Algorithms + Data Structures = Programs, Prentice Hall, 2004.
5.	Hugges J. K. and J. I. Michtm, A Structured Approach to Programming, PHI, 1987.

PREREQUISITE: BE 101-5 Introduction to Computing and Problem Solving

COURSE OBJECTIVES:

1.	To impart a thorough understanding of linear data structures such as stacks, queues and their applications.
2.	To impart a thorough understanding of non-linear data structures such as trees, graphs and
3.	their applications.
4.	To impart familiarity with various sorting, searching and hashing techniques and their performance comparison.
5.	To impart a basic understanding of memory management.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1.	Compare different programming methodologies and define asymptotic notations to analyze performance of algorithms.
2.	Use appropriate data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.
3.	Appreciate different memory management techniques and their significance
4.	Represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.
5.	Illustrate and compare various techniques for searching and sorting.
6.	Illustrate various hashing techniques.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO 1	1	3	3	3										-	-	1
CO 2	1	-	3	-										-	3	1
CO 3	1	3	3	-										-	-	1
CO 4	1	-	3	3										-	3	1
CO 5	1	3	3	3										-	3	1
CO 6	1	3	3	-										-	3	1

CO-PO MAPPING JUSTIFICATION:

CO s	PO s	JUSTIFICATION
CO1	PO1	Apply the knowledge of mathematics in problems like time complexity
	PO2	Identify less complex algorithm.
	PO3	Design the solution by applying best data structure and less complex algorithm.
	PO4	The knowledge of asymptotic notations helps in analysis of performance of solutions to complex problems
CO2	PO1	The knowledge of arrays, linked lists, stacks and queues can be applied to solve complex engineering problems.
	PO3	The knowledge of arrays, linked lists, stacks and queues can be applied to design solutions to complex engineering problems.

CO3	**PO1**	Apply the basics of mathematics in different memory management techniques
	PO2	To analyse different cases of memory management startegies like first fit, best fit etc
	PO3	Design solutions for different memory management techniques
CO4	**PO1**	The knowledge of non linear data structures like trees and graphs can be applied to solve complex engineering problems.
	PO3	This knowledge can be used to design efficient solutions to complex problems.
	PO4	The knowledge helps in representation, analysis and interpretation of data to provide valid conclusions.
CO5	**PO1**	This basic knowledge of sorting and searching can be used in solutions to complex engineering problems.
	PO2	Identify and analyze engineering problems to arrive at substantiated conclusions regarding sorting and searching
	PO3	This basic knowledge of sorting and searching can be used in designing solutions to complex engineering problems.
	PO4	This concept is fundamental in conducting investigations and interpretations of data.
CO6	**PO1**	The knowledge of various hashing techniques can be applied in designing solutions to complex engineering problems.
	PO2	To analyse different hashing techniques or hash functions to arrive at conclusions
	PO3	The knowledge of hashing can be applied to design solutions to complex engineering problems.

CO-PSO MAPPING JUSTIFICATION:

CO s	PSO s	JUSTIFICATION
CO1	**PSO3**	This knowledge helps to design good and efficient algorithms and thereby can be used in research and other innovative ideas.
CO2	**PSO1**	The knowledge of arrays, linked lists, stacks and queues can be applied to design solutions to complex engineering problems in using suitable data structures
	PSO3	The knowledge of arrays, linked lists, stacks and queues and its usage will help in having practical proficiency in programming concepts
CO3	**PSO3**	The knowledge of memory management strategies will help in building programming concepts and will help towards research too.
CO4	**PSO2**	The basic information in non linear data structures like trees and graphs will help in choosing the best data structures and algorithms
	PSO3	The basic information in non linear data structures like trees and graphs will help in building practical proficiency

CO5	**PSO2**	This basic knowledge of sorting and searching will help in choosing the best data structures and algorithms
	PSO3	The knowledge about sorting and searching like trees and graphs will help in building practical proficiency
CO6	**PSO2**	This basic knowledge of hashing will help in choosing the best data structures and algorithms
	PSO4	The knowledge about hashing will help in building practical proficiency in the case of implementing searching techniques

CS 207 ELECTRONIC DEVICES AND CIRCUITS

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course: **Electronic Devices and Circuits**	Course code**: CS207**
L-T-P**: 3-0-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	**Wave shaping circuits:** Sinusoidal and non-sinusoidal wave shapes, Principle and working of RC differentiating and integrating circuits, Conversion of one non-sinusoidal wave shape into another. Clipping circuits - Positive, negative and biased clipper. Clamping circuits - Positive, negative and biased clamper. Voltage multipliers- Voltage doubler and tripler. Simple sweep circuit using transistor as a switch.	5	15
II	Regulated power supplies: Review of simple zener voltage regulator, Shunt and series voltage regulator using transistors, Current limiting and fold back protection, 3 pin regulators-78XX and 79XX, IC 723 and its use as low and high voltage regulators, DC to DC conversion, Circuit/block diagram and working of SMPS. Field effect transistors: JFET – Structure, principle of operation and characteristics, Comparison with BJT. MOSFET- Structure, Enhancement and Depletion types, principle of operation and characteristics.	7	15
III	Amplifiers: Introduction to transistor biasing, operating point, concept of load line, thermal stability, fixed bias, self bias, voltage divider bias. Classification of amplifiers, RC coupled amplifier - voltage gain and frequency response. Multistage amplifiers - effect of cascading on gain and bandwidth. Feedback in amplifiers - Effect of negative feedback on amplifiers. MOSFET Amplifier- Circuit diagram and working of common source MOSFET amplifier.	7	15
IV	Oscillators: Classification, criterion for oscillation,		15

	analysis of Wien bridge oscillator, Hartley and Crystal oscillator. Non-sinusoidal oscillators: Astable, monostable and bi-stable multivibrators using transistors (Only design equations and working of circuit are required, Analysis not required).	5	
V	Operational amplifiers: Differential amplifier, characteristics of op- amps(gain, bandwidth, slew rate, CMRR, offset voltage, offset current), comparison of ideal and practical opamp(IC741), applications of op-amps- scale changer, sign changer, adder/summing amplifier, subtractor, integrator, differentiator, Schmitt trigger, Wien bridge oscillator.	8	
VI	Integrated circuits: Active filters – Low pass and high pass (first and second order) active filters using op-amp with gain (No analysis required). D/A and A/D convertors – important specifications, Sample and hold circuit. Binary weighted resistor and R-2R ladder type D/A convertors. (concepts only). Flash, dual slope and successive approximation type A/D convertors. Circuit diagram and working of Timer IC555, astable and monostable multivibrators using 555.	8	20

TEXT BOOKS:

1	David A Bell, Electronic Devices and Circuits, Oxford University Press, 2008
2	Salivahanan S. and V. S. K. Bhaaskaran, Linear Integrated Circuits, Tata McGraw Hill, 2008

REFERENCES:

1	Neamen D., Electronic Circuits, Analysis and Design, 3/e, TMH, 2007
2	Robert Boylestad and L Nashelsky, Electronic Devices and Circuit Theory, Pearson.
3	Bogart T. F., Electronic Devices Circuits, 6/e, Pearson, 2012.
4	Maini A. K. and V. Agrawal, Electronic Devices and Circuits, Wiley India, 2011.
5	K.Gopakumar, Design and Analysis of Electronic Circuits, Phasor Books, Kollam, 2013

6	Millman J. and C. Halkias, Integrated Electronics, 2/e, McGraw-Hill, 2010

PREREQUISITE: BE101 – 04 Introduction to Electronics Engineering

COURSE OBJECTIVES:

1	To make students understand the design concepts of various system software like Assembler, Linker, Loader and Macro pre-processor, Utility Programs such as Text Editor and Debugger.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to distinguish different software into different categories.
2	Students will be able to design, analyze and implement one pass, two pass or multi pass assembler
3	Students will be able to design, analyze and implement loader and linker.
4	Students will be able to design, analyze and implement macro processors
5	Students will be able to critique the features of modern editing /debugging Tools.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	3	3	2	2									3	3	
CO2	3	3	3	1	2									3	3	
CO3	3	3	3	2	2									3	3	
CO4	3	3	3	2	2									3	3	
CO5	3	3	3	2	2									3	3	
CO6	3	3	3	2										3		

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	Working of RC circuits
	PO2	Analysis and derivation of RC circuits requires mathematical background
	PO3	Design of clippers, clampers, integrators and differentiators
	PO4	Problems based on RC circuits
	PO5	Circuits can be implemented using PSpice

CO2	**PO1**	Working of Voltage regulators and FETs
	PO2	Analysis of Regulators
	PO3	Design of regulator circuits
	PO4	Design problems of regulators
	PO5	Circuits can be implemented using PSpice
CO3	**PO1**	Apply the knowledge of Amplifiers
	PO2	Analysis of CE/CC/CB configuration of amplifiers
	PO3	Circuit design Feedback amplifiers
	PO4	Problems from Amplifiers
	PO5	Circuits can be implemented using PSpice
CO4	**PO1**	Apply the knowledge of oscillators
	PO2	Analysis configuration of different Oscillators
	PO3	Circuit design of Oscillators
	PO4	Problems from oscillators
	PO5	Circuits can be implemented using PSpice
CO5	**PO1**	Working of op-amp circuits
	PO2	Analysis of op-amp circuits
	PO3	Design and applications of op-amp circuits
	PO4	Op-amp circuit design/problems
	PO5	Circuits can be implemented using PSpice
CO6	**PO1**	Apply the knowledge of optical components and filters in new methods
	PO2	Analysis of integrated circuits/D/A and A/D converts
	PO3	Design of Multivibrators using IC 555
	PO4	Problems from multivibrators

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	**PSO1**	Graduates will be able to analyze and design analog circuits.
	PSO2	Graduates will be able to design RC circuits using PSpice
CO2	**PSO1**	Graduates will able to learn knowledge of regulators and FETs.
	PSO2	Graduates will be able to design Regulator circuits using PSpice
CO3	**PSO1**	Graduates will know different types of amplifiers.
	PSO2	Graduates will be able to design Amplifiers circuits using PSpice

CO4	**PSO1**	Graduates will know different types of oscillators.
	PSO2	Graduates will be able to design oscillators circuits using PSpice
CO5	**PSO1**	Graduates will analyse the applications of electronic circuits using op-amp.
	PSO2	Graduates will be able to design Op-amp circuits using PSpice
CO6	**PSO1**	Graduates will able to know Implementation & Design of Integrated circuits

HS200 BUSINESS ECONOMICS

COURSE INFORMATION SHEET:

Program: **Computer science & Engineering**	Degree :**B-Tech**
Course**: Business Economics**	Course code**: HS200**
L-T-P**:3-0-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Nature of Economics Definitions of Economics and their limitations, Economic Problems (2 Hrs.), Economic Systems, meaning of Business or Managerial Economics (2 Hrs.)and its role and relevance in managerial decision making in an industrial setting (2 Hrs).	6	15
II	Demand and Supply Analysis Demand Curve, Demand function (2 Hrs.), Elasticity of demand and its estimation (2 Hrs.), Supply curve, equilibrium price and price mechanism (2 Hrs).	6	15
III	Production Economics Economies of Scale and Diseconomies of Scale (1 Hr.), Production and Cost Functions. Factors of Production (2 Hrs.), Law of Diminishing marginal Productivity. Construction and analysis of Break Even Charts (3 Hrs.)	6	15
IV	Market Structure and Price-Output Decisions Price and output determination under Perfect Competition, Monopoly and Monopolistic Competition (3 Hrs.). Collusion and Cartel, Nash Equilibrium (3 Hrs.)	6	15
V	Money, National Income and Taxation Money, Emerging Bit Coin concept, Quantity Theory of Money, Interest Rate Management (2 Hrs), Open Market Operations by RBI, Selective Credit Controls, SLR, CRR (2 Hrs), Definition & Measurement of National Income, methods, sectors of economy (3 Hrs), inflation, deflation, trade cycles- ValueAdded Tax (2 Hrs).	9	20
VI	Investment Decisions and Balance Sheet Analysis Capital Budgeting, Investment Analysis – NPV, IRR, Profitability Index, ARR, Payback Period (3 Hrs), Depreciation, Time value of money. Business Forecasting– Elementary techniques (2 Hrs). Balance sheet preparation principles and interpretation (4 Hrs)	9	20

TEXT BOOKS:

1	Yogesh, Maheswari, Management Economics , PHI learning, NewDelhi, 2012

REFERENCES:

1	Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition, 2010
2	Khan M Y, Indian Financial System, Tata McGraw Hill, 7th edition, 2011
3	Samuelson, Managerial Economics, 6th edition, Wiley
4	Snyder C and Nicholson W, Fundamentals of Microeconomics, Cengage Learning (India), 2010.
5	Truett, Managerial Economics: Analysis, Problems, Cases, 8th Edition, Wiley Welch, Economics: Theory and Practice 7th Edition, Wiley

PREREQUISITE:NIL

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	To familiarize the elementary perspectives of economics
2	To acquaint the students about the concepts of demand, supply and general production theory related to economics
3	To apply business analysis to the firm under different market conditions
4	To apply economic models to examine current economic scenario and to solve the economic issues
5	To apply various economic tools for analyzing the projects and decision making process
6	To analyze the various economic tools like balance sheet, tax, forecasting, and international concepts like FDI, FPI, and FII

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1											3					
CO2	2										2	3				
CO3	2										2					
CO4								3				2				
CO5	3										2					
CO6	2										3					

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION

CO1	PO11	To know about the elementary principles in business economics helps them to understand the management as well as the business practices in economics
CO2	PO2	Simple kind of mathematical equations are used to identify the degree of elasticities related to demand and supply and production function
	PO11	With help of management and business practices students can analyze the changing patterns of demand, supply and production function
	PO12	The demand and supply functions are lifelong learning concepts
CO3	PO2	To analyze the market conditions of a firm, break even concepts is used. It is a mathematical concept.
	PO11	The marketing functions are highly correlated with the business practices and principles in economics
CO4	PO8	To analyze the current economic scenario it necessary to take into consider the social and legal procedures and programmed related to them
	PO12	Corrective action related to economic scenario helps the students to analyze the various economic conditions faced throughout their life
CO5	PO1	The decision making and evaluation of projects are based on different economic tools which are used mathematical and statistical equations.
	PO11	Some kind of decision making functions are based on the principles that is used in economics like risk, uncertainty etc
CO6	PO1	Mathematical tools are used to analyze the various economic tools. Eg, trend projection method, balance sheet
	PO12	These are helpful to students to identify the various opportunities in their life within outside the nation

CS 231 DATA STRUCTURES LAB

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Data Structures Lab**	Course code**: CS 231**
L-T-P**: 0-0-3**	Credit**:1**

SYLLABUS:

EXPERIMENTS
List of Exercises/Experiments : (Minimum 12 are to be done) 1. Implementation of Stack and Multiple stacks using one dimensional array. ** 2. Application problems using stacks: Infix to post fix conversion, postfix and pre-fix evaluation, MAZE problem etc. ** 3. Implementation of Queue, DEQUEUE and Circular queue using arrays. 4. Implementation of various linked list operations. ** 5. Implementation of stack, queue and their applications using linked list. 6. Implementation of trees using linked list 7. Representation of polynomials using linked list, addition and multiplication of polynomials. ** 8. Implementation of binary trees using linked lists and arrays- creations, insertion, deletion and traversal. ** 9. Implementation of binary search trees – creation, insertion, deletion, search 10. Application using trees 11. Implementation of sorting algorithms – bubble, insertion, selection, quick (recursive and nonrecursive), merge sort (recursive and non-recursive), and heap sort.** 12. Implementation of searching algorithms – linear search, binary search.** 13. Representation of graphs and computing various parameters (in degree, out degree etc.) - adjacency list, adjacency matrix. 14. Implementation of BFS, DFS for each representation. 15. Implementation of hash table using various mapping functions, various collision and overflow resolving schemes.** 16. Implementation of various string operations. 17. Simulation of first-fit, best-fit and worst-fit allocations. 18. Simulation of a basic memory allocator and garbage collector using doubly linked list. ** mandatory.

PREREQUISITE: BE 101-5 Introduction to Computing and Problem Solving

COURSE OBJECTIVES:

6.	To implement basic linear and non-linear data structures and their major operations.
7.	To implement applications using these data structures.
8.	To implement algorithms for various sorting techniques

COURSE OUTCOMES:

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

CO's	DESCRIPTION
7.	Appreciate the importance of structure and abstract data type, and their basic usability in different applications
8.	Analyze and differentiate different algorithms based on their time complexity.
9.	Implement linear and non-linear data structures using linked lists.
10.	Understand and apply various data structure such as stacks, queues, trees, graphs, etc. To solve various computing problems.
11.	Implement various kinds of searching and sorting techniques, and decide when to choose which technique.
12.	Identify and use a suitable data structure and algorithm to solve a real world problem

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO 7	2													1		
CO 8			3	2										3		
CO 9	2		3											3		
CO 10	1		2	3										2		
CO 11	1	2	2	1										1		2
CO 12			3	2										2		2

CO-PO MAPPING JUSTIFICATION:]

CO s	PO s	JUSTIFICATION
CO 1	PO 1	The knowledge of structure and abstract data type can be applied
CO 2	PO3	Efficient algorithms can be designed based on their time complexity
CO 2	PO4	Analysis of algorithms helps to select suitable algorithms and reach complexity.
CO 3	PO1	The knowledge can be enhanced by implementing the data structure using any programming language

CO 4	PO1	The knowledge about the various data structures can be applied to solve complex engineering problems.
	PO3	The knowledge about various data structures can be applied to design efficient solutions to complex engineering problems
CO 5	PO1	The knowledge of searching and sorting algorithms can be applied to solve complex engineering problems.
	PO2	The knowledge of searching and sorting algorithms can be appled to analyze problems and reach conclusions.
	PO3	The knowledge of searching and sorting algorithms can be applied to design solutions to complex problems.
	PO4	The knowledge of searching and sorting algorithms can be applied in analysis and interpretation of data
CO 6	PO3	This helps to design an efficient solution to complex problems.
	PO4	This knowledge helps in suitable representations and thereby interpretation of data can be done efficiently

CO-PSO MAPPING JUSTIFICATION:

CO s	PSO s	JUSTIFICATION
CO1	**PSO1**	These fundamental concepts of CS can be applied to solve complex problems
CO2	**PSO1**	Complexity analysis can be applied in research and other innovative areas.
CO3	**PSO1**	The implementation of data structures helps to design solutions to complex engineering problems.
CO4	**PSO1**	The knowledge about various data structures can be applied to design efficient solutions to complex engineering problems
CO5	**PSO1**	The knowledge of searching and sorting algorithms can be applied in analysis of problems and design solutions.
	PSO3	This fundamental knowledge can be used in research and other areas.
CO6	**PSO1**	knowledge of data structures help to analyze and design solution to complex problems
	PSO3	This is a core fundamental concept in CS which can be applied in research area also.

CS 233 ELECTRONIC CIRCUITS LABORATORY

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Electronic Circuits Laboratory**	Course code**: CS233**
L-T-P**: 3-0-0**	Credit**:1**

SYLLABUS:

EXPT NO.	EXPERIMENT DETAILS	HOURS
(Minimum 13 experiments are to be done in the semester, at least 6 each should be selected from the first(Exp. 1-10) and second(Exp. 11-20) half. Experiment no. 18 is compulsory).		
1	Forward and reverse characteristics of PN diode and Zener diode	3
2	Input and output characteristics of BJT in CE configuration and evaluation of parameter	3
3	RC integrating and differentiating circuits-Transient response with different time constant	3
4	RC low pass and high pass circuits- Frequency response with sinusoidal input	3
5	Clipping circuits (Positive, negative and biased) - Transient and transfer characteristics	3
6	Clamping circuits (Positive, negative and biased)- Transient characteristics	3
7	Bridge Rectifier - with and without filter- ripple factor and regulation	3
8	Simple Zener regulator- Line and load characteristics	3
9	RC coupled CE amplifier – Mid band gain and frequency response	3
10	RC phase shift or Wien bridge oscillator using transistor	3
11	Astable and Monostable multivibrators using transistors	3

TEXT/ REFERENCES BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
1	Sedra and Smith: Microelectronic Circuits, 4/e, Oxford University Press 1998.
2	B. Razavi , “Fundamentals of Microelectronics”, Wiley

3	DavidA Bell, Electronic Devices and Circuits, Oxford University Press, 2008
4	Electronics Lab Manual Vol. 1 / K. A. Navas /
1	David A Bell, Electronic Devices and Circuits, Oxford University Press, 2008
2	Salivahanan S. and V. S. K. Bhaaskaran, Linear Integrated Circuits, Tata McGraw Hill, 2008

PREREQUISITE: CS 207 Electronic Devices And Circuits

COURSE OBJECTIVES:

1	To introduce the working of analog electronic circuits.
2	To design, implement and demonstrate analog circuits using electronic components.
3	To provide hands-on experience to the students so that they are able to put theoretical concepts to practice.
4	To use computer simulation tools such as PSPICE, or Multisim to the simulation of electronic circuits.
5	To create an ability to develop descriptions, explanations, predictions and models using evidence.
6	To create an ability to communicate effectively the scientific procedures and explanations about the experiments in oral/report forms.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	To introduce the working of analog electronic circuits.
2	To design, implement and demonstrate analog circuits using electronic components.
3	To provide hands-on experience to the students so that they are able to put theoretical concepts to practice.
4	To use computer simulation tools such as PSPICE, or Multisim to the simulation of electronic circuits.
5	To create an ability to develop descriptions, explanations, predictions and models using evidence.
6	To create an ability to communicate effectively the scientific procedures and explanations about the experiments in oral/report forms.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	1														
CO2	3	3	3											3	3	
CO3	3	3	3											3	3	
CO4	3	3	3											3	3	
CO5	3	3	3											3	3	
CO6	3	3	3											3	3	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	Working of RC circuits
	PO2	Analysis and derivation of RC circuits requires mathematical background
CO2	PO1	Apply the knowledge of RC circuits
	PO2	Analysis and derivation of RC circuits
	PO3	Design of RC circuits
CO3	PO1	Clipper and clamper circuits are used in electronic circuits
	PO2	Analysis and operation of clipper circuit require sound knowledge of engineering science
	PO3	Design of waveform shaping, level shifting and noise removal application
CO4	PO1	Working of op-amp circuits
	PO2	Analysis of op-amp circuits
	PO3	Design of circuits for amplifying signals
CO5	PO1	Multivibrator circuits are used in signal generators
	PO2	Analysis and operation of multi-vibrator
	PO3	Design of Multivibrators using IC 555 and transistors
CO6	PO1	Oscillator circuits are used in signal generators
	PO2	Analysis and operation of oscillator
	PO3	Design of sine wave generation circuits

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO2	PSO1	Graduates will able to learn knowledge of regulators and FETs.

	PSO2	Graduates will be able to design Regulator circuits using PSpice
CO3	**PSO1**	Graduates will know about the working of clippers and clampers
	PSO2	Graduates will be able to design clippers and clampers circuits using PSpice
CO4	**PSO1**	Graduates will analyse the applications of electronic circuits using op-amp.
	PSO2	Graduates will be able to design Op-amp circuits using PSpice
CO5	**PSO1**	Graduates will able to know Implementation & Design of multivibrators
	PSO2	Graduates will be able to design multivibrator circuits using PSpice
CO6	**PSO1**	Graduates will able to know different types of oscillators.
	PSO2	Graduates will be able to design oscillators circuits using PSpice

SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY

COURSE HANDBOOK

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SEMESTER 4

MA202 PROBABILITY DISTRIBUTIONS, TRANSFORM & NUMERICAL METHODS

COURSE INFORMATION SHEET:

Program : **Computer science & Engineering**	Degree :**B-Tech**
Course**: Probability Distributions, Transform & Numerical Methods**	Course code**: MA202**
L-T-P**:3-1-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Discrete Probability Distributions. (Relevant topics in section 4.1,4,2,4.4,4.6 Text1) Discrete Random Variables, Probability distribution function, Cumulative distribution function. Mean and Variance of Discrete Probability Distribution. Binomial Distribution-Mean and variance. Poisson Approximation to the Binomial Distribution. Poisson distribution-Mean and variance.	7	15
II	Continuous Probability Distributions. (Relevant topics in section 5.1,5.2,5.5,5.7 Text1) Continuous Random Variable, Probability density function, Cumulative density function, Mean and variance. Normal Distribution, Mean and variance (without proof). Uniform Distribution.Mean and variance. Exponential Distribution, Mean and variance.	7	15
III	Fourier Integrals and transforms. (Relevant topics in section 11.7, 11.8, 11.9 Text2) Fourier Integrals. Fourier integral theorem (without proof). Fourier Transform and inverse transform. Fourier Sine & Cosine Transform, inverse transform.	7	15
IV	Laplace transforms. (Relevant topics in section 6.1,6.2,6.3,6.5,6.6 Text2) Laplace Transforms, linearity, first shifting Theorem. Transform of derivative and Integral, Inverse Laplace transform, Solution of ordinary differential equation using Laplace transform. Unit step function, second shifting theorem. Convolution Theorem (without proof). Differentiation and Integration of transforms.	8	15
V	Numerical Techniques.(Relevant topics in section.19.1,19.2,19.3 Text2) Solution Of equations by Iteration, Newton- Raphson Method. Interpolation of Unequal intervals-Lagrange's Interpolation formula. Interpolation of Equal intervals-Newton's forward difference formula, Newton's Backward difference formula.	7	20
VI	Numerical Techniques. (Relevant topics in section 19.5,20.1,20.3, 21.1 Text2) Solution to linear System-Gauss Elimination, Gauss Seidal Iteration Method. Numeric Integration-Trapezoidal Rule, Simpson's 1/3 Rule. Numerical solution of firstorder ODE-Euler method, Runge-Kutta Method (fourth order)..	8	20

TEXT BOOKS:

1	Miller and Freund's "Probability and statistics for Engineers"-Pearson-Eighth Edition
2	Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley, 2015.

REFERENCES:

1	V. Sundarapandian, "Probability, Statistics and Queuing theory", PHI Learning, 2009.
2	C. Ray Wylie and Louis C. Barrett, "Advanced Engineering Mathematics"-Sixth Edition
3	Jay L. Devore, "Probability and Statistics for Engineering and Science"-Eight Edition
4	Steven C. Chapra and Raymond P. Canale, "Numerical Methods for Engineers"-Sixth Edition-Mc Graw Hill.

PREREQUISITE:NIL

COURSE OBJECTIVES:

1	To introduce the concept of random variables, probability distributions, specific discrete and continuous distributions with practical application in various Engineering andsocial lifesituations
2	To know Laplace and Fourier transforms, that has wide applications in all Engineering courses.
3	To enable the students to solve various engineering problems using numericalmethods.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	To have a concept of discrete probability density functions and probability distributions like Binomial Distribution and Poisson Distribution
2	To have a concept of continuous probability density functions and probability distributions like Normal, Uniform and Exponential distribution
3	To use Fourier integrals and Fourier transforms in solving various engineering problems
4	To understand the concept of Laplace and inverse Laplace transforms and apply them to solve ordinary differential equations
5	To use the iteration and interpolation methods to solve engineering problems.
6	To use the concept of numerical methods and their applications to solve linear systems and first order ODE's.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	3	3	2	2	3	2									
CO2	3	3	3	2	2	3	2									

CO3	3		3	3	3											
CO4	2		2													
CO5	3		3													
CO6	2		2													

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	**PO1**	Students use the knowledge in data analysis
	PO2	Helps students to Check for the possibilities
	PO3	Helps students to conclude from data distribution
	PO4	Help students in interpreting the
	PO5	students would be able to predict from the statistical analysis of the data
	PO6	Help students to analyze the population interests
	PO7	Help students in taking safety measures by past data analysis
CO2	**PO1**	Students use the knowledge in data analysis
	PO2	Helps students to Check for the possibilities
	PO3	Helps students to conclude from data distribution
	PO4	Help students in interpreting the
	PO5	students would be able to predict from the statistical analysis of the data
	PO6	Help students to analyze the population interests
	PO7	Help students in taking safety measures by past data analysis
CO3	**PO1**	Help students in using in signals and image processing
	PO3	Help students in using compression and decompression of signals
	PO4	Help students to solve some complex mathematics problems
	PO5	Like FFT, students can use in communication systems
CO4	**PO1**	Help students in solving the differential equations
	PO3	Help students in using in data interpolation
CO5	**PO1**	Help students Analysing the data from interpolation
	PO3	Help students to provide valid conclusion using the approximation methods
CO6	**PO1**	Help students in solving complex integration and differential equations
	PO3	Help students to provide valid conclusion using the approximation methods

CS 202COMPUTER ORGANIZATION AND ARCHITECTURE

COURSE INFORMATION SHEET:

Program: Computer Science and Engineering	**Degree: B-Tech**
Course: Computer Organization and Architecture	**Course code: CS 202**
L-T-P:3-1-0	**Credit:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Basic Structure of computers–functional units – basic operational concepts –bus structures -software. Memory locations and addresses– memory operations –instructions and instructionsequencing –	6	15

	addressing modes – ARM Example(programs not required). Basic I/O operations –stacks subroutine calls.		
II	Basic processing unit – fundamental concepts – instruction cycle - execution of a completeinstruction –multiple- bus organization – sequencing of control signals. Arithmetic algorithms: Algorithms for multiplication and division of binary and BCD numbers— array multiplier —Booth's multiplication algorithm — restoring and non-restoring division — algorithms for floating point, multiplication and division.	10	15
III	I/O organization: accessing of I/O devices – interrupts –direct memory access –buses –interface circuits –standard I/O interfaces (PCI, SCSI, USB).	8	15
IV	Memory system: basic concepts –semiconductor RAMs –memory system considerations– semiconductor ROMs –flash memory –cache memory and mapping functions.	9	15
V	Processor Logic Design: Register transfer logic – inter register transfer – arithmetic, logic andshift micro operations –conditional control statements. Processor organization:–design of arithmetic unit, logic unit, arithmetic logic unit and shifter –status register –processor unit –design of accumulator.	9	20
VI	Control Logic Design: Control organization –design of hardwired control –control of processorunit –PLA control. Micro-programmed control: Microinstructions –horizontal and verticalmicro instructions – micro-program sequencer –micro programmed CPU organization.	9	20

TEXT BOOK:

1	Hamacher C., Z. Vranesic and S. Zaky, Computer Organization,5/e, McGraw Hill, 2011.
2	Mano M. M., Digital Logic & Computer Design, 4/e,Pearson Education, 2013.

REFERENCES:

1	Mano M. M., Digital Logic & Computer Design, 4/e, Pearson Education, 2013.
2	Patterson D.A. and J. L. Hennessey, Computer Organization and Design, 5/e, Morgan Kauffmann Publishers, 2013.
3	William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson, 9/e, 2013.
4	Chaudhuri P., Computer Organization and Design, 2/e, Prentice Hall, 2008.
5	Rajaraman V. and T. Radhakrishnan, Computer Organization and Architecture, Prentice

	Hall, 2011.
6	Messmer H. P., The Indispensable PC Hardware Book, 4/e, Addison-Wesley, 2001

PREREQUISITE: CS203 Switching theory and logic design

COURSE OBJECTIVES:

1	To impart an understanding of the internal organization and operations of a computer.
2	To introduce the concepts of processor logic design and control logic design.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to identify the basic structure and functional units of a digital computer.
2	Analyze the effect of addressing modes on the execution time of a program and the internal working of Subroutines.
3	Identify the roles of various functional units of a computer in instruction execution And Learn to Design the basic Datapath inside the processor.
4	Identify the pros and cons of different types of control logic design in processors. To learn how the control signals are generated by the control logic and Design the Control Unit.
5	Analyze the algorithms used by the ALU for execution and Design processing unit using the concepts of ALU and control logic design.
6	Analyze object oriented constructs in different programming languages.
7	Compare different concurrency constructs and Interpret the concepts of run- time program management

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	**3**	**1**												**2**		
CO2	**2**	**2**			**1**									**2**		
CO3	**2**	**1**	**3**											**3**		
CO4	**3**	**2**	**3**											**3**		

CO5	**2**	**2**	**3**			**1**								**2**	**2**	
CO6	**2**	**2**	**1**		**1**							**1**		**2**		
CO7	**2**	**2**	**2**									**1**		**2**		

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	Students will be able to identify the basic concept in a system design.
	PO2	Students will be able to Analyze the existing computer Hardware Design and understand its working principle.
CO2	PO1	Students will attain the ability tounderstand and identify the addressing modes and their usage in applications.
	PO2	Students will be able to analyze the existing computer system memory addressing and accordingly make efficient usage of the methods.
	PO5	Students will be able toidentify application of different addressing modes.
CO3	PO1	Students will attain the ability toidentify the roles of various functional units of a computer in the instruction execution process.
	PO2	Students will learn the fundamental principles used in datapath design, which will enable them to formulate / analyze the design of processors.
	PO3	Students will learn designof the basic datapath inside the processorwhich will enable them in developing new datapath models based on the then requirement. .
CO4	PO1	Students will gain the fundamental knowledge of how the control signals are generated by the control logic unit.
	PO2	Students will gain the ability to understand the pros and cons of different types of control logic designs in processors, which will enable them to formulate / analyze the design of processors.
	PO3	Students will gain the ability to Design the Control Unit for processors.
CO5	PO1	Students will be able to understand the fundamentals in Processing Unit Development.
	PO2	Students will gain the ability to analyze the algorithms used by the ALU for program execution.
	PO3	Students will learn to design processing unit that meet the specified needsusing the concepts of ALU and control logic design.
	PO6	Students will be able to propose efficient processing techniques.
CO6	PO1	Students will learn the fundamentals of Interfacing.
	PO2	Students will be able toidentify and analyse the core principles of interfacing and make appropriate choice.

	PO3	Students will be able to design / develop Interfacing Circuits based on the current requirements.
	PO5	Students will be able to Select appropriate interface standards for I/O interface.
	PO12	Students will be able to design new interface standards.
CO7	PO1	Students will gain the knowledge of the fundamentals of Memory Design.
	PO2	Students will learn to Analyze the use of different types of Memories.
	PO3	Students will learn how to Design different types of Memories.
	PO12	Students will be able to Come up with more efficient Memory management techniques.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Graduates attain the ability to design and develop hardware and software based systems.
CO2	PSO1	Graduates attain the ability to evaluate and recognize potential risks in existing methods and provide creative solutions.
CO3	PSO1	Graduates attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions for design of appropriate computer Hardware.
CO4	PSO1	Graduates attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions for design of appropriate computer Hardware.
CO5	PSO1	Graduates attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions.
	PSO2	Graduates attain the ability to use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm for design of appropriate computer Hardware.
CO6	PSO1	Graduates attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions for design of appropriatecomputer Hardware.
CO7	PSO1	Graduates attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions for design of appropriate computer Hardware.

CS 204 OPERATING SYSTEM

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Operating Systems**	Course code**: CS 204**
L-T-P**: 3-1-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	**Introduction**: Functions of an operating system. Single processor, multiprocessor and clustered systems – overview. Kernel Data Structures – Operating Systems used in different computing environments. **Operating System Interfaces and implementation** - User Interfaces, System Calls – examples. Operating System implementation - approaches. Operating System Structure – Monolithic, Layered, Micro-kernel, Modular. System Boot process.	9	15
II	**Process Management**: Process Concept – Processes-States – Process Control Block – Threads. Scheduling – Queues – Schedulers – Context Switching. Process Creation and Termination. **Inter Process Communication**: Shared Memory, Message Passing, Pipes.	9	15
III	**Process Synchronization**: Critical Section-Peterson's solution. Synchronization – Locks, Semaphores, Monitors, Classical Problems – Producer Consumer, Dining Philosophers and Readers-Writers Problems	8	15
IV	**CPU Scheduling** – Scheduling Criteria – Scheduling Algorithms. **Deadlocks** – Conditions, Modeling using graphs. Handling – Prevention – Avoidance – Detection-Recovery.	8	15
V	**Memory Management**: Main Memory – Swapping – Contiguous Memory allocation – Segmentation – Paging – Demand paging	8	20
VI	**Storage Management:** *Overview of mass storage structure- disks and tapes. Disk structure – accessing disks.* Disk scheduling and management. Swap Space. **File System Interface**: File Concepts – Attributes – operations – types – structure – access methods. File system mounting. Protection. File system implementation. Directory implementation – allocation	8	20

	methods. Free space Management. **Protection**– Goals, Principles, Domain. Access Matrix.		

TEXT BOOKS:

1	Abraham Silberschatz, Peter B Galvin, Greg Gagne, Operating System Concepts, 9/e, Wiley India, 2015.

REFERENCES:

1	Garry Nutt, Operating Systems: 3/e, Pearson Education, 2004
2	Bhatt P. C. P., An Introduction to Operating Systems: Concepts and Practice, 3/e, Prentice Hall of India, 2010.
3	William Stallings, Operating Systems: Internals and Design Principles, Pearson, Global Edition, 2015.
4	Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, Pearson, 4/e, 2015.
5	Madnick S. and J. Donovan, Operating Systems, McGraw Hill, 2001.
6	Hanson P. B., Operating System Principle, Prentice Hall of India, 2001.
7	Deitel H. M., An Introduction to Operating System Principles, Addison-Wesley, 1990.

PREREQUISITE: CS205 Data structures

COURSE OBJECTIVES:

1	To impart fundamental understanding of the purpose, structure, functions of operating system.
2	To impart the key design issues of an operating system

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Identify the significance of operating system in computing devices.
2	Exemplify the communication between application programs and hardware devices through system calls.
3	Compare and illustrate various process scheduling algorithms.
4	apply appropriate memory and file management schemes
5	Illustrate various disk scheduling algorithms.
6	Appreciate the need of access control and protection in an operating system.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	-	2	-	-	-	-	-	-	-	-	-	2	2	2	
CO2	2	-	2	-	-	-	-	-	-	-	-	-	-	2	-	
CO3	1	-	2	-	-	-	-	-	-	-	-	-	1	2	-	
CO4	3	-	2	-	-	-	-	-	-	-	-	-	1	2	-	
CO5	2	-	2	-	-	-	-	-	-	-	-	-	1	2	-	
CO6	3	-	2	-	-	-	-	-	-	-	-	-	2	2	-	

CO-PO MAPPING JUSTIFICATION:

CO1	PO1	Identifying the significance of OS in computing devices will be helpful in designing new operating systems.
	PO3	The knowledge about significance of OS in computing devices helps to design and develop new computing devices with new OS s
CO2	PO1	The knowledge about system calls helps to find the solution of complex engineering problems related to OS
	PO3	The knowledge about system calls plays a role in designing solutions to complex problems.
CO3	PO1	The knowledge about process and process scheduling algorithms helps to choose the suitable algorithm when designing a new OS so as to solve complex problems.
	PO3	The knowledge about process and process scheduling algorithms helps to choose the suitable algorithm when designing a new and efficient OS.
CO4	PO1	The knowledge about memory management and file management helps to choose the suitable algorithm when designing a new OS so as to solve complex problems.
	PO3	The knowledge about memory management and file management helps to choose the suitable algorithm when designing a new and efficient OS.
CO5	PO1	The knowledge about disk scheduling algorithms helps to choose the suitable algorithm when designing a new OS so as to solve complex problems.
	PO3	The knowledge about disk scheduling algorithms helps to choose the suitable algorithm when designing a new and efficient OS.
CO6	PO1	The knowledge about the access control and protection mechanisms helps to strengthen the security aspects when designing a new OS so as to solve complex problems.
	PO3	The knowledge about the access control and protection mechanisms helps to strengthen the security aspects when designing a new OS so as to solve complex problems.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	The knowledge of significance of OS in computing devices is a fundamental principle in computer science and helps to develop new OSs for various new computing devices
	PSO2	The knowledge of OS in computing devices helps to develop and design new OS of good quality and performance.
	PSO3	This can be applied in competitive research to develop new and innovative products to meet the societal needs.
CO2	PSO2	The knowledge about system calls is important in programming and software development
CO3	PSO1	The knowledge and understanding about process scheduling algorithms is a fundamental concept in computer science and has Some impact on the computer specific skills.
	PSO2	The knowledge and understanding about process scheduling algorithms helps to develop OSs that gives good performance.
CO4	PSO1	The knowledge about file management and memory management is a fundamental concept in CS and is needed to design a new OS

	PSO2	The knowledge about file management and memory management is needed to design a new OS that gives good performance.
CO5	PSO1	The knowledge about disk scheduling is a CS specific skill needed when we design a new OS
	PSO2	The knowledge and understanding of disk scheduling algorithms helps to develop new OS that delivers good quality.
CO6	PSO1	The need for access control and protection is vital in developing OSs in various computing areas.
	PSO2	The implementation aspects of access control and protection is necessary in developing new OSs.

CS206 Object Oriented Design and Programming

COURSE INFORMATION SHEET

PROGRAMME: **COMPUTER SCIENCE & ENGINEERING**	DEGREE: **BTECH**
COURSE: **OBJECT ORIENTED DESIGN & PROGRAMMING**	SEMESTER: **IV** CREDITS: **4**
COURSE CODE: **CS206**	COURSE TYPE:**CORE**

REGULATION:**2016**	
COURSEAREA/DOMAIN: **PROGRAMMING**	CONTACT HOURS: **3+1 (Tutorial) hours/week.**

SYLLABUS:

MODULE	DETAILS	HOURS
I	Object oriented concepts, Object oriented systems development life cycle. Unified Modeling Language, UML class diagram, Use-case diagram. Java Overview: Java virtual machine, *data types, operators, control statements*, Introduction to Java programming.	**8**
II	Classes fundamentals, objects, methods, constructors, parameter passing, overloading, access control keywords.	**7**
III	Inheritance basics, method overriding, abstract classes, interface. Defining and importing packages. Exception handling fundamentals, multiple catch and nested try statements.	**6**
IV	Input/Output: files, stream classes, reading console input. Threads: thread model, use of Thread class and Runnable interface, thread synchronization, multithreading.	**6**
V	String class - basics. Applet basics and methods. Event Handling: delegation event model, event classes, sources, listeners.	**7**
VI	Introduction to AWT: working with frames, graphics, color, and font. AWT Control fundamentals. Swing overview. Java database connectivity: JDBC overview, creating and executing queries, dynamic queries.	**8**
	TOTAL HOURS	**42**

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Herbert Schildt, Java: The Complete Reference, 8/e, Tata McGraw Hill, 2011.
T	Bahrami A., Object Oriented Systems Development using the Unified Modeling Language, McGraw Hill, 1999.
R	Y. Daniel Liang, Introduction to Java Programming, 7/e, Pearson, 2013.
R	Nageswararao R., Core Java: An Integrated Approach, Dreamtech Press, 2008.
R	Flanagan D., Java in A Nutshell, 5/e, O'Reilly, 2005.
R	Barclay K., J. Savage, Object Oriented Design with UML and Java, Elsevier, 2004.

R	Sierra K., Head First Java, 2/e, O'Reilly, 2005.
R	Balagurusamy E., Programming JAVA a Primer, 5/e, McGraw Hill, 2014.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
CS205	Data Structures	Developing Programming Skills	**S3**

COURSE OBJECTIVES:

1	To introduce basic concepts of object oriented design techniques.
2	To give a thorough understanding of Java language.
3	To provide basic exposure to the basics of multithreading, database connectivity etc.

4 To impart the techniques of creating GUI based applications.

COURSE OUTCOMES:

Students will be able to

Sl No	**DESCRIPTION**	**Blooms' Taxonomy Level**
C206.1	Apply object oriented principles in software design process.	Understand (level 1)

C206.2	Develop Java programs for real applications using java constructs and libraries.	Create (level 5)
C206.3	Understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using Java language.	Apply (level 3)
C206.4	Implement Exception Handling in java.	Apply (level 3)
C206.5	Use graphical user interface and Event Handling in java.	Understand (level 2)

CS206.6	Develop and deploy Applet in java.	Apply(level 3)

CO-PO AND CO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C206.1	_	1	2	_	_	_	_	_	_	_	_	_	_	2	_
C206.2	_	_	2	1	_	_	_	_	_	_	_	_	2	2	2
C206.3	2	_	2	_	_	_	_	_	_	_	_	_	2	2	1
C206.4	_	_	2	_	_	_	_	_	_	_	_	_	_	_	1
C206.5	_	_	2	_	2	_	_	_	_	_	_	_	_	_	2
C206.6	_	_	2	_	2	_	_	_	_	_	_	_	_	_	1
C206	**2**	**1**	**2**	**1**	**2**	**_**	**_**	**_**	**_**	**_**	**_**	**_**	**2**	**2**	**1**

JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/MEDIUM/HIGH	JUSTIFICATION
C206.1-PO2	L	By gaining the ability to apply object oriented principles in software design process, the students will be able to analyze complex engineering problems in the domain of software development with better effectiveness.
C206.1-PO3	M	Student is able to design UML diagrams for problems.
C206.1- PSO2	M	The students will get an insight into software design process and they would be able to apply standard practices in software project development to an extent.
C206.2- PO3	M	By gaining the ability to develop Java programs for real applications,

		the students will be able to develop components of a system that meet the specified needs with appropriate consideration for the public health.
C206.2-PO4	L	Java programming helps in finding conclusions to problems.
C206.2-PSO1	M	The students will be able to build a strong foundation for java programming language but more training would be required to develop the ability to identify, analyze and design solutions for complex engineering problems.
C206.2-PSO2	M	The students will learn the programming language java and the practice of programming will help them to improve their programming skills to the next level.
C206.2-PSO3	M	The students will learn the programming language java which can be exploited to create innovative products for the society with limited support.
C206.3-PO1	M	By understanding the object oriented features of java, the students will be able to apply the knowledge in java to derive solutions to computing problems.
C206.3-PO3	M	By understanding the object oriented features of java, the students will be able to design/develop system components of a system that meet the specified needs with appropriate consideration for the public health.

C206.3- PSO1	M	The students will be able to develop a good idea on how to design a solution for computing problems by employing java programming language.
C206.3- PSO2	M	By understanding and applying various object oriented features of java, the students will be able to improve their programming skills in java.
C206.3- PSO3	L	By understanding and applying various object oriented features of java, the students will be able to initiate the process of developing innovative products using java.
C206.4-PO3	M	Exception handling provides robustness which improves the quality and reliability of the software solution.
C206.4- PSO3	L	Students will be able to develop robust innovative products in java by implementing exception handing.
C206.5-PO3	M	Study on event handling enables students to design and develop solutions to problems.
C206.5-PO5	M	Enables students to use modern tools to create and use GUI.
C206.5- PSO3	M	The usage of graphical user interface and event handling in java will help the students to develop innovative products in java that will be of good market value and demand.
C206.6-PO3	M	Students get the ability to design applets to solve problems.
C206.6-PO5	M	The ability to take the aid of modern tools to create applets.
C206.6-PSO3	L	The ability to develop applets will help the students to equip their products with applets which will improve the quality of the product.

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSIONAL REQUIREMENTS:

SLNO	DESCRIPTION	PROPOSED ACTIONS	MAPPING
1	HTML	LAB SESSIONS	PO3, PSO2

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST

LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

SLNO	DESCRIPTION	PROPOSEDACTIONS	MAPPING
1	Familiarization of Eclipse	LAB SESSIONS	PO5, PSO2

WEB SOURCE REFERENCES:

1	https://docs.oracle.com/javase/tutorial/
2	http://www.javatpoint.com/java-tutorial
3	http://www.tutorialspoint.com/java/
4	https://www.youtube.com/channel/UC_c-e1vu4MBqOLY9WV1UrZw
5	https://www.youtube.com/watch?v=_3XiiNZYpAw
6	http://www.w3schools.in/java/

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

CHALK & TALK	STUD. ASSIGNMENT	WEB RESOURCES	LCD/SMART BOARDS
STUD. SEMINARS	☐ADD-ON COURSES		

ASSESSMENT METHODOLOGIES-DIRECT

ASSIGNMENTS	STUD. SEMINARS	TESTS/MODEL EXAMS	UNIV. EXAMINATION
STUD. LAB PRACTICES	☐STUD. VIVA	☐MINI/MAJOR PROJECTS	☐CERTIFICATIONS
☐ADD-ON COURSES	☐OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	STUDENT FEEDBACK ON FACULTY (TWICE)
ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐OTHERS

CS208 Principles of Database Design

COURSE INFORMATION SHEET

PROGRAMME: **COMPUTER SCIENCE &ENGINEERING**	DEGREE:**B.TECH**
COURSE: **PRINCIPLES OF DATABASEDESIGN**	SEMESTER: **IV** CREDITS:3
COURSECODE: **CS208** REGULATION: **2016**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: **System Software Concepts**	CONTACT HOURS: 2 + 1 (Tutorial) hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): CS333	LAB COURSE NAME: Application Software Development Lab

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY% MARKS
I	**Introduction:** Data: structured, semi-structured and unstructured data**,** Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS. Database architectures and classification. (Reading: ElmasriNavathe, Ch. 1 and 2. Additional Reading: Silbershatz, Korth, Ch. 1) **Entity-Relationship Model:** Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Relationships of degree greater than 2 (Reading: ElmasriNavathe, Ch. 7.1-7.8)	6	15
II	**Relational Model:** Structure of relational Databases, Integrity Constraints, synthesizing ER diagram to relational schema (Reading: ElmasriNavathe, Ch. 3 and 8.1, Additional Reading: Silbershatz, Korth, Ch. 2.1-2.4) **Database Languages:** Concept of DDL and DML relational algebra (Reading: Silbershatz, Korth, Ch 2.5-2.6 and 6.1-6.2, ElmasriNavathe, Ch. 6.1-6.5)	6	15
III	**Structured Query Language (SQL**): Basic SQL Structure, examples, Set operations, Aggregate Functions, nested sub-queries (Reading: ElmasriNavathe, Ch. 4 and 5.1) **Views, assertions and triggers** (Reading: ElmasriNavathe, Ch. 5.2-5.3, Silbershatz, Korth Ch.5.3).	07	15

IV	**Relational Database Design:** Different anomalies in designing a database, normalization, functional dependency (FD), Armstrong's Axioms, closures, Equivalence of FDs, minimal Cover (proofs not required). Normalization using functional dependencies, INF, 2NF, 3NF and BCNF, lossless and dependency preserving decompositions (Reading: Elmasri and Navathe, Ch. 14.1-14.5, 15.1-15.2. Additional Reading: Silbershatz, Korth Ch. 8.1-8.5)	7	15

V	**Physical Data Organization**: index structures, primary, secondary and clustering indices, Single level and Multi-level indexing, B-Trees and B+- Trees (basic structure only, algorithms not needed **Query Optimization**: heuristics-based query optimization (Reading Elmasri and Navathe, Ch. 18.1- 18.3, 18.6-18.8)	08	20
VI	**Transaction Processing Concepts:** overview of concurrency control and recovery acid properties, serial and concurrent schedules, conflict serializability. Two-phase locking, failure classification, storage structure, stable storage, log based recovery, deferred database modification, check-pointing, (Reading Elmasri and Navathe, Ch. 20.1-20.5 (except 20.5.4-20.5.5) ,Silbershatz, Korth Ch. 15.1 (except 15.1.4-15.1.5), Ch. 16.1 – 16.5) R**ecent topics (preliminary ideas only):** Semantic Web and RDF(Reading: Powers Ch.1, 2), GIS, biological databases (Reading: Elmasri and Navathe Ch. 23.3-23.4) Big Data (Reading: Plunkett and Macdonald, Ch. 1, 2)	08	20

TEXT/REFERENCEBOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Elmasri R. and S. Navathe, *Database Systems: Models, Languages, Design andApplication Programming*, Pearson Education, 2013.
T2	Sliberschatz A., H. F. Korth and S. Sudarshan, *Database System Concepts*, 6/e, McGraw Hill, 2011.
R1	Powers S., *Practical RDF*, O'Reilly Media, 2003.
R2	Plunkett T., B. Macdonald, *et al.*, *Oracle Big Data Hand Book*, Oracle Press, 2013.

COURSEPRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
CS205	Data structures	To learn how data are stored and organized	**I & II**

COURSE OBJECTIVES:

1	To impart the basic understanding of the theory and applications of database management systems.
2	To give basic level understanding of internals of database systems.
3	To expose to some of the recent trends in databases.

COURSE OUTCOMES:

CO's	DESCRIPTION
CO1	The students will be able to define, explain and illustrate the fundamental concepts of databases. (Level 2)
CO2	The students will be able to construct an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures. (Level 3)
CO3	The students will be able to model and design a relational database following the design principles (Level 6)
CO4	The students will be able to develop queries for relational database in the context of practical applications (Level 3)
CO5	The students will be able to define, explain and illustrate fundamental principles of data organization, query optimization and concurrent transaction processing. (Level 2)
CO6	The students will be able to appreciate the latest trends in databases.(Level 5)

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 3	PSO 3
CO1	1	1	2	-	-	_	_	_	_	_	_	_	1	2	_
CO2	3	2	2	-	_	_	_	_	_	_	_	_	1	2	_
CO3	2	2	2	-	-	_	_	_	_	_	_	_	1	2	_
CO4	2	1	2	_	2	_	_	_	_	_	_	_	1	-	_
CO5	2	2	2	-	-	_	_	_	_	_	_	_	-	2	-
CO6	3	2	2	-	-	-	_	_	_	_	_	_	1	2	_

JUSTIFICATION FOR CO-PO-PSO CORRELATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	As students could just classify different data models
CO1	PO2	Students could identify functionalities of DBMS
CO1	PO3	Knowledge in architecture of DBMS help students to clearly understand the functionalities of DBMS
CO2	PO1	Students will be able to classify different SQL queries
CO2	PO2	Students will be able to identify formal query languages in database.
CO2	PO3	Students will be able to understand the formulation and working of SQL queries
CO3	PO1	Students will be able to identify oracle database structure
CO3	PO2	Students will be able to classify different indexing schemes used in retrieval
CO3	PO3	Students gain competency in PL/SQL programming.
CO4	PO1	Students will be able to identify different normalization procedures used in database design
CO4	PO2	Students will gain knowledge in classifying different normal forms
CO4	PO3	Students gain competency in designing database following normal form standards.
CO4	PO5	Students will be to apply proper normalization for developing well tuned database
CO5	PO1	Students will be able to describe transaction processing and related issues
CO5	PO2	Students will be able to classify different concurrency control techniques.
CO5	PO3	Students gain competency in understanding different query processing & optimization.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Students gain knowledge in E-R modelling
CO1	PSO2	Students acquire competency in building E-R models of database
CO2	PSO1	Understanding of the working of different SQL queries is required in interacting with database
CO2	PSO2	Students acquire competency in developing SQL queries to interact with database
CO3	PSO1	Understanding of the indexing schemes in database
CO3	PSO2	Students acquire competency in developing PL/SQL programs
CO4	PSO1	Understanding of the normalization schemes for database design in developing normalized database
CO5	PSO2	Studentsacquireknowledgeintransactionprocessingandrelated issues, concurrency control and query processing andoptimization

CS232 Free and Open Source Software Lab

COURSE INFORMATION SHEET

PROGRAMME: **COMPUTER SCIENCE &ENGINEERING**	DEGREE: **BTECH**
COURSE**: FREE AND OPEN SOURCE SOFTWARE LAB**	SEMESTER: **IV** CREDITS:**1**
COURSECODE: **CS232** REGULATION**:2016**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN**: SYSTEM SOFTWARE CONCEPTS**	CONTACT HOURS: **3 Lab hours/ Week**.
CORRESPONDING LAB COURSE CODE (IF ANY): **NIL**	LAB COURSE NAME: **NIL**

SYLLABUS:

1. Getting started with Linux basic commands for directory operations, displaying directory structure in tree formatetc.

2. Linux commands for operations such as redirection, pipes, filters, job control, changing ownership/permissions offiles/links/directory.

3. Advanced linux commands curl, wget, ftp, ssh andgrep

4. Shell Programming : Write shell script to show various system configurationlike
   - Currently logged user and his loginname
   - Your currentshell
   - Your homedirectory
   - Your operating systemtype
   - Your current pathsetting
   - Your current workingdirectory
   - Number of users currently loggedin

5. Write shell script to show various system configurationslike
   - your OS and version, release number, kernelversion
   - all availableshells
   - computer CPU information like processor type, speedetc
   - memoryinformation
   - hard disk information like size of hard-disk, cache memory, modeletc
   - File system(Mounted)

6. Write a shell script to implement a menu driven calculator with followingfunctions
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Modulus

7. Write a script called addnames that is to be called asfollows
./addnamesulist username

Here *ulist*is the name of the file that contains list of user names and *username* is a particular student's username. The script should

- check that the correct number of arguments was received and print a message, in case the number of arguments isincorrect
- check whether the ulist file exists and print an error message if it doesnot
- check whether the username already exists in the file. If the username exists, print a message stating that the name already exists. Otherwise, add the username to the end of thelist.

8. Version Control System setup and usage using GIT. Try the followingfeatures.

- Creating arepository
- Checking out arepository
- Adding content to therepository
- Committing the data to arepository
- Updating the localcopy
- Comparing differentrevisions
- Revert
- Conflicts and a conflictResolution

9. Shell script which starts on system boot up and kills every process which uses more than a specified amount of memory orCPU.

10. Introduction to packet management system: Given a set of RPM or DEB, build and maintain, and serve packages over http or ftp. Configure client systems to access the packagerepository.

11. Perform simple text processing using Perl,Awk.

12. Running PHP: simple applications like login forms after setting up a LAMPstack

13. Virtualization environment (e.g., xen, kqemu, virtualbox or lguest) to test applications, new kernels and isolate applications. It could also be used to expose students to other alternate OS such asfreeBSD

14. Compiling from source: learn about the various build systems used like the auto* family, cmake, ant etc. instead of just running the commands. This could involve the full process like fetching from a cvs and also include autoconf, automakeetc.,

15. Kernel configuration, compilation and installation: Download / access the latest kernel source code from *kernel.org*, compile the kernel and install it in the local system. Try to view the source code of thekernel

16. GUI Programming: Create scientific calculator – using any one of Gambas, GTK,QT

17. Installing various software packages. Either the package is yet to be installed or an older version is present. The student can practice installing the latest version. (Internet access isneeded).

- Install samba and share files towindows

- Install Common Unix PrintingSystem(CUPS)

18. Set up the complete network interface by configuring services such as gateway, DNS, IP tables etc. using*ifconfig*

LAB CYCLE

Day 1

1. Study on basic Linux commands. (ls, cd, mkdir, man, info, rmetc..)
2. Study on files and process management commands. (jobs, ps, fg, bg, top,etc..)

Day 2

3. Study on simple Shell scripting.

Write simple shell scripts todisplay:

Currently logged user and his log
name Your current shell
Your home directory
Your operating system type
Your current path setting
Your current working directory
Show currently logged number of users

Day 3

4. Study on shell scripts to extract and list system configurations.

Write simple shell scripts todisplay:

Your OS and version, release number, kernel
version Show all available shells
Show mouse settings
Show computer CPU information like processor type, speed
etc Show memory information
Show hard disk information like size of harddisk, cache memory, model
etc File system (Mounted)

Day 4

5. Study on advanced Linux commands. (curl, wget, ftp, ssh, grep, find, locate, script, screen etc..)

Day 5

6. Setup of version control system GIT.

Using GIT do thefollowing:

- Create arepository
- Check out arepository

- Add content to therepository
- Commit the data to arepository
- Update the localcopy
- Compare differentrevisions
- Revert
- Conflicts and Solve aconflict

Day 6

7. Simple Text Processing using PERL,AWK

Day 7

8. Set up the complete network interface by configuring services such as gateway, DNS, IP tables etc. usingifconfig

Day 8

9. Study on Debian package management system.
apt, aptitude.
Preparing sources list.
Installing, upgrading and uninstalling packets.
10. Study on installing an application from sourcecode.

Day 9

11. Setting up and configuring LAMP to run a simple PHP application with user authenticationsystem.

Day 10

12. Study on installation of VirtualBox. Create a virtual machine with given specification usingVirtualbox.

Day 11

13. Compiling from source: learn about the various build systems used like the auto* family, cmake, ant etc. instead of just running thecommands.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
CS 204	OPERATING SYSTEMS	OS concepts	S4

COURSE OBJECTIVES:

1	To expose students to FOSS environment and introduce them to use open source packages in open source platform.

COURSE OUTCOMES:

SNO	DESCRIPTIO N	Bloom's Taxonomy Level
CS232.1	Identify and apply various Linux commands	Apply (Level 3)
CS232.2	Develop shell scripts and GUI for specific needs	Apply (Level 3)
CS232.3	Use tools like GIT	Understand (Level 2)
CS232.4	Perform basic level application deployment, kernel configuration and installation, packet management and installation etc.	Knowledge (Level 1)

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P0 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS232.1	3	-	2	-	-	-	-	-	-	-	-	-	2	2	-
CS232.2	3	-	2	-	-	-	-	-	-	-	-	-	2	2	-
CS232.3	1	-	1	-	1	-	-	-	-	-	-	-	1	1	1
CS232.4	1	-	1	-	1	-	-	-	-	-	-	-	1	1	1
CS232	**2**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**

JUSTIFICATIONS FOR CO-PO MAPPING

CO's	PO's	JUSTIFICATION
CO1	PO1	The knowledge about Linux commands is needed to solve complex problems
CO1	PO3	The knowledge about Linux commands is needed for the design and development of solutions tocomplex problems.
CO2	PO1	The knowledge of shell scripts and GUI is helpful when solving complex problems
CO2	PO3	The knowledge of shell scripts and GUI is helpful when designing and developing solutions to complex problems.
CO3	PO1	The knowledge of how to use GIT Is useful to solve complex problems.
CO3	PO3	The knowledge of usage of GIT helps to design and develop solutions to complex problems.

CO3	PO5	Students get an idea on usage of GIT tool.
CO4	PO1	The knowledge to perform basic level application deployment, kernel configuration and installation, packet management and installation etc. helps in solving complex engineeringproblems.
CO4	PO3	The knowledge to perform basic level application deployment, kernel configuration and installation, packet management and installation etc. helps in designing and developing solutions to complex engineering problems.
CO4	PO5	The knowledge to perform basic level application deployment, kernel configuration and installation, packet management and installation etc. helps to use any new OS.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Knowledge of Linux commands help to design solutions.
CO1	PSO2	The knowledge of Linux commands helps to develop software skills.
CO1	PSO2	The knowledge of shell scripts and GUI helps to enrich the software skills.
CO3	PSO1	Knowledge of GIT is a core concept in computerscience which can be applied to design solutions for complex engineering problems.
CO3	PSO2	The knowledge of GIT helps to enhance the software development skills.
CO3	PSO3	GIT helps to improve the professional side of a programmer.
CO4	PSO1	The knowledge to perform basic level application deployment, kernel configuration and installation, packet management and installation etc. helps to design efficient software solutions for problems in multi- disciplinary areas.
CO4	PSO2	The knowledge to perform basic level application deployment, kernel configuration and installation, packet management and installation etc. helps in developing software skills.
CO4	PSO3	The knowledge to perform basic level application deployment, kernel configuration and installation, packet management and installation etc. helps tocreate a new OS.

CS 234 DIGITAL SYSTEMS LAB

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course **: Digital Systems Lab**	Course code**: CS 234**
L-T-P**: 0-0-3**	Credit**:1**

EXPERIMENTS:

12 exercises / experiments are mandatory

1. Familiarizations and verification of the truth tables of basic gates and universal gates.
2. Verification of Demorgan's laws for two variables.
3. Implementation of half adder and full adder circuits using logic gates.
4. Implementation of half subtractor and full subtractor circuits using logic gates.
5. Implementation of parallel adder circuit.
6. Realization of 4 bit adder/subtractor and BCD adder circuits using IC 7483.
7. Implementation of a 2 bit magnitude comparator circuit using logic gates.
8. Design and implementation of code convertor circuits
   a) BCD to excess 3 code b) binary to gray code
10. Implementation of multiplexer and demultiplexer circuits using logic gates. Familiarization with various multiplexer and demultiplexer ICs.
11. Realization of combinational circuits using multiplexer/demultiplexer ICs.
12. Implementation of SR, D, JK, JK master slave and T flip flops using logic gates. Familiarization with IC 7474 and IC 7476.
13. Implementation of shift registers using flip flop Integrated Circuits.
14. Implementation of ring counter and Johnson counter using flip flop Integrated Circuits.
15. Realization of asynchronous counters using flip flop ICs.
16. Realization of synchronous counters using flip flop ICs. Familiarization with various counters Integrated Circuits.
17. Implementation of a BCD to 7 segment decoder and display.
18. Simulation of Half adder, Full adder using VHDL.

(Note: The experiments may be done using hardware components and/or VHDL)

TEXT BOOKS /REFERENCES:

1	Mano M. M. and M. D Ciletti, Digital Design, 4/e, Pearson Education, 2008.

2	Floyd T. L., Digital Fundamentals, 10/e, Pearson Education, 2009.
3	M. Morris Mano, Computer System Architecture, 3/e, Pearson Education, 2007.
4	Harris D. M. and, S. L. Harris, Digital Design and Computer Architecture, 2/e, Morgan Kaufmann Publishers, 2013
5	Tokheim R. L., Digital Electronics Principles and Applications, 7/e, Tata McGraw Hill, 2007.
6	Mano M. M. and M. D Ciletti, Digital Design, 4/e, Pearson Education, 2008.
7	Leach D, Malvino A P, Saha G, Digital Principles and Applications, 8/e, McGraw Hill Education, 2015.
8	Rajaraman V. and T. Radhakrishnan, An Introduction to Digital Computer Design, 5/e, Prentice Hall India Private Limited, 2012.
9	Mano M. M., Digital Logic & Computer Design, 4/e, Pearson Education, 2013.

PREREQUISITE : CS203 Switching theory and logic design

COURSE OBJECTIVES:

1	To familiarize students with digital ICs, the building blocks of digital circuits
2	To provide students the opportunity to set up different types of digital circuits and study their behavior

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Identify and explain the digital ICs and their use in implementing digital circuits.
2	Design and implement different kinds of digital circuits.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	3		2					1						2	
CO2	3	3	3	2					1						2	
CO3	3	3	3	2					1						2	
CO4	3	3	3	2	2				1						2	
CO5	3	3	3	2	2										2	
CO6	3	3	3	2	2				1						2	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	**PO1**	Study of Logic gates
	PO2	Boolean Algebra and its minimization
	PO4	Individual and group assignments
	PO9	Study of different logic gate IC's
CO2	**PO1**	Truth table and Sop simplification
	PO2	Analysis of combinational logic circuits
	PO3	Design of combinational logic circuits
	PO4	Individual and group assignments and design problems
	PO9	Study of different digital circuits and applications
CO3	**PO1**	Truth table and excitation table for flip flops
	PO2	Analysis of Shift registers and its application
	PO3	Counter circuits are needed for most of the social related digital systems
	PO4	Individual and group assignments and design problems
	PO9	Study of different sequential circuits and its applications
CO4	**PO1**	Logic gates, Flip Flops
	PO2	Analysis of digital circuits used in day to day life
	PO3	Design circuits like digital display, event counters , token display, etc
	PO4	Individual and group assignments and decoder circuits
	PO5	Design of digital circuits used in various applications.
	PO9	Study of different sequential circuits and its applications
CO5	**PO1**	Truth table and excitation table for flip flops
	PO2	Analysis of Shift registers and its applications
	PO3	Design circuits like digital display, event counters , token display, etc
	PO4	Individual and group assignments and decoder circuits
	PO5	Design of digital circuits used in various applications.
CO6	**PO1**	Logic gates, Flip Flops
	PO2	Analysis of digital circuits used in day to day life
	PO3	Design circuits like digital display, event counters , token display, etc
	PO4	Individual and group assignmen ts and decoder circuits
	PO5	Design of digital circuits used in various applicatio ns.
	PO9	Study of different sequential circuits and its applicatio ns

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	**PSO2**	Boolean Algebra and its minimization is used to design and implement digital circuits
CO2	**PSO2**	Students will be able to Design of digital circuits used in various applications
CO3	**PSO2**	
CO4	**PSO2**	
CO5	**PSO2**	
CO6	**PSO2**	

SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY

COURSE HANDBOOK

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SEMESTER V

CS301 THEORY OF COMPUTATION

COURSE INFORMATION SHEET:

Program: **Computer Science and Engineering**	Degree :**B-Tech**
Course**: Theory of Computation**	Course code**: CS 301**
L-T-P**: 3-1-0-4**	Credit**:5**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to Automata Theory and its significance. Type 3 Formalism: Finite state automata – Properties of transition functions, Designing finite automata, NFA, Finite Automata with Epsilon Transitions, Equivalence of NFA and DFA, Conversion of NFA to DFA, Equivalence and Conversion of NFA with and without Epsilon Transitions.	10	15%
II	Myhill-Nerode Theorem, Minimal State FA Computation. Finite State Machines with Output- Mealy and Moore machine (Design Only), Two- Way Finite Automata. Regular Grammar, Regular Expressions, Equivalence of regular expressions and NFA with epsilon transitions. Converting Regular Expressions to NFA with epsilon transitions Equivalence of DFA and regular expressions, converting DFA to Regular Expressions.	10	15%
III	Pumping Lemma for Regular Languages, Applications of Pumping Lemma. Closure Properties of Regular sets (Proofs not required), Decision Problems related with Type 3 Formalism Type 2 Formalism:- Context-Free Languages (CFL), Context-Free Grammar (CFG), Derivation trees, Ambiguity, Simplification of CFG, Chomsky Normal Form, Greibach normal forms	9	15%
IV	Non-Deterministic Pushdown Automata (NPDA), design. Equivalence of acceptance by final state and empty stack in PDA. Equivalence between NPDA and CFG, Deterministic Push Down Automata, Closure properties of CFLs (Proof not required), Decision Problems related with Type 3 Formalism	8	15%
V	Pumping Lemma for CFLs, Applications of Pumping Lemma. **Type 1 Formalism:** Context-sensitive Grammar. Linear	9	20%

	Bounded Automata (Design not required) **Type 0 Formalism:** Turing Machine (TM) – Basics and formal definition, TMs as language acceptors, TMs as Transducers, Designing Turing Machines.		
VI	Variants of TMs -Universal Turing Machine, Multi- tape TMs, Non Deterministic TMs, Enumeration Machine (Equivalence not required), Recursively Enumerable Languages, Recursive languages, Properties of Recursively Enumerable Languages and Recursive Languages, Decidability and Halting Problem. Chomsky Hierarchy	8	20%

TEXT BOOKS:

1	John E Hopcroft, Rajeev Motwani and Jeffrey D Ullman, Introduction to Automata Theory, Languages, and Computation, 3/e, Pearson Education, 2007
2	John C Martin, Introduction to Languages and the Theory of Computation, TMH, 2007
3	Michael Sipser, Introduction To Theory of Computation, Cengage Publishers, 2013

REFERENCES:

1	Dexter C. Kozen, Automata and Computability, Springer1999

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce the concept of formal languages.	
2	To discuss the Chomsky classification of formal languages with discussion on grammar and automata for regular, context-free, context sensitive and unrestricted languages	
3	To discuss the notions of decidability and halting problem	

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Classify formal languages into regular, context-free, context sensitive and unrestricted languages
2	Design finite state automata, regular grammar, regular expressions and Myhill Nerode Theorem
3	Design push-down automata and context-free grammar representations for context-free languages

4	Understand Pumping Lemma of CFL and Linear Bounded Automata Design and Context Sensitive Language
5	Design Turing Machines for accepting recursive languages and recursive enumerable languages.
6	Understand the notions of decidability and undecidability of problems, Halting problem

CO-PO-PSO MAPPING:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**		**PSO 1**	**PSO 2**	**PSO 3**
CO 1	-	3	3	-										-	-	2
CO 2	1	3	3	-										-	-	2
CO 3		3	3	3										-	-	2
CO 4		3	3	3										-	-	2
CO 5	3			3												
CO 6	3			3												

CO-PO MAPPING JUSTIFICATION:

CO's	**PO's**	**JUSTIIFICATION**
CO1	**PO2**	Analyze the problem in linguistic sense.
	PO3	Design new formal methods to solve the problem with various constraints.
CO2	**PO1**	Basic mathematical skill to design language specific automata models.
	PO2	Analyze regular expressions and automata for better tracking of solutions
	PO3	Design new automata for complex problems.
CO3	**PO2**	Analyze CFG to solve more complex problems
	PO3	Design Push Down automata or Stack Machine to simulate system components.

	PO4	Conduct various investigations on effectiveness of PDA
CO4	**PO2**	Analyze CSG to solve more complex problems
	PO3	Design Linear Bounded automata to simulate system components.
	PO4	Conduct various investigations on effectiveness of LBA
CO5	**PO1**	Analyze the problems based on unary or binary logic.
	PO4	Conduct investigations on strength of Turing Machine
CO6	**PO1**	Theoretical analysis on strength of algorithms
	PO4	Investigate the challenging problem of undecidability.

CO-PSO MAPPING JUSTIFICATION:

CO's	**PSO's**	**JUSTIFICATION**
CO1	**PSO3**	Design of hardware using automata
CO2	PSO3	Design of new logic
CO3	PSO3	Design of language based systems
CO4	PSO3	Design of new automatic hardware using state machines.

CS 204 OPERATING SYSTEM

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course: **System Software**	Course code**: CS303**
L-T-P**: 3-1-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction : System Software Vs. Application Software, Different System Software– Assembler, Linker, Loader, Macro Processor, Text Editor, Debugger, Device Driver, Compiler, Interpreter, Operating System(Basic Concepts only) SIC & SIC/XE Architecture, Addressing modes, SIC & SIC/XE Instruction set, Assembler Directives and Programming.	8	15
II	Assemblers Basic Functions of Assembler. Assembler output format – Header, Text and End Records- Assembler data structures, Two pass assembler algorithm, Hand assembly of SIC/XE program, Machine dependent assembler features.	6	15
III	Assembler design options: Machine Independent assembler features – program blocks, Control sections, Assembler design options- Algorithm for Single Pass assembler, Multi pass assembler, Implementation example of MASM Assembler	7	15
IV	Assembler design options: Machine Independent assembler features – program blocks, Control sections, Assembler design options- Algorithm for Single Pass assembler, Multi pass assembler, Implementation example of MASM Assembler	7	15
V	Macro Preprocessor:- Macro Instruction Definition and Expansion. One pass Macro processor Algorithm and data structures, Machine Independent Macro Processor Features, Macro processor design options	7	20
VI	Device drivers: Anatomy of a device driver, Character and block device drivers, General design of device drivers Text Editors: Overview of Editing, User Interface, Editor Structure. Debuggers :- Debugging Functions and Capabilities, Relationship with other parts of the system, Debugging	8	20

	Methods- By Induction, Deduction and Backtracking.		

TEXT BOOKS:

1	Leland L. Beck, System Software: An Introduction to Systems Programming, 3/E, Pearson Education Asia, 1997.

REFERENCES:

1	Systems Programming and Operating Systems – D.M. Dhamdhere, Tata McGraw Hill Second Revised Edition.
2	Writing UNIX device drivers - George Pajari -Pearson Education Asia.
	Systems Programming – John J. Donovan, Tata McGraw Hill Edition 1991
	System Software – J Nithyashri –Second Edition- Tata McGraw Hill
3	Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, Linux Device Drivers, Third Edition, O.Reilly Books
4	M. Beck, H. Bohme, M. Dziadzka, et al., Linux Kernel Internals, Second Edition, Addison Wesley Publications
5	Peter Abel, IBM PC Assembly Language and Programming, Third Edition, Prentice Hall of India.
6	http://gcc.gnu.org/onlinedocs/gcc-2.95.3/cpp_1.html - The C Preprocessor

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To make students understand the design concepts of various system software like Assembler, Linker, Loader and Macro pre-processor, Utility Programs such as Text Editor and Debugger.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to distinguish different software into different categories.
2	Students will be able to design, analyze and implement one pass, two pass or multi pass assembler
3	Students will be able to design, analyze and implement loader and linker.
4	Students will be able to design, analyze and implement macro processors
5	Students will be able to critique the features of modern editing /debugging Tools.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO1	3	1	_	_	_	_	_	_	_	_	_	_		1	_	_

CO2	3	3	_	_	_	_	_	_	_	_	_	_		1	_	_
CO3	2	2	_	_	_	_	_	_	_	_	_	_		2	_	_
CO4	2	2	_	_	_	_	_	_	_	_	_	_		1	1	_
CO5	3	2	_	_	_	_	_	_	_	_	_	_		_	_	_

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	Students can identify the softwares using the concepts learnt
CO1	PO2	Students can analyse and explain the working of the existing softwares
CO2	PO1	Students can analyze the functioning of an assembler
CO2	PO2	Students can explain the variants of the existing one using the concepts learnt
CO3	PO1	Algorithms learnt can be extrapolated to create new system softwares
CO3	PO2	Algorithms learnt can be used to design new loading schemes
CO4	PO1	Algorithms can be formulated using engineering principles
CO4	PO2	Algorithms formulated can be converted into code using suitable programming languages
CO5	PO1	Students can identify and explain the softwares for the new advancements in the field.
CO5	PO2	Students can identify and explain the softwares for the new advancements in the field.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Students can identify and analyse the softwares
CO2	PSO1	Identify the existing softwares and also explain their working
CO3	PSO1	Design solutions for the softwares that are required by the system
CO4	PSO1	Write algorithms and also decide on the various concepts of programming
CO4	PSO2	Suitable programming strategies can be applied to convert the algorithms to programs

CS305 MICROPROCESSORS AND MICROCONTROLLERS

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree : **B-Tech**
Course**: Microprocessors and Microcontrollers**	Course code**: CS 305**
L-T-P**:2-1-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Evolution of microprocessors, 8086 Microprocessor - Architecture and signals, Memory organisation, Minimum and maximum mode of operation, Minimum mode Timing Diagram. Comparison of 8086 and 8088.	7	15
II	8086 Addressing Modes, 8086 Instruction set and Assembler Directives - Assembly Language Programming with Subroutines, Macros, Passing Parameters, Use of stack.	8	15
III	Interrupts - Types of Interrupts and Interrupt Service Routine. Handling Interrupts in 8086, Interrupt programming. Basic Peripherals and their Interfacing with 8086 - Programmable Interrupt Controller - 8259 - Architecture.	7	15
IV	Interfacing Memory, I/O, 8255 - Detailed study - Architecture, Control word format and modes of operation, Architecture and modes of operation of 8279 and 8257 (Just mention the control word, no need to memorize the control word format)	7	15
V	Microcontrollers - Types of Microcontrollers - Criteria for selecting a microcontroller - Example Applications. Characteristics and Resources of a microcontroller. Organization and design of these resources in a typical microcontroller - 8051. 8051 Architecture, Register Organization, Memory and I/O addressing, Interrupts and Stack.	8	20
VI	8051 Addressing Modes, Different types of instructions and Instruction Set, Simple programs. Peripheral Chips for timing control - 8254/8253.	8	20

TEXT BOOKS:

1	Bhurchandi and Ray, Advanced Microprocessors and peripherals, Third Edition McGraw Hill, 2012
2	Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design,

	Pearson Education, 2011.
3	Douglas V. Hall, SSSP Rao, Microprocessors and Interfacing, Third Edition, McGrawHill Education, 2012.

REFERENCES:

1	Barry B. Brey, The Intel Microprocessors – Architecture, Programming and Interfacing, Eigth Edition, Pearson Education, 2015
2	A. NagoorKani, Microprocessors and Microcontrollers, Second Edition, Tata McGraw Hill, 2012.

PREREQUISITE:

CS 202 COMPUTER ORGANIZATION AND ARCHITECTURE

COURSE OBJECTIVES:

1	To impart basic understanding of the internal organisation of 8086 Microprocessor and 8051 microcontroller.
2	To introduce the concepts of interfacing microprocessors with external devices.
3	To develop Assembly language programming skills.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Describe different modes of operations of a typical microprocessor and microcontroller
2	Design and develop 8086 assembly language programs using software interrupts and various assembler directives.
3	Interface microprocessors with various external devices.
4	Analyze and compare the features of microprocessors
5	Analyze and compare the features of microcontrollers
6	Design and develop assembly language programs using 8051 microcontrollers.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12		PSO 1	PSO 2	PSO 3
CO 1	**3**	**2**	**1**											**3**		
CO 2		**1**	**3**		**2**									**3**	**2**	**1**

CO 3		**2**	**3**	**1**	**2**									**3**		
CO 4	**2**	**3**	**1**											**2**		
CO 5	**2**	**3**	**1**											**2**		
CO 6		**1**	**3**		**2**									**3**	**2**	**1**

CO-PO MAPPING JUSTIFICATION:

CO1	**PO1**	**3**	Understand the different modes of operations of microprocessor and microcontroller and apply its knowledge for the solve embedded system issues
	PO2	**2**	Analyse the problems associated with embedded applications and arrive at proper conclusions
	PO3	**1**	Design solutions for problems associated with microprocessor & microcontroller applications
CO2	**PO2**	**1**	Analyze problems associated with microprocessors and use assembly language programs to solve these problems
	PO3	**3**	Develop an assembly language program to meet the specification needed for 8086 application
	PO5	**2**	Select appropriate software and hardware tools for developing a 8086 application
CO3	**PO2**	**2**	Analyze the problems of interfacing a microprocessor with external devices and find appropriate solutions by applying the concepts of interfacing
	PO3	**3**	Design interfacing circuitry and develop assembly language program to interface 8086 with various external devices
	PO4	**1**	Understand the concept of interfacing and use it for design of valid solutions
	PO5	**2**	Select appropriate software and hardware tools for interfacing 8086 with external devices
CO4	**PO1**	**2**	Apply the knowledge of microprocessor and microcontroller features to solve the complex problems
	PO2	**3**	Analyse and compare features of 8086 and 8051 to formulate appropriate solutions
	PO3	**1**	Design appropriate system based on the feature comparison
CO5	**PO1**	**2**	Apply the knowledge of microcontroller features to solve the complex problems
	PO2	**3**	Analyse and compare features of 8051 to formulate appropriate solutions
	PO3	**1**	Design appropriate system based on the feature comparison
CO6	**PO2**	**1**	Analyse problems associated with microcontroller and use assembly language programs to solve these problems
	PO3	**3**	Develop an assembly language program to meet the specification needed for

			8051 application
	PO5	**2**	Select appropriate software and hardware tools for developing 8051 application

CO-PSO MAPPING JUSTIFICATION:

CO1	**PSO1**	**3**	Graduates will be able to design and develop microprocessor and microcontroller applications after understanding its various modes of operations
CO2	**PSO1**	**3**	Graduates will be able to design and develop assembly language programs to provide hardware and software solutions to microprocessor design
	PS02	**2**	Graduates will be able to use the concept of software of interrupts and assembler directives to create microprocessor applications
	PS03	**1**	Graduates will be able to posses a new area of programming concepts and can contribute to research of microprocessors
CO3	**PSO1**	**3**	Graduates will be able to design interface circuitry and develop programs for interfacing microprocessors with various external devices
CO4	**PSO1**	**2**	Graduates will be able to evaluate microprocessor applications by comparing their features
CO5	**PSO1**	**2**	Graduates will be able to evaluate microcontroller applications by comparing their features
CO6	**PSO1**	**3**	Graduates will be able to design and develop assembly language programs to provide hardware and software solutions to microcontroller design
	PS02	**2**	Graduates will be able to use the concept of software of interrupts and assembler directives to create microcontroller applications
	PSO3	**1**	Graduates will be able to possess a new area of programming concepts and can contribute to research of microcontrollers

CS307 Data Communication

COURSE INFORMATION SHEET

PROGRAMME: **COMPUTER SCIENCE &ENGINEERING**	DEGREE:**BTECH**
COURSE: **DATA COMMUNICATION**	SEMESTER: **V** **CREDITS:3**
COURSE CODE: **CS307**	COURSE TYPE: CORE
COURSE AREA/DOMAIN: **NETWORKING & COMMUNICATION**	CONTACT HOURS: **3 hours/Week**.

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Data Transmission: Communication model Simplex, half duplex and full duplex transmission - Periodic Analog signals: Sine wave, phase, wavelength, time and frequency domain, bandwidth - Digital Signals; Digital data Transmission:- Analog & Digital data, Analog & Digital signals, Analog &Digital transmission – Transmission Impairments: Attenuation, Delay distortion, Noise - Channel capacity: Nyquist Bandwidth, Shannon's Capacity formula.	**8**	15
II	Transmission media - Guided Transmission Media: Twisted pair, Coaxial cable, optical fiber, Wireless Transmission, Terrestrial microwave, Satellite microwave. Wireless Propagation: Ground wave propagation, Sky Wave propagation, LoS Propagation.	**7**	15
III	Signal Encoding techniques - Digital Data Digital Signals: NRZ, Multilevel binary, Biphase - Digital Data Analog Signals : ASK, FSK, PSK - Analog Data Digital Signals: Sampling theorem, PCM, Delta Modulation - Analog Data Analog Signals: AM, FM, PM.	**7**	15
IV	Multiplexing- Space Division Multiplexing- Frequency Division Multiplexing: Wave length Division Multiplexing - Time Division multiplexing: Characteristics, Digital Carrier system, SONET/SDH-Statistical time division multiplexing: Cable Modem - Code Division Multiplexing. Multiple Access– CDMA.	**7**	15
V	Digital Data Communication Techniques - Asynchronous transmission, Synchronous transmission- Detecting and Correcting Errors-Types of Errors-Error Detection: Parity check, Cyclic Redundancy Check (CRC) - Error Control Error Correction: Forward Error Correction and Hamming Distance.	**6**	15

VI	Spread Spectrum Techniques-Direct Sequence Spread Spectrum (DSSS), Frequency Hopping Spread Spectrum (FHSS). Basic principles of switching - Circuit Switched Networks, Structure of Circuit Switch – Packet Switching: Datagram Networks, Virtual Circuit Networks, Structure of packet switches.	**7**	20

TEXT/REFERENCEBOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	1. William Stallings, Data and Computer Communication 9/e, Pearson Education,Inc. [Chapters: 4, 5, 6, 7, 8,9]. 2. Forouzan B. A., Data Communications and Networking, 5/e, Tata McGraw Hill,2013. [Chapters:3,4, 5,6,7,8] 3. Schiller J., Mobile Communications, 2/e, Pearson Education, 2009.[Chapters:2,3] 4. Curt M. White, Fundamentals of Networking and Communication 7/e, Cengagelearning. [Chapter 3,4,9,10]
R1	1. Forouzan B. A., Data Communications and Networking, 4/e, Tata McGraw Hill,2007. 2. Tanenbaum A. S. and D. Wetherall, Computer Networks, Pearson Education,2013.

COURSEPRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BE 101-4	Introduction to Electronics Engineering	To get a basic knowledge about signals	**II**
CS203	Switching Theory and Logic design	To get a basic knowledge about how multiplexing and digital logic work	**III**

COURSE OBJECTIVES:

1	*To introduce fundamental communication models*
2	*To discuss various time domain and frequency domain concepts of data communication.*
3	*To introduce the concepts of encoding, multiplexing and spread spectrum.*

COURSE OUTCOMES:

Co's	DESCRIPTION
1.	The students will be able to identify and list the various issues present in the design of a data communication system.
2.	The students will be able to apply the time domain and frequency domain concepts of signals in data communication.
3.	The students will be able to compare and select transmission media based on transmission impairments and channel capacity.
4.	The students will be able to select and use appropriate signal encoding techniques and multiplexing techniques for a given scenario.

5.	The students will be able to design suitable error detection and error correction algorithms to achieve error free data communication and explain different switching techniques.

CO-PO AND CO-PSO MAPPING

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	-	-	3			-	-	-	-	-	-	-	3	-	-
CO4	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-
CO5	1	-	-	3	-	-	-	-	-	-	-	-	2	1	-

JUSTIFICATIONS FOR CO-PO MAPPING

CO's	**PO's**	**Justification**
CO1	PO1	They could apply the knowledge acquired to describe the concepts of data communication systems.
CO2	PO2	Understanding the concepts of time and frequency domain they can design appropriate communication systems.
CO3	PO3	They could apply the knowledge acquired to compare the various transmission mediums.
CO4	PO4	Understanding the concept of signal encoding will help to design appropriate systems for communication.
CO5	PO5	Studies about the various error detection and correction schemes for transmission of data.

CO5	PO5	They could apply the concepts of error detection and correction for creating reliable transmission of data over the network.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Professional Skills: Attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions

CO2	PSO1	Professional Skills: Attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions
CO3	PSO1	Professional Skills: Attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions
CO4	PSO2	Foundation of mathematical concepts: To use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.
CO5	PSO2	Foundation of mathematical concepts: To use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

CS 309 GRAPH THEORY AND COMBINATORICS

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Graph Theory and Combinatorics**	Course code**: CS 309**
L-T-P**:2-0-2**	Credit**:5**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introductory concepts - What is graph – Application of graphs – finite and infinite graphs – Incidence and Degree – Isolated vertex, pendent vertex and Null graph. Paths and circuits – Isomorphism, sub graphs, walks, paths and circuits, Connected graphs, disconnect graphs..	9	15
II	Euler graphs, Hamiltonian paths and circuits, Dirac's theorem for Hamiltonicity, Travelling salesman problem. Directed graphs – types of digraphs, Digraphs and binary relation	10	15
III	Trees – properties, pendent vertex, Distance and centres - Rooted and binary tree, counting trees, spanning trees	7	15
IV	Vertex Connectivity, Edge Connectivity, Cut set and Cut Vertices, Fundamental circuits, Planar graphs, Different representation of planar graphs, Euler's theorem, Geometric dual, Combinatorial dual.	9	15
V	Matrix representation of graphs- Adjacency matrix, Incidence Matrix, Circuit matrix, Fundamental Circuit matrix and Rank, Cut set matrix, Path matrix	8	20
VI	Graphs theoretic algorithms - Algorithm for computer representation of a graph, algorithm for connectedness and components, spanning tree, shortest path.	7	20

TEXT BOOKS:

1	NarasinghDeo, Graph theory, PHI.
2	Douglas B. West, Introduction to Graph Theory, Prentice Hall India Ltd.
3	Robin J. Wilson, Introduction to Graph Theory, Longman Group Ltd.

REFERENCES:

1	R. Diestel,Graph Theory, free online edition: diestel-graph-theory.com/basic.html.

PREREQUISITE:

NIL

COURSE OBJECTIVES:

1	To introduce the fundamental concepts in graph theory, including properties and characterization of graphs/ trees and Graphs theoretic algorithms

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Demonstrate the knowledge of fundamental concepts in graph theory, including properties
2	Understand the characterization of graphs
3	Demonstrate the knowledge of fundamental concepts of trees
4	Distinguish between planar and non-planar graphs and solve problems.
5	Understand the different matrix representations of graph.
6	Develop efficient algorithms for graph related problems in different domains of engineering and science.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3														3	
CO2															3	
CO3	3														3	
CO4	3			3											3	
CO5	3														3	
CO6	3			3		3									3	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	**PO1**	Fundamental knowledge in graph theory will help to analyze the engineering problems very easily
CO3	**PO1**	Basic knowledge about trees will help to analyze the engineering problems
CO4	**PO1**	Planar and non planar graphs will help to solve problems with high complexity in Engineering
CO4	**PO4**	Difference between planar and non planar graphs will help to design solutions to various complex engineering tasks
CO5	**PO1**	Basic knowledge in graph representations will help to model various problems in engineering field.
CO6	**PO1**	Graph theoretic algorithms will help to enrich the analysis of engineering problems.
CO6	**PO4**	Algorithms for graph will help to provide valid conclusions to various complex engineering problems
CO6	**PO6**	Graph theoretic algorithms provides an easier access to the solutions in the professional engineering practice

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	**PSO2**	Fundamental knowledge in graph theory will ensure basic mathematical knowledge
CO2	**PSO2**	Understand the characterization of graphs, will help to model mathematically problems
CO3	**PSO2**	Basic knowledge about trees will help to analyze the mathematical problems
CO4	**PSO2**	By planar graphs mathematical problems can be easily solved
CO5	**PSO2**	Basic knowledge in graph representations will help to model various problems in engineering field.
CO6	**PSO2**	Algorithms for graph will help to provide valid conclusions to various complex mathematical problems

CS361 SOFT COMPUTING

COURSE INFORMATION SHEET:

Program: **COMPUTER SCIENCE & ENGINEERING**	Degree :**B-Tech**
Course**: Soft Computing**	Course code**: CS361**
L-T-P**:3-0-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to Soft Computing Artificial neural networks - biological neurons, Basic models of artificial neural networks – Connections, Learning, Activation Functions, McCulloch and Pitts Neuron, Hebb network.	8	15
II	Perceptron networks – Learning rule – Training and testing algorithm, Adaptive Linear Neuron, Back propagation Network – Architecture, Training algorithm	8	15
III	Fuzzy logic - fuzzy sets - properties - operations on fuzzy operations on fuzzy relations	7	15
IV	Fuzzy membership functions, fuzzification, Methods of membership value assignments – intuition – inference – rank ordering, Lambda –cuts for fuzzy sets, Defuzzification Methods	7	15
V	Truth values and Tables in Fuzzy Logic, Fuzzy propositions, Formation of fuzzy rules - Decomposition of rules – Aggregation of rules, Fuzzy Inference Systems – Mamdani – and – Sugeno - types, - Neuro-fuzzy – hybrid - systems - characteristics - classification.	8	20
VI	Introduction to genetic algorithm, operators in genetic algorithm - coding – selection - cross over – mutation, Stopping condition for genetic algorithm flow, Genetic-neuro hybrid systems, Genetic-Fuzzy rule based system	8	20

TEXT BOOKS:

1	S. N. Sivanandam and S. N.Deepa, Principles of soft computing – Wiley India
2	Timothy J. Ross, Fuzzy Logic with engineering applications – Wiley India

REFERENCES:

1	N. K. Sinha and M. M. Gupta, Soft Computing & Intelligent Systems: Theory & /Elsevier.

	2009.
2	Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc.
3	R. Eberhart and Y. Shi, Computational Intelligence: Concepts to Implementation, 2007.
4	Ross T.J. , Fuzzy Logic with Engineering Applications- McGraw Hill.
5	Driankov D., Hellendoorn H. and Reinfrank M., An Introduction to Fuzzy Control- Narosa Pub.
6	Bart Kosko, Neural Network and Fuzzy Systems- Prentice Hall, Inc., Englewood Cliffs

PREREQUISITE:

NIL

COURSE OBJECTIVES:

1	To introduce the concepts in Soft Computing such as Artificial Neural Networks, Fuzzy logic-based systems, genetic algorithm-based systems and their hybrids.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Learn about soft computing techniques and their applications.
2	Analyze various neural network architectures.
3	Define the fuzzy systems.
4	Understand the genetic algorithm concepts and their applications.
5	Identify and select a suitable Soft Computing technology to solve the problem; construct a solution and implement a Soft Computing solution.
6	**Design & implement** analog circuits using OPAMPs .

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	1	1	3	-	-			_	_	_	_	_		1	3	-
CO2	2	2	3	-	_			_	_	_	_	_		1	3	-
CO3	2	2	3	-	-			_	_	_	_	_		1	3	-
CO4	1	1	2	_	-			_	_	_	_	_		1	-	-
CO5	2	2	3	-	-			_	_	_	_	_	_	_	3	-

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION

CO1	**PO1**	As they could just apply the knowledge of soft computing for solutions to engineering problems
	PO2	Students could arrive at conclusions using principles of softcomputing
	PO3	They can design soft computing systems for societal needs
CO2	**PO1**	Students will be able to describe neural network architectures
	PO2	Students will be able to analyse problems and arrive at conclusions using neural networks.
	PO3	Students will be able to design systems using neural networks
CO3	**PO1**	Students will be able to describe various fuzzy systems
	PO2	Students will be able to describe various fuzzy operations
	PO3	Students gain competency in designing fuzzy inference system
CO4	**PO1**	Students will be able to identify different genetic algorithm operations
	PO2	Students will gain knowledge in applying genetic algorithm Methods
	PO3	Students gain competency in designing a genetic method for a Problem
CO5	**PO1**	Students will be able to identify different soft computing methods for real time problems
	PO2	Students will be able to design algorithms using standard practices in soft computing.
	PO3	Students gain competency in designing and developing their own soft computing system

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	**PSO1**	They can design solutions for complex engineering problems by understanding the core principles of working of human brain.
CO1	**PSO2**	Students acquire competency in designing and developing soft computing algorithms which meets the demands of the industry.
CO2	**PSO1**	Understanding of the working of different neural architectures.
CO2	**PSO2**	Students acquire competency in developing a neural network.
CO3	**PSO1**	Understanding the working of various methods fuzzy systems
CO3	**PSO2**	Students acquire competency in developing good fuzzy inference system
CO4	**PSO1**	Understanding of the design and working of genetic algorithm based method
CO5	**PSO2**	Students acquire competency in design and development of soft computing system in the field of character recognition, Weather forecasting

CS367 LOGIC FOR COMPUTER SCIENCE

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Logic For Computer Science**	Course code**: CS367**
L-T-P**:3-0-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introductory Concepts: Mathematical Logic, Propositional Logic, First Order Logic, Modal and Temporal logic, Program Verification. Propositional Logic: Formulae and interpretations, Equivalence, Satisfiability & Validity, Semantic Tableaux, Soundness and Completeness.	6	15
II	The Hilbert Deductive System, Derived Rules, Theorems and operators, Soundness and Completeness, Consistency. Resolution in Propositional Logic: Conjunctive Normal Clausal form, resolution rule.	6	15
III	Binary Decision Diagrams: Definition, Reduced and ordered BDD, Operators. Predicate Logic: Relations, predicates, formulae and interpretation, logical equivalence, semantic tableaux, soundness.	7	15
IV	The Hilbert deduction system for predicate logic. Functions, PCNF and clausal form, Herbrand model. Resolution in predicate logic: ground resolution, substitution, unification, general resolution.	8	15
V	Temporal logic: Syntax and semantics, models of time, linear time temporal logic, semantic tableaux. Deduction system of temporal logic.	7	20
VI	Program Verification: Need for verification, Framework for verification, Verification of sequential programs, deductive system, verification, synthesis. Modal Logic: Need for modal logic, Case Study: Syntax and Semantics of K, Axiomatic System KC.	8	20

TEXT BOOKS:

1	Modechai Ben-Ari, Mathematical Logic for Computer Science, Springer, 3/e, 2102.
2	Arindhama Singh, Logics for Computer Science, Prentice Hall India, 2004.

REFERENCES:

1	Michael Huth, Mark Ryan, Logic in Computer Science: Modeling and Reasoning about Systems, Cambridge University Press, 2005.

PREREQUISITE: CS205 Data Structures, CS201 Discrete Computational Structures

COURSE OBJECTIVES:

1	To introduce the concepts of mathematical logic and its importance.
2	To discuss propositional, predicate, temporal and modal logic and their applications.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Explain the concept of logic and its importance.
2	Understand fundamental concepts in propositional logic and apply resolution techniques.
3	Understand fundamental concepts in predicate logic and apply resolution techniques.
4	Understand fundamental concepts in temporal logic and apply resolution techniques.
5	Understand the concept of program verification and apply it in real-world scenarios.
6	Understand fundamental concepts in modal logic.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	2	2	2	2										1	2	
CO2	1	1	2											1	2	
CO3	2	1	2	2										1	2	
CO4	1	2	2	3										1	2	
CO5		2	2	2										1	2	
CO6	2	1	2	2										1	2	

CO-PO MAPPING JUSTIFICATION:

CO1	**PO1**	**2**	The knowledge in logic helps in solving complex engineering problems.
	PO2	**2**	The knowledge of Boolean algebra helps in analysis of performance of solutions to complex problems
	PO3	**2**	The knowledge in problem solving helps in designing solutions for complex engineering problems.
	PO4	**2**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
CO2	**PO1**	**1**	The knowledge of propositional logic can be applied to solve complex engineering problems.
	PO2	**1**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using the knowledge of propositional logic and resolution methods
	PO3	**2**	The knowledge of propositional logic can be applied to design solutions to complex engineering problems
CO3	**PO1**	**2**	The knowledge of predicate logic can be applied to solve complex engineering problems
	PO2	**1**	The knowledge of predicate logic can be used to Identify, formulate, review research literature, and analyze complex engineering problems.
	PO3	**2**	The knowledge of predicate logic can be applied to design solutions to complex engineering problems
	PO4	**2**	This knowledge helps in representation, analysis and interpretation of data to provide valid conclusions
CO4	**PO1**	**1**	The knowledge of temporal logic can be applied to solve complex engineering problems
	PO2	**2**	The knowledge of temporal logic can be used to Identify, formulate, review research literature, and analyze complex engineering problems.
	PO3	**2**	The knowledge of temporal logic can be applied to design solutions to complex engineering problems
	PO4	**3**	This knowledge helps in representation, analysis and interpretation of data to provide valid conclusions
CO5	**PO2**	**2**	The knowledge of various techniques can be used to Identify, formulate, review research literature, and analyze complex engineering problems.
	PO3	**2**	The knowledge of various techniques can be applied in designing solutions to complex multidisciplinary engineering problems
	PO4	**2**	This knowledge helps in representation, analysis and interpretation of data to provide valid conclusions
CO6	**PO1**	**2**	The knowledge of modal logic can be applied to solve complex engineering problems
	PO2	**1**	The knowledge of modal logic can be used to Identify, formulate, review research literature, and analyze complex engineering problems.
	PO3	**2**	The knowledge of modal logic can be applied to design solutions to complex engineering problems
	PO4	**2**	This knowledge of KC helps in representation, analysis and interpretation of data to provide valid conclusions

CS 331 SYSTEMS LAB

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course **: Systems Lab**	Course code**: CS 331**
L-T-P**: 0-0-3**	Credit**:1**

SYLLABUS:

12 Experiments are Mandatory

Part A

1. Simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.
   a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
2. Simulate the following file allocation strategies.
   a) Sequential b) Indexed c) Linked
3. Implement the different paging techniques of memory management.
4. Simulate the following file organization techniques *
   a) Single level directory b) Two level directory c) Hierarchical
5. Implement the banker's algorithm for deadlock avoidance.*
6. Simulate the following disk scheduling algorithms. *
   a) FCFS b)SCAN c) C-SCAN
7. Simulate the following page replacement algorithms
   a) FIFO b)LRU c) LFU
8. Implement the producer-consumer problem using semaphores. *
9. Write a program to simulate the working of the dining philosopher's problem.*

Part B

10. Implement the symbol table functions: create, insert, modify, search, and display.
11. Implement pass one of a two pass assembler. *
12. Implement pass two of a two pass assembler. *
13. Implement a single pass assembler. *
14. Implement a two pass macro processor *
15. Implement a single pass macro processor.
16. Implement an absolute loader.
17. Implement a relocating loader.
18. Implement pass one of a direct-linking loader.
19. Implement pass two of a direct-linking loader.
20. Implement a simple text editor with features like insertion / deletion of a character, word, and sentence.
21. Implement a symbol table with suitable hashing.*

TEXT BOOKS /REFERENCES:

1	Leland L. Beck, System Software: An Introduction to Systems Programming, 3/E, Pearson

	Education Asia, 1997.
2	http://gcc.gnu.org/onlinedocs/gcc-2.95.3/cpp_1.html - The C Preprocessor
3	Systems Programming and Operating Systems – D.M. Dhamdhere, Tata McGraw Hill Second Revised Edition.
4	Writing UNIX device drivers - George Pajari -Pearson Education Asia.
5	Systems Programming – John J. Donovan, Tata McGraw Hill Edition 1991
6	System Software – J Nithyashri –Second Edition- Tata McGraw Hill
7	Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, Linux Device Drivers, Third Edition, O.Reilly Books
8	M. Beck, H. Bohme, M. Dziadzka, et al., Linux Kernel Internals, Second Edition, Addison Wesley Publications
9	Peter Abel, IBM PC Assembly Language and Programming, Third Edition, Prentice Hall of India.

PREREQUISITE : Operating System, C-programming, Data structure

COURSE OBJECTIVES:

1	To build an understanding on design and implementation of different types of system software.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Compare and analyze CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
2	Implement basic memory management schemes like paging.
3	Implement synchronization techniques using semaphores etc.
4	Implement banker's algorithm for deadlock avoidance.
5	Implement memory management schemes and page replacement schemes and file allocation and organization techniques.
6	Implement system software such as loaders, assemblers and macro processor.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1			_	3	_	1	_	_	_	_	_	_	1	_	_	
CO2	3	3	_	_	_	_	_	_	_	_	_	_	1	_	_	
CO3	2	2	_	_	_	_	_	_	_	_	_	_	2	_	_	
CO4	2	2		_	_	_	_	_	_	_	_	_	1	1	_	
CO5				3		1										
CO6	3	2		_	_	_	_	_	_	_	_	_	-	_	_	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO4	Students can identify various CPU scheduling algorithms
	PO6	Students can analyze and explain the working of the CPU scheduling
CO2	PO1	Students can analyze basic memory management schemes
	PO2	Students can explain the working of various memory management scheme and analyze the performance
CO3	PO1	Implement synchronization concepts using semaphore
	PO2	Algorithms learnt can be used to find solutions for various synchronization problem
CO4	PO1	Students will analyze the working of bankers algorithm for deadlock avoidance
	PO2	Algorithms formulated can be converted into code using suitable programming languages
CO5	PO4	Students can identify and explain page replacement schemes
	PO6	Students can implement page replacement schemes
CO6	PO1	Students can identify and explain assembler functionality
	PO2	Students can implement the working of one pass and two pass assembler

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Students can identify and analyze the operating system and system software functionality
CO2	PSO1	Identify the existing soft wares and also explain their working
CO3	PSO1	Design solutions for the soft wares that are required by the system
CO4	PSO1	Write algorithms and also decide on the various concepts of programming
CO4	PSO2	Suitable programming strategies can be applied to convert the algorithms to programs

CS333 Application Software Development Lab

COURSE INFORMATION SHEET

PROGRAMME**: COMPUTER SCIENCE & ENGINEERING**	DEGREE: **B.TECH**
COURSE: **Application Software Development Lab**	SEMESTER: **V** CREDITS: **1**
COURSE CODE :**CS333** REGULATION: **2016**	COURSE TYPE: **LAB**
COURSE AREA/DOMAIN: **DATA BASE MANAGEMENT SYSTEM**	CONTACT HOURS: **0-0-3**

SYLLABUS

EXPERIMENTS LIST

List of Exercises/Experiments: (Exercises/experiments marked with * are mandatory from each part. Total 12 Exercises/experiments are mandatory)

1. Creation of a database using DDL commands and writes DQL queries to retrieve information from thedatabase.
2. Performing DML commands like Insertion, Deletion, Modifying, Altering, and Updating records based onconditions.
3. Creating relationship between the databases.*
4. Creating a database to set various constraints.*
5. Practice of SQL TCL commands like Rollback, Commit,savepoint.
6. Practice of SQL DCL commands for granting and revoking userprivileges.
7. Creation of Views and Assertions*
8. Implementation of Build in functions in RDBMS*
9. Implementation of various aggregate functions in SQL*
10. Implementation of Order By, Group By& Having clause.*
11. Implementation of set operators, nested queries and Join queries*
12. Implementation of various control structures using PL/SQL*
13. Creation of Procedures and Functions*
14. Creation of Packages *

15. Creation of database Triggers and Cursors*

16. Practice various front-end tools and reportgeneration.

17. Creating Forms and Menus

18. Mini project (Application Development using Oracle/ MySQL usingDatabase connectivity)*

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
CS208	PRINCIPLES OF DATABASE DESIGN	Gives concepts about the theory and practice of database systems and to exposure to oracle database programming, modelling and design.	**4**

COURSE OBJECTIVES:

1. To introduce basic commands and operations ondatabase.
2. To introduce stored programming concepts (PL-SQL) using Cursors andTriggers.
3. To familiarize front end tools ofdatabase.

COURSE OUTCOMES:

Co's	Description
1	The students will be able design and implement a database for a given problem using database design principles.
2	The students will be able to apply stored programming concepts (PL-SQL) using Cursors and Triggers.
3	The students will be able to use graphical user interface, Event Handling and Database connectivity to develop and deploy applications and applets.
4	The students will be able to develop medium-sized project in a team.

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	1	_	_	_	_	_	_	_	2	2	_
CO2	2	2	2	-	_	_	_	_	_	_	_	_	1	3	_
CO3	2	1	2	-	2	_	_	_	_	_	_	_	1	2	_
CO4	2	1	-	1	3	2	_	_	_	_	_	_	1	3	1

JUSTIFICATIONS FOR CO-PO MAPPING

CO's	PO's	Justification
CO1	PO1	The student becomes able to design a database and include tables in it for data storage.
CO1	PO2	The student can analyze a problem based on its data requirements.
CO1	PO3	The student can design the structure of the tables based on the given problem.
CO1	PO4	Able to interpret the given problem and find out the fields required in the tables and the database.
CO1	PO5	The student becomes well versed in using Oracle for designing database solutions.
CO2	PO1	The student is able to apply the procedural anguage concepts in database design and implementation using PL/SQL.
CO2	PO2	The student is able to analyze a given data manipulation problem using procedural language concepts of SQL.
CO2	PO3	The student can solve a data processing problem and easily handle errors using PL/SQL constructs.
CO3	PO1	The student will be able to use the concepts of GUI, database connectivity in problems.
CO3	PO2	The student will be able to analyze a given problem and determine the requirement of GUI interface and database connectivity for the problem.
CO3	PO3	The student will be able to design applications using the concepts of GUI and applets.
CO3	PO5	The student is able to use modern tools to develop high end applications which use database in the back end.
CO4	PO1	The student gets a general knowledge about how to design and develop a small sized project.
CO4	PO2	The student gets an idea on how to work as a team to analyze a given problem definition.
CO3	PO4	The student is able to perform a feasibility study on a given problem so as to develop a solution to it.
CO4	PO5	The student is able to use modern tools to develop a small database project by working as a team.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO3	PSO1	The student is able to understand the basics of database design and its core principles and apply them for application software development.
CO3	PSO2	The student is able to use the concepts of database design in application development.
CO4	PSO1	The student can use the concepts of triggers and cursors and solve complex database problems.
CO6	PSO2	The student can implement the concepts of triggers, cursors, packages, procedures and functions to build software solutions to data handling problems.
CO6	PSO1	The student is able to design applications combining the concepts of database and GUI.
CO3	PSO2	The student is able to perform database connectivity from front-end applications.
CO3	PSO1	The student is made able to design and develop small sized applications using databases in the back-end.
CO4	PSO3	The student acquires professional skills in developing database solutions.

SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY

COURSE HANDBOOK

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SEMESTER VI

CS 302 DESIGN AND ANALYSIS OF ALGORITHMS

COURSE INFORMATION SHEET:

Program: Computer Science & Engineering	Degree :B-Tech
Course: Design and Analysis of Algorithms	Course code: CS 302
L-T-P:3-1-0	Credit:5

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to Algorithm AnalysisTime and Space ComplexityElementary operations and Computation of Time ComplexityBest, worst and Average Case Complexities- Complexity Calculation of simple algorithms Recurrence Equations:Solution of Recurrence Equations – Iteration Method and Recursion Tree Methods	8	15
II	Master's Theorem(Proof not required) – examples, Asymptotic Notations and their properties- Application of Asymptotic Notations in Algorithm Analysis- Common Complexity Functions AVL Trees – rotations, Red-Black Trees insertion and deletion (Techniques only; algorithms not expected). B-Trees – insertion and deletion operations. Sets- Union and find operations on disjoint sets.	10	15
III	Graphs – DFS and BFS traversals, complexity, Spanning trees – Minimum Cost Spanning Trees, single source shortest path algorithms, Topological sorting, strongly connected components.	7	15
IV	Divide and Conquer:The Control Abstraction, 2 way Merge sort, Strassen's Matrix Multiplication, Analysis Dynamic Programming : The control Abstraction- The Optimality Principle- Optimal matrix multiplication, Bellman-Ford Algorithm	9	15
V	Analysis, Comparison of Divide and Conquer and Dynamic Programming strategies Greedy Strategy: - The Control Abstraction- the Fractional Knapsack Problem, Minimal Cost Spanning Tree Computation- Prim's Algorithm – Kruskal's Algorithm.	9	20
VI	Back Tracking: -The Control Abstraction – The N Queen's Problem, 0/1 Knapsack Problem Branch and Bound:Travelling Salesman Problem. Introduction to Complexity Theory :-Tractable and Intractable Problems- The P and NP Classes- Polynomial Time Reductions - The NP- Hard and NP-Complete Classes	9	20

TEXT BOOKS:

1	Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Computer Algorithms, Universities Press, 2007 [Modules 3,4,5]
2	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, MIT Press, 2009 [Modules 1,2,6]

REFERENCES:

1	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, The Design and Analysis of Computer Algorithms, Pearson Education, 1999.
2	Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson, 3rd Edition, 2011.
3	Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson, 3rd Edition, 2011.
4	Richard E. Neapolitan, Kumarss Naimipour, Foundations of Algorithms using C++ Psuedocode, Second Edition, 1997.

PREREQUISITE:NIL

COURSE OBJECTIVES:

1	To introduce the concepts of Algorithm Analysis, Time Complexity, Space Complexity.
2	To discuss various Algorithm Design Strategies with proper illustrative examples.
3	To introduce complexity theory.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Analyze a given algorithm and express its time and space complexities in asymptotic notations and solve recurrence equations using iteration method, recurrence tree method, and Master's theorem.
2	Solve operations of AVL tree, Red Black tree and B trees.
3	Design algorithms for graph theoretic properties and operations.
4	Design algorithms using Divide and Conquer and Dynamic programming strategies and compare the two strategies.
5	Solve optimization problems using greedy strategy.
6	Design efficient algorithms using backtracking and Branch & Bound techniques for solving problems.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P O7	PO8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO 1	1	1	3	3											3	
CO 2																
CO 3	3															
CO 4	2	2	2		3										3	
CO 5			1	3											3	
CO 6	2	2													3	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	As the students could just define the knowledge acquired
	PO2	Knowledge of algorithm analysis methods helps students in problem analysis
	PO3	Complexity analysis of the engineering solutions will help students to design and develop sustainable solutions.
	PO4	A complexity analysis of the engineering solutions provide Information to provide valid conclusions
CO3	PO1	Fundamental knowledge in graph theory will help to analyze the engineering problems very easily
CO4	PO1	Having the knowledge of different algorithm development strategies students can apply these knowledge in solving complex engineering problems
	PO2	Having the knowledge in algorithm development strategies students could analyze the problem and come to a conclusion on which design principle to be used
	PO3	Having the knowledge in algorithm development strategies students could analyze the problem and come to a conclusion on which design principle to be used
	PO5	Knowledge of classification of algorithms into different classes helps the students in identifying the framework to be used for designing a new algorithm
CO5	PO3	Knowledge of classification of algorithms into different classes helps the students in identifying the framework to be used for designing a new algorithm
	PO5	Knowledge of classification of algorithms into different classes helps the students to get to know various complex algorithms
CO6	PO1	Knowledge of backtracking algorithm analysis methods helps students in problem

		analysis
	PO2	Having the knowledge of backtracking and branch and bound algorithm development strategies students can apply these knowledge in solving complex engineering problems

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO2	Knowledge of algorithm analysis methods helps students in problem analysis
CO4	PSO2	Selecting the appropriate method FOR EG Divide and conquer or dynamic programming to analyze the algorithm will help in a better analysis of algorithm
CO5	PSO2	Selecting the appropriate method such as greedy method to analyze the algorithm will help in a better analysis of algorithm
CO6	PSO2	Selecting the appropriate method such as backtracking or branch and bound to analyze the algorithm will help in a better analysis of algorithm

COURSE INFORMATION SHEET:

Program: Computer Science & Engineering	Degree :B-Tech
Course: Compiler Design	Course code: CS 304
L-T-P:3-0-0	Credit:3

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to compilers – Analysis of the source program, Phases of a compiler, Grouping of phases, compiler writing tools – bootstrapping Lexical Analysis: The role of Lexical Analyzer, Input Buffering, Specification of Tokens using Regular Expressions, Review of Finite Automata, Recognition of Tokens.	7	15
II	Syntax Analysis: Review of Context-Free Grammars – Derivation trees and Parse Trees, Ambiguity. Top-Down Parsing: Recursive Descent parsing, Predictive parsing, LL(1) Grammars.	6	15
III	Bottom-Up Parsing: Shift Reduce parsing – Operator precedence parsing (Concepts only) LR parsing – Constructing SLR parsing tables, Constructing, Canonical LR parsing tables and Constructing LALR parsing tables.	7	15
IV	Syntax directed translation: Syntax directed definitions, Bottom- up evaluation of S- attributed definitions, Lattributed definitions, Top-down translation, Bottom-up evaluation of inherited attributes. Type Checking : Type systems, Specification of a simple type checker.	8	15
V	Run-Time Environments: Source Language issues, Storage organization, Storage- allocation strategies. Intermediate Code Generation (ICG): Intermediate languages – Graphical representations, Three-Address code, Quadruples, Triples. Assignment statements, Boolean expressions.	7	20
VI	Code Optimization:Principal sources of optimization, Optimization of Basic blocks Code generation: Issues in the design of a code generator. The target machine, A simple code generator.	7	20

REFERENCES:

1	Aho A Ravi Sethi and J D Ullman, Compilers Principles Techniques and Tools,Addison Wesley
2	Kenneth C Louden, “Compiler Construction Principles and Practice”, Cenage Learning Indian Edition
3	D M Dhamdhare, System programming and operating system, Tata McGraw Hill & Company
4	Tremblay and Sorenson, The Theory and Practice of Compiler Writing - Tata McGraw Hill & Company

PREREQUISITES:

1. CS 100 Problem Solving and Computer Programming
2. CS 301 Theory of Computation

COURSE OBJECTIVES:

1	To provide a thorough understanding of the internals of Compiler Design.

COURSE OUTCOMES:

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

CO’s	DESCRIPTION
1	Analyze a given algorithm and express its time and space complexities in asymptotic notations and solve recurrence equations using iteration method, recurrence tree method, and Master's theorem.
2	Solve operations of AVL tree, Red Black tree and B trees.
3	Design algorithms for graph theoretic properties and operations.
4	Design algorithms using Divide and Conquer and Dynamic programming strategies and compare the two strategies.
5	Solve optimization problems using greedy strategy.
6	Design efficient algorithms using backtracking and Branch & Bound techniques for solving problems.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3
CO 1	3		2											3	2	3
CO 2	2				3									2	-	2
CO 3			2		1									1	1	-

CO 4			3	1									3	2	-
CO 5			2										1	-	-
CO 6															

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	Understanding the various phases of compiler helps to design a compiler.
	PO3	Knowledge of various phases of compiler helps to design system components.
CO2	PO1	Usage of Compiler tools helps to understand how to design the lexical analyzer and parser.
	PO5	Usage of tools like LEX and YACC helps to understand how to design the lexical analyzer and parser.
CO3	PO3	Differentiating various parsers helps to design language parsers.
	PO5	Knowledge of tools like YACC helps to design parser.
CO4	PO3	Knowledge of optimization techniques help to design algorithms with minimum time and space complexity
	PO4	Study of storage allocation strategies helps to analyze various types of data to reach valid conclusions.
CO5	PO3	Knowledge about Register reusability helps the students to develop programs with less number of data hazards.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Knowledge of various phases of compiler helps to design a compiler.
	PSO2	Ability to apply the knowledge of various phases of compiler helps to design a compiler.
	PSO3	Usage of Compiler tools helps to understand how to design the lexical analyzer and parser.
CO2	PSO1	Usage of tools like LEX and YACC helps to understand how to design the lexical analyzer and parser.
	PSO3	Knowledge of tools like LEX and YACC helps to design the lexical analyzer and parser.
CO3	PSO1	Understanding various parsers helps to restructure current parsing methods.

	PSO2	Knowledge of designing parsers helps to develop new
CO4	PSO1	Knowledge of various storage allocation strategies help students to identify, analyze and design solutions as it belong to the core principles of Computer Science.
	PSO2	Knowledge of stack, heap etc help students to acquire programming efficiency by designing memory efficient algorithms
CO5	PSO1	Knowledge about register allocation help students to develop programs with minimum memory usage

COURSE INFORMATION SHEET:

Program: Computer Science & Engineering	Degree :B-Tech
Course: Computer Networks	Course code: CS 306
L-T-P:3-1-0	Credit:4

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction – Uses – Network Hardware – LAN –MAN – WAN, Internetworks – Network Software – Protocol hierarchies – Design issues for the layers – Interface & Service – Service Primitives. Reference models – OSI – TCP/IP.	7	15
II	Data Link layer Design Issues – Flow Control and ARQ techniques. Data link Protocols – HDLC. DLL in Internet. MAC Sub layer – IEEE 802 FOR LANs & MANs, IEEE 802.3, 802.4, 802.5. Bridges - Switches – High Speed LANs - Gigabit Ethernet. Wireless LANs - 802.11 a/b/g/n, 802.15.PPP	8	15
III	Network layer – Routing – Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, RIP, OSPF, Routing for mobile hosts.	7	15
IV	Congestion control algorithms – QoS. Internetworking – Network layer in internet. IPv4 - IP Addressing – Classless and Classfull Addressing. Sub-netting.	7	15
V	Internet Control Protocols – ICMP, ARP, RARP, BOOTP. Internet Multicasting – IGMP, Exterior Routing Protocols – BGP. IPv6 – Addressing – Issues, ICMPv6.	7	20
VI	Transport Layer – TCP & UDP. Application layer –FTP, DNS, Electronic mail, MIME, SNMP. Introduction to World Wide Web.	7	20

TEXT BOOKS:

1	Andrew S. Tanenbaum, Computer Networks, 4/e, PHI. [Modules 1,2,3,4,5]
2	. Behrouz A. Forouzan, Data Communications and Networking, 4/e, Tata McGraw Hill. [Modules 1,2,6]

REFERENCES:

1	Fred Halsall, Computer Networking and the Internet, 5/e.

2	James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach, 6/e.
3	Keshav, An Engineering Approach to Computer Networks, Addison Wesley, 1998.
4	Request for Comments (RFC) Pages - IETF -https://www.ietf.org/rfc.html

PREREQUISITE:

NIL

COURSE OBJECTIVES:

1	To build an understanding of the fundamental concepts of computer networking.
2	To introduce the basic taxonomy and terminology of computer networking.
3	To introduce advanced networking concepts.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Enables the students to visualize the different aspects of networks, protocols and network design models.
2	Enables the students to examine various Data Link layer design issues and Data Link protocols.
3	Enables the students to examine various network layer algorithms and protocols.
4	Enables the students to examine IP addressing,classless addressing etc
5	Enables the students to examine the important aspects and functions of network layer
6	.Enables the students to examine the important aspects and functions of transport layer and application layer in internetworking.

CO-PO-PSO MAPPING:

CO-PO MAPPING JUSTIFICATION:

	CO'S	PO'S		Justification
CS306	CO1	PO1	1	Apply the knowledge acquired to classify the layers based on its function
		PO2	2	Understanding the layer functions helps the students to identify and formulate the problems based on the layer

		PO4	2	Understanding the layer functions and understanding the network factors, helps in analyzing and interpreting the quality of networks.
	CO2	PO2	1	Apply the basic knowledge of translators and its working process to develop compilers for different languages.
		PO4	2	Understanding the various channel access techniques helps in analyzing and interpreting the quality of networks.
	CO3	PO3	2	Studies about the various routing techniques helps the students to fix up the shortest path routes for packets in the network
		PO4	2	Understanding the various routing techniques helps in analyzing and interpreting the quality of networks.
		PO5	2	Understanding the various routing techniques helps in analyzing research based works
	CO4	PO2	2	Applies the knowledge in identifying the appropriate end to end protocol for reliable communication
		PO4	3	Understanding the various end to end protocols helps in analyzing and interpreting the quality of networks.
	CO5	PO1	1	They could apply the knowledge acquired on various applications over internet
		PO2	1	They could identify the various applications over the internet.
	CO6	PO4	2	The students could analyze the applications over the internet.
		PO5	2	The students could analyze and interpret the applications over the internet.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Apply network layer for the creation of simple networks

CS308 SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

COURSE INFORMATION SHEET:

Program: Computer Science & Engineering	Degree : B-Tech
Course: Software Engineering And Project	Course code: CS 308

Management	
L-T-P:3-0-0	Credit:3

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to software engineering- scope of software engineering – historical aspects, economic aspects, maintenance aspects, specification and design aspects, team programming aspects. Software engineering a layered technology – processes, methods and tools. Software process models – prototyping models, incremental models, spiral model, waterfall model.	7	15
II	Process Framework Models: Capability maturity model (CMM), ISO 9000. Phases in Software development – requirement analysis- requirements elicitation for software, analysis principles, software prototyping, specification.	6	15
III	Planning phase – project planning objective, software scope, empirical estimation models-COCOMO, single variable model, staffing and personal planning. Design phase – design process, principles, concepts, effective modular design, top down, bottom up strategies, stepwise refinement	7	15
IV	Coding – programming practice, verification, size measures, complexity analysis, coding standards. Testing – fundamentals, white box testing, control structure testing, black box testing, basis path testing, code walk-throughs and inspection, testing strategies-Issues, Unit testing, integration testing, Validation testing, System testing.	7	15
V	Maintenance-Overview of maintenance process, types of maintenance. Risk management: software risks - risk identification-risk monitoring and management. Project Management concept: People – Product-Process-Project.	7	20
VI	Project scheduling and tracking: Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task Software configuration management: Basics and standards User interface design - rules. Computer aided software engineering tools - CASE building blocks, taxonomy of CASE tools, integrated CASE environment.	8	20

REFERENCES:

1	Ian Sommerville, Software Engineering, University of Lancaster, Pearson Education, Seventh edition, 2004.
2	K. K.Aggarwal and Yogesh Singh, Software Engineering, New age International Publishers, Second edition, 2005.
3	Roger S. Pressman, Software Engineering : A practitioner's approach, McGraw Hill publication, Eighth edition, 2014
4	S.A. Kelkar, Software Project Management: A concise study, PHI, Third edition, 2012.
5	Walker Royce, Software Project Management : A unified frame work, Pearson Education, 1998

PREREQUISITE:
NIL

COURSE OBJECTIVES:

1	To introduce the fundamental concepts of software Engineering
2	To build an understanding on various phases of software development
3	To introduce various software process models

COURSE OUTCOMES:
After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Identify suitable lifecycle models to be used
2	Analyze a problem and identify and define the computing requirements to the problem
3	Translate a requirement specification to a design using an appropriate software engineering methodology
4	Formulate appropriate testing strategy for the given software system
5	Develop software projects based on current technology, by managing resources economically and keeping ethical values
6	Develop software projects based on the created schedule and manage the versions of created software using appropriate version control system

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO1		3								1	2			2		3
CO2		3	2						1	2					3	
CO3			3	1	3					2	2			3		2

CO4	2		3	3	2						1			3		
CO5					3			3	1		3	2		2		3
CO6					3			3	1					2		3

CO-PO MAPPING JUSTIFICATION:

CO1	PO2	3	Identify the suitable lifecycle model to be used and arrive at substantiated conclusions
	PO10	1	Prepare reports using proper documentation strategies, in order to give clear instructions to the next phase of software development
	PO11	2	Understand project management principles in order to select a proper lifecycle model
CO2	PO2	3	Analyze software problems and arrive at suitable conclusions using software engineering principles
	PO3	2	Develop proper solutions so as to meet the requirements prescribed by the user
	PO9	1	Find the solution to the problem individually or as a team work
	PO10	2	Prepare effective presentations and reports so as to document the problem solving strategy adopted
CO3	PO3	3	Design the software based on the requirements of user, using appropriate software practices
	PO4	1	Analyze the proposed design based on the knowledge and data interpretation
	PO5	3	Design a software based on modern tools of software development
	PO10	2	Prepare design reports using proper notations, in order to give clear instructions to the next phase of software development
	PO11	2	Understand software design principles to select appropriate design strategy
CO4	PO1	2	Apply the knowledge of software testing principles to evaluate the developed software product
	PO3	3	Design test cases and testing strategies in order to evaluate the correctness of the software
	PO4	3	Perform the verification and validation of the software after the analysis of design and interpretation of gathered data
	PO5	2	Use appropriate CASE tools for generating test cases and for performing software testing
	PO11	1	Understand software testing principles to select appropriate testing strategy
CO5	PO5	3	Develop a software project based on modern software tools

	PO8	3	Apply ethical principles and norms of engineering practice while developing a software product
	PO9	1	Software product is developed as a team work
	PO11	3	Understand Project Management Principles for developing efficient software product
	PO12	2	Develop the software based on current technology with updated concepts
C06	PO5	3	Apply suitable tools for version management while developing a software project
	P08	3	Apply the time management principles and ethical values for completing the project within the prescribed schedule
	P09	1	Apply team management strategies to produce the software as it is a collaborative work

CO-PSO MAPPING JUSTIFICATION:

CO1	PSO1	2	Graduates will be able to design and develop software based systems
	PSO3	3	Graduates will be able to grasp software development life cycle and methodologies
CO2	PS02	3	Graduates will be able to crack the problem using appropriate engineering principles
CO3	PSO1	3	Graduates will be able to design the software systems and provide creative solutions
	PSO3	2	Graduates posses competent skills and knowledge of software design process
CO4	PSO1	3	Graduates attain the ability to evaluate the risk associated with the software and provide creative solutions
CO5	PSO1	2	Graduates attain the ability to provide creative solutions to the problems
	PSO3	3	Graduates attain the ability to make new innovations and ideas in an ethical manner
CO6	PSO1	2	Graduates attain the ability to deliver the software product within the deadline
	PSO3	3	Graduates posses skills to use software tools for the efficient development and management of the software

CS366 NATURAL LANGUAGE PROCESSING

COURSE INFORMATION SHEET:

Program: Computer Science & Engineering	Degree :B-Tech
Course: Natural Language Processing	Course code: CS366
L-T-P:3-0-0	Credit:3

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to Natural Language Understanding- Levels of language analysis- Syntax, Semantics, Pragmatics. Linguistic Background- An Outline of English Syntax.	10	15
II	Lexicons, POS Tagging, Word Senses. Grammars and Parsing- Features, Agreement and Augmented Grammars.	10	15
III	Grammars for Natural Language, Parsing methods and Efficient Parsing. Ambiguity Resolution- Statistical Methods. Probabilistic Context Free Grammar.	12	15
IV	Semantics and Logical Form: Linking Syntax and Semantics- Ambiguity Resolution- other Strategies for Semantic Interpretation- Scoping and the Interpretation of Noun Phrases.	8	15
V	Knowledge Representation and Reasoning- Local Discourse Context and Reference- Using World Knowledge- Discourse Structure- Defining a Conversational Agent.	10	20
VI	Applications- Machine Translation, Information Retrieval and Extraction, Text Categorization and Summarization.	6	20

TEXT BOOKS:

1	James Allen, Natural Language Understanding, The Benjamin/Cummings Publishing Company Inc., Redwood City, CA.
2	D. Jurafsky and J. H. Martin, Speech and Language Processing, Prentice Hall India.

REFERENCES:

1	Charniak, Eugene, Introduction to Artificial intelligence, Addison-Wesley.
2	Ricardo Baeza-Yates and BerthierRibeiro-Neto, Modern Information Retrieval, AddisonWesley,1999.
3	U. S. Tiwary and TanveerSiddiqui, Natural Language Processing and Information Retrieval,

	Oxford University Press.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce the fundamentals of Language processing from the algorithmic viewpoint.
2	To discuss various issues those make natural language processing a hard task.
3	To discuss some applications of Natural Language Processing (NLP).

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to appreciate the fundamental concepts of Natural Language Processing.
2	Students will be able to design algorithms for NLP tasks.
3	Students will be able to develop useful systems for language processing and related tasks involving text processing.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO 1	2	2	3	2										2	2	2
CO 2		2	3											2	1	3
CO 3		2	3											2	1	3

CO-PO MAPPING JUSTIFICATION:

CO1	PO1	2	Complex engineering problems like machine translation can be automated
	PO2	2	Problems in different languages can analyze easily.
	PO3	3	New systems can be developed for public in the local languages
	PO4	2	Fundamental concept from NLP can create new research ideas.
CO2	PO2	2	Based on problem analysis new algorithm can design.
	PO3	3	For public health and safety new algorithms can be designed.
CO3	PO2	2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using Text processing methods

	PO3	3	Text mining methods helps to design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

CO-PSO MAPPING JUSTIFICATION:

CO1	PSO1	2	With usage of NLP concept students can design software for different languages.
	PSO2	2	By knowing fundamental natural language concepts student can solve different automated language translation problems.
	PO3	2	Deep learning in NLP concepts will create more research opportunities for students.
CO2	PSO1	2	Students can design various algorithms for natural language processing like parsing, stemming, tokenization etc.
	PSO2	1	With knowledge of language syntax and semantic students can design algorithm for various languages.
	PSO3	3	For various Indian languages there is no language processing systems, so students can work on it and develop different software methodologies.
CO3	PSO1	2	Currently available algorithms can be modified .
	PSO2	1	Students can design algorithms for local language text processing
	PSO3	3	New text processing methods can be developed with the concepts of NLP.

COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE & ENGINEERING	DEGREE: BTECH
COURSE: WEB TECHNOLOGIES	SEMESTER: VI
COURSECODE:CS368	COURSE TYPE: ELECTIVE
COURSE AREA/DOMAIN: PROGRAMMING , DATASTRUCTURES & ALGORITHMS	CONTACT HOURS: 3+1 (Tutorial) hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY):	LAB COURSE NAME: Nil

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY% MARKS
I	Introduction to the Internet: The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol. Common Gateway Interface (CGI), Content Management System– Basics Case Study: Apache Server, Word Press.	6	15
II	Introduction to HTML/XHTML : Origins and Evolution of HTML and XHTML, Basic Syntax of HTML, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, Syntactic Differences between HTML andXHTML.	7	15
III	Introduction to Styles sheets and Frameworks Cascading Style Sheets: Levels of Style Sheets - Style Specification Formats,SelectorForms,	6	15
IV	Introduction to JavaScript and jQuery The Basics of JavaScript: Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics- Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object CreationandModification,Arrays,	7	15
V	Introduction to Data Interchange Formats XML: The Syntax of XML, XML Document Structure, Namespaces, XML Schemas, Displaying Raw XML Documents, Displaying XML Documents with CSS, XSLT Style Sheets, XML Applications. JSON(Basics Only): Overview, Syntax, Datatypes, Objects, Schema, Comparison with XML	8	20

VI	Introduction to PHP: Origins and Uses of PHP, Overview of PHP - General Syntactic Characteristics - Primitives, Operations, and Expressions - Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking.	8	20

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
1	Robert W Sebesta, Programming with World Wide Web , 7th ed., Pearson Education ,New Delhi, 2009
2	Deitel & Deitel Internet & World Wide Web *How To Program* 4th ed., Pearson International Edition Education ,New Delhi, 2009
3	Bob Boiko, Content Management Bible, 2nd Edition, Wiley Publishers. [Chapter 1, 2]
4	Chris Bates, Web Programming Building Internet Applications, 3/e, Wiley India Edition 2009.
5	Bear Bibeault and Yehuda Katz, jQuery in Action, Second Edition, Manning Publications.[Chapter 1] Black Book, Kogent Learning Solutions Inc. 2009
6	Dream Tech, Web Technologies: HTML, JS, PHP, Java, JSP, ASP.NET, XML, AJAX,
9	Jeffrey C Jackson, Web Technologies A Computer Science Perspective, Pearson Education Inc. 2009.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
CS100	Computer programing	Programming skills	II

COURSE OBJECTIVES:

1	To impart the design, development and implementation of Dynamic Web Pages.
2	To develop programs for Web using Scripting Languages.
3	To give an introduction to Data Interchange formats in Web.

COURSE OUTCOMES:

Sl No	DESCRIPTION	Blooms' Taxonomy Level
C01	Graduate will be able to summarize the basic tags and properties in HTML, XHTML and CSS.	Understand (Level 2)
C02	Graduate will be able to select XHTML tags and CSS properties to design web pages.	Evaluate (Level5)
C03	Graduates will be able to prepare XML documents to store and transport data.	Apply (Level 3)
C04	Graduates will be able to write programs in PHP.	Apply (Level 3)

C05	Graduates will be able to develop web applications using Javascript and PHP.	Knowledge (Level 1)

CORSE OUTCOME AND PROGRAMME OUTCOME MAPPING

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C01	1	_	2	_	_	_	_	_	_	_	_	_	2	_	_
C02	_	2	3	2	_	_	_	_	_	_	_	_	_	_	2
C03	_	2	2	_	_	_	_	_	_	_	_	_	1	_	2
C04	1	2	3	2	_	_	_	_	_	_	_	_	2	2	_
C05	-	_	3	_	_	_	_	_	_	_	_	_	2	_	_

JUSTIFICATIONS FOR CO-PO MAPPING

CO's	PO's	JUSTIFICATION
CO1	PO1	Graduate attains a basic knowledge about XHTML and its tags.
CO1	PO3	Graduate is equipped to use XHTML tags for design of a static web page and forms.
CO2	PO2	Graduate is made capable of identifying the basic suitable tags and CSS styles to design web pages.
CO2	PO3	Graduate is able to design simple and creative web pages.
CO2	PO4	Graduate is able to apply CSS properties to basic tags in XHTML.
CO3	PO2	Graduate will be able to create XML documents to store and maintain data.
CO3	PO3	Graduates are able to create DTDs to design the structure of XML documents.
CO4	PO1	Graduate achieves a basic insight on PHP programming languages.
CO4	PO2	Graduate is able to analyze a problem and write solutions using PHP.
CO4	PO3	Graduate is able to develop solutions to complex problems using the given programming languages.

CO4	PO4	Graduates achieves knowledge on writing PHP programs
CO5	PO3	Graduate is made able to develop web pages using javascipt and PHP.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Graduate is made able to identify the core principles of basic web page creation.
CO2	PSO3	Graduate is able to use XHTML and CSS for developing innovative web pages.
CO3	PSO1	Graduate attains a basic knowledge on XML schemas and their need in XML.
CO3	PSO3	Graduate attains information on basic structure of XML documents which can be used for creating XML documents.
CO4	PSO1	Graduates achieves knowledge on writing PHP programs
CO5	PSO1	Graduates will able to develop web applications.

CS332 MICROPROCESSOR LAB

COURSE INFORMATION SHEET:

Program: Computer Science & Engineering	Degree : B-Tech
Course: Microprocessor Lab	Course code: CS 332
L-T-P:0-0-3	Credit:1

LIST OF EXPERIMENTS

I. Assembly Language Programming Exercises/Experiments using MASM

1. Implementation of simple arithmetic operations using 8086 in MASM
2. String Comparison
3. String Scanning
4. Palindrome
5. Vowel Count
6. Binary Search
7. Sorting

II. Assembly Language Programming Exercises/Experiments using 8086 Trainer kit

1. Implementation of Simple Arithmetic operations using 8086 Trainer kit

III. Interfacing Exercises/Experiments with 8086 trainer kit through Assembly Language Programming

1. Stepper motor Interfacing using 8086

IV. Exercises/Experiments using 8051 trainer kit

1. Implementation of Simple Arithmetic operations using 8051
2. Stepper motor interfacing using 8051
3. Interfacing 8051 with DAC interface

PREREQUISITE:

CS 305 MICROPROCESSORS AND MICROCONTROLLERS

COURSE OBJECTIVES:

1	To practice assembly language programming on 8086
2	To practice fundamentals of interfacing/programming various peripheral devices with microprocessor and microcontroller

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Develop assembly language programs for problem solving using software interrupts and various assembler directives
2	Implement interfacing of various I/O devices to the microprocessor/microcontroller through assembly language programming

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3
CO1	3	2	3		1									3	2	2
CO2	2		3	2	1									2		3

CO-PO MAPPING JUSTIFICATION:

CO1	PO1	3	Apply the knowledge of assembly language programming to solve the hardware specific problems associated with 8086
	PO2	2	Identify and analyse the hardware problems and arrive at conclusion using software interrupts and assembler directives
	PO3	3	Design and develop assembly language programs to meet the requirements of the society
	PO5	1	Create and use appropriate engineering tools while developing assembly program
CO2	PO1	2	Apply the knowledge of interfacing to solve the microprocessor/microcontrollerproblems
	PO3	3	Design and develop assembly language programs to interface 8086 and microcontrollers with I/O devices
	PO5	1	Create and use appropriate engineering tools for interfacing microprocessor/microcontroller with I/O device

CO-PSO MAPPING JUSTIFICATION:

CO1	PSO1	3	Graduates will be able to develop assembly language programs in order to provide solutions to hardware problems
	PSO2	2	Graduates will be able to crack the problems associated with microprocessor using suitable algorithms
	PSO3	2	Graduates will possess competent skills and knowledge of hardware design process
CO2	PSO1	2	Graduates will be able to develop interfacing programs for interfacing I/O devices with microcontroller/microprocessor
	PS03	3	Graduates will be able to provide new ideas and innovations to the area of microprocessor/microcontroller

CS334 NETWORK PROGRAMMING LAB

COURSE INFORMATION SHEET

Program: Computer Science & Engineering	Degree :B-Tech
Course : NETWORK PROGRAMMING LAB	Course code: CS334
L-T-P: 0-0-3	Credit:1

SYLLABUS:

12 Experiments are Mandatory

List of Exercises/ Experiments (12 Exercises/ Experiments are to be completed. Exercises/ Experiments marked with * are mandatory)

1. Getting started with Basics of Network configurations files and Networking Commands in Linux.
2. To familiarize and understand the use and functioning of System Calls used for Operating system and network programming in Linux.
3. Familiarization and implementation of programs related to Process and thread.
4. Implement the First Readers-Writers Problem.
5. Implement the Second Readers-Writers problem.
6. Implement programs for Inter Process Communication using PIPE, Message Queue and Shared Memory.
7. Implement Client-Server communication using Socket Programming and TCP as transport layer protocol.*
8. Implement Client-Server communication using Socket Programming and UDP as transport layer protocol.*
9. Implement a multi user chat server using TCP as transport layer protocol.*
10. Implement Concurrent Time Server application using UDP to execute the program at remoteserver. Client sends a time request to the server, server sends its system time back to the client. Client displays the result.*
11. Implement and simulate algorithm for Distance vector routing protocol.
12. Implement and simulate algorithm for Link state routing protocol.
13. Implement Simple Mail Transfer Protocol.*
14. Develop concurrent file server which will provide the file requested by client if it exists. If not server sends appropriate message to the client. Server should also send its process ID (PID) to clients for display along with file or the message.*
15. Using Wireshark observe data transferred in client server communication using UDP and identify the UDP datagram.
16. Using Wireshark observe Three Way Handshaking Connection Establishment, Data Transfer and Three Way Handshaking Connection Termination in client server communication using TCP.
17. Develop a packet capturing and filtering application using raw sockets.

18. Design and configure a network with multiple subnets with wired and wireless LANs using required network devices. Configure the following services in the network- TELNET, SSH, FTP server, Web server, File server, DHCP server and DNS server.*
19. Install network simulator NS-2 in any of the Linux operating system and simulate wired and wireless scenarios.

TEXT BOOKS /REFERENCES:

1	Herbert Schildt, Java: The Complete Reference, 8/e, Tata McGraw Hill, 2011.
2	Y. Daniel Liang, Introduction to Java Programming, 7/e, Pearson, 2013
3	Abraham Silberschatz, Peter B Galvin, Greg Gagne, Operating System Concepts, 9/e, Wiley India, 2015.
4	Computer Networks A Systems Approach-Larry L.Peterson and Bruce S.Davie,4th Edition .Morgan Kaufman

PREREQUISITE : Object Oriented Design and Programming, Operating System, Data Communication, Computer Network

COURSE OBJECTIVES:

1	To familiarize various Network related commands and configuration files in Linux Operating System.
2	To introduce techniques for network analysis
3	To engage with Linux System Calls for Network Programming
4	To know various Computer Networks for designing and deployment for communication.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Identifying the usage of network related commands and configuration files in Linux Operating System
2	Implementing network application programs.
3	Using network monitoring tools analyze network traffic.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	1	-	-	-	1	-	-		-	-	-	-		1	-	
CO2	-	-	3	-	-	-	-		-	-	-	-		3		
CO3	2	2	-	-	1	-	-	-	2	3	-	-		3		

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	The knowledge about system calls helps to find the solution of complex engineering problems related to OS
	PO5	Engineering tools can be created and applied to complex engineering activities using Linux concepts
CO2	PO3	The knowledge about process helps to choose the suitable algorithm to solve complex problems.
CO3	PO1	The knowledge about Wireshark and other network protocols to find the solution of complex engineering problems related to network.
	PO2	Knowledge about networking protocols helps to identify, formulate and analyze network traffic monitoring.
	PO5	Familiarization of Wireshark and other tools helps to model complex engineering activities related to network simulation.
	PO9	Individual and team work effectively help to understand the network traffic monitoring and tools associated to it.
	PO10	Communication can be made possible by demonstrating the networking traffic and commands.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of Linux
CO2	PSO1	Analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of Operating system and network application programs.
CO3	PSO1	Analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of networking

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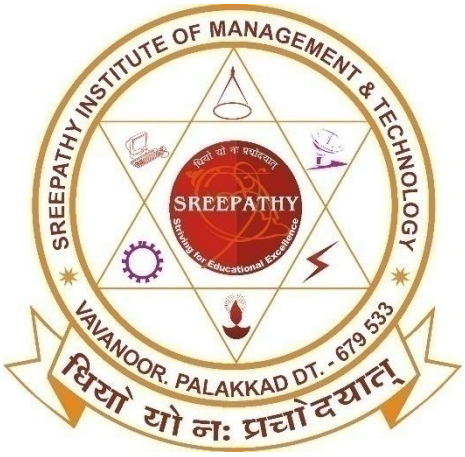

COURSE HANDBOOK

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SEMESTER VII

CS 401 COMPUTER GRAPHICS

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Computer Graphics**	Course code**: CS 401**
L-T-P**: 4-0-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Basic concepts in Computer Graphics – Types of Graphic Devices – Interactive Graphic inputs – Raster Scan and Random Scan Displays.	7	15
II	Line Drawing Algorithm- DDA, Bresenham's algorithm – Circle Generation Algorithms –Mid point circle algorithm, Bresenham's algorithm- Scan Conversion-frame buffers – solid area scan conversion – polygon filling algorithms	8	15
III	Two dimensional transformations. Homogeneous coordinate systems – matrix formulation and concatenation of transformations. Windowing concepts –Window to Viewport Transformation- Two dimensional clipping-Line clipping – Cohen Sutherland, Midpoint Subdivision algorithm	8	15
IV	Polygon clipping-Sutherland Hodgeman algorithm, Weiler-Atherton algorithm, Three dimensional object representation-Polygon surfaces, Quadric surfaces – Basic 3D transformations	8	15
V	Projections – Parallel and perspective projections – vanishing points. Visible surface detection methods– Back face removal-Z-Buffer algorithm, A-buffer algorithm, Depth-sorting method, Scan line algorithm.	9	20
VI	Image processing – Introduction - Fundamental steps in image processing – digital image representations – relationship between pixels – gray level histogram –spatial convolution and correlation – edge detection – Robert, Prewitt, Sobel.	8	20

TEXT BOOKS:

1.	Donald Hearn and M. Pauline Baker, Computer Graphics, PHI, 2e, 1996

2.	E. Gose, R. Johnsonbaugh and S. Jost., Pattern Recognition and Image Analysis, PHI
3.	William M. Newman and Robert F. Sproull , Principles of Interactive Computer Graphics
4.	Zhigang Xiang and Roy Plastock, Computer Graphics (Schaum's outline Series),

REFERENCES:

1.	David F. Rogers , Procedural Elements for Computer Graphics, Tata McGraw Hill,
2.	M. Sonka, V. Hlavac, and R. Boyle, Image Processing, Analysis, and Machine Vision,
3.	Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing. Pearson, 2017

PREREQUISITE: NIL

COURSE OBJECTIVES:

1.	To introduce concepts of graphics input and display devices.
2.	To discuss line and circle drawing algorithms.
3.	To introduce 2D and 3D transformations and projections.
4.	To introduce fundamentals of image processing.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1.	Understand the basics of computer graphics & Compare various graphics devices
2.	Analyze and implement algorithms for line drawing, circle drawing and polygon filling
3.	Apply geometrical transformation on 2D and 3D objects
4.	Analyze and implement algorithms for clipping
5.	Apply various projection techniques on 3D objects
6.	Summarize visible surface detection methods
7.	Understand Digital Image Processing

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO 1	3													3		
CO 2	3	2	3											3	3	
CO 3	3	2	3											3		
CO 4	3	2	3											3	3	
CO 5	3	2	2											3		
CO 6	2	2												3		
CO 7	2	2	2	1	1									3		2

CO-PO MAPPING JUSTIFICATION:

CO s	PO s	JUSTIFICATION	
CO1	PO1	3	Students will be able to understand the basic working principles of graphics devices & Compare various graphics devices
CO2	PO1	3	Students can apply the knowledge of mathematics, engineering fundamentals for line drawing, circle drawing and polygon filling
	PO2	2	Students can identify and analyze methods for line drawing, circle drawing and polygon filling
	PO3	3	Students can develop solutions for line drawing, circle drawing and polygon filling
CO3	PO1	3	Students can apply the basics of mathematics to study the concepts of geometric transformation on objects.
	PO2	2	Students can identify and analyze geometrical transformation on 2D and 3D objects
	PO3	3	Students can design graphics applications by applying the transformation steps on objects. (Animations etc.)
CO4	PO1	3	Students can apply mathematics and engineering fundamentals to study the concept of clipping.
	PO2	2	Students can analyze the various clipping techniques using the first principles of mathematics.
	PO3	3	Students will be able to apply the process of clipping to graphics applications.
CO5	PO1	3	Students can apply mathematics and engineering fundamentals to study the concept of projection techniques
	PO2	2	Students can analyze the projection techniques using the principles of mathematics.

	PO3	**2**	Projection techniques can be used for designing software and hardware graphics systems.
CO6	**PO1**	**2**	Students will be able to understand the basic concepts in visible surface detection techniques.
	PO2	**2**	Students can analyze various techniques of visible surface detection using the principles of mathematics.
CO7	**PO1**	**2**	Students will be able to apply the knowledge of mathematics, science etc in image processing techniques like edge detection, convolution, correlation etc.
	PO2	**2**	Students will be able to understand the basic concept of image processing and its application like edge detection etc. by using the basic engineering and mathematics principles.
	PO3	**2**	Students can design various image processing application system using the basic knowledge on image processing like convolution , correlation etc
	PO5	**1**	Students will be able to use image processing tools like MATLAB, OpenCV to design application programs.

CO-PSO MAPPING JUSTIFICATION:

CO s	PSO s	JUSTIFICATION
CO1	**PSO1**	Students will be able to understand the concepts of computer graphics and the devices used.
CO2	**PSO1**	Students will be able to understand the concepts of drawing basic primitives like line, circle etc..
	PSO2	Students will get the ability to acquire programming efficiency by studying the basic primitive drawing algorithms in software project development
CO3	**PSO1**	Students will be able to understand the concepts transformation on 2d and 3d objects
CO4	**PSO1**	Students can analyze various clipping techniques and can understand the concept of clipping on different type of objects.
	PSO2	Students will be able to implement the clipping algorithm using graphics programming languages and can use this to design various applications
CO 5	**PSO1**	Students will be able to implement the various projection techniques on 3D objects using graphics programming languages and can use this to design various applications.
CO6	**PSO1**	Students can analyze various surface detection techniques and able to understand the concept of eliminating hidden surface
CO 7	**PSO 1**	Students will be able to understand the concepts of image processing techniques.
	PSO 3	Students will be able to design and develop innovative products by applying the concepts of image processing.

CS 403 PROGRAMMING PARADIGMS

COURSE INFORMATION SHEET:

Program: Computer Science and Engineering	**Degree: B-Tech**
Course: Programming Paradigms	**Course code: CS 403**
L-T-P:3-0-0	**Credit: 3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Names, Scopes and Bindings:- Names and Scopes, Binding Time, Scope Rules, Storage Management, Binding of Referencing Environments. Control Flow: - Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Non-determinacy.	7	15
II	Data Types:-Type Systems, Type Checking, Records and Variants, Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and Input/Output, Equality Testing and Assignment.	7	15
III	Subroutines and Control Abstraction: - Static and Dynamic Links, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Co-routines.	7	15
IV	Functional and Logic Languages:- Lambda Calculus, Overview of Scheme, Strictness and Lazy Evaluation, Streams and Monads, Higher-Order Functions, Logic Programming in Prolog, Limitations of Logic Programming.	7	15
V	Data Abstraction and Object Orientation:- Encapsulation, Inheritance, Constructors and Destructors, Aliasing, Overloading, Polymorphism, Dynamic Method Binding, Multiple Inheritance. Innovative features of Scripting Languages:- Scoping rules, String and Pattern Manipulation, Data Types, Object Orientation.	7	20
VI	Concurrency:- Threads, Synchronization. Run-time program Management:- Virtual Machines, Late Binding of Machine Code,	7	20

	Reflection, Symbolic Debugging, Performance Analysis.		

TEXT BOOK:

1	Scott M L, Programming Language Pragmatics, 3rd Edn., Morgan Kaufmann Publishers, 2009.

REFERENCES:

1	David A Watt, Programming Language Design Concepts, Wiley Dreamtech, 2004
2	Ghezzi C and M, Jazayeri, Programming Language Concepts, 3rd Edn, Wiley.1997
3	Kenneth C Louden, Programming Languages: Principles and Practice, 3rd Edn., Cengage Learning, 2011.
4	Pratt T W, M V Zelkowitz, and T. V. Gopal, Programming Languages: Design and Implementation, 4th Edn., Pearson Education, 2001
5	R W Sebesta, Concepts of Programming Languages, 11th Edn., Pearson Education, 2015
6	Ravi Sethi, Programming Languages: Concepts & Constructs, 2nd Edn., Pearson Education, 2006
7	Tucker A B and R E Noonan, Programming Languages: Principles and Paradigms, 2nd Edn,McGraw Hill, 2006.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce the basic constructs that underlie all programming languages
2	To introduce the basics of programming language design and implementation
3	To introduce the organizational framework for learning new programming languages.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Compare scope and binding of names in different programming languages.
2	Analyze control flow structures in different programming languages.
3	Understand and Appraise (Assess the performance of) data types in different programming languages.
4	Analyze different control abstraction mechanisms
5	Understand and Appraise constructs in functional, logic and scripting languages
6	Analyze object oriented constructs in different programming languages
7	Compare different concurrency constructs and Interpret the concepts of run- time program management

CO-PO-PSO MAPPING:

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	**1**											**1**		**1**		
CO2	**2**	**1**										**1**		**1**	**1**	
CO3	**1**											**1**		**1**	**1**	
CO4	**2**	**1**		**1**								**1**		**2**		
CO5	**1**	**1**										**1**		**1**		
CO6	**2**	**1**		**1**								**1**		**2**	**1**	
CO7	**2**	**1**		**1**								**1**		**1**	**1**	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	The students will be able to gain a thorough understanding of the scope and binding of names in different programming languages.

	PO12	The students will be able to understand, learn or develop new programming languages based on the future industry requirements.
CO2	PO1	The students will be able to gain a thorough understanding of the various control flow structures in various programming languages.
	PO2	The students will develop the ability to identify and analyze complex engineering problems in programming by understanding the core principles and concepts of control flow structures.
	PO12	The students will be able to understand, learn or develop new programming languages based on the future industry requirements.
CO3	PO1	The students will be able to gain a thorough understanding of the various data types used in programming languages.
	PO12	The students will be able to analyze the data types used in various programming languages, understand, learn or develop new programming languages based on the future industry requirements and thereby indulge in lifelong learning.
CO4	PO1	The students will be able to gain a thorough understanding of the control abstraction mechanisms.
	PO2	The students will be able to analyze complex engineering problems, apply suitable abstractions using appropriate programming paradigms, reaching substantiated conclusions.
	PO4	The students will be able to analysis and interpret data, and synthesis the information to provide valid conclusions.
	PO12	The students learn to analyze control abstractions in various programming languages which help in to understand, learn or develop new programming languages based on the future industry requirements and thereby indulge in lifelong learning.
CO5	PO1	The students will be able to gain a thorough understanding of the constructs in functional, logic, and scripting languages.
	PO2	The students will be able to analyze complex engineering problems reaching substantiated conclusions using the basic principles of functional programming.
	PO12	The students will be able to select an appropriate programming language for applications depending on the future industry requirements and thereby

		indulge in lifelong learning.
CO6	PO1	The students will be able to gain a thorough understanding of the object oriented constructs in various programming languages.
	PO2	The students will be able to identify, formulate, review research literature, and analyze complex engineering problems, using programming, reaching substantiated conclusions.
	PO4	The students will be able to use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO12	The students will be able to analyze the object oriented constructs in various programming languages, which helps to select an appropriate programming language for applications depending on the future industry requirements and thereby indulge in lifelong learning.
CO7	PO1	The students will be able to gain a thorough understanding of the concurrency constructs and the concepts of run-time program management.
	PO2	The students will be able to identify, formulate, and analyze complex engineering problems reaching substantiated conclusions using first principles concurrency and run-time program management.
	PO4	The students will be able to use research-based knowledge including analysis and interpretation of data, programming constructs, and synthesis of the information to provide valid conclusions.
	PO12	The students will be able to analyze the concurrency constructs and interpret the concepts of run-time program management which helps to select an appropriate programming language for applications depending on the future industry requirements and thereby indulge in lifelong learning.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	c apply the fundamentals in the development of new programming languages.
CO2	PSO1	Graduates will be gain the ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of control flow structures in programming.

	PSO2	Graduates will be able to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.
CO3	PSO1	Graduates will attain the ability to appreciate and access the usage of data types in new programming languages thereby increasing their programming efficiency.
	PSO2	Graduates will be able to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.
CO4	PSO1	Graduates will be able to attain the ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of programming.
CO5	PSO1	Graduates will attain the ability to select the appropriate programming language for the application in hand.
CO6	PSO1	Graduates will attain the ability to select the appropriate Object Oriented programming language for the application in hand. They will develop the ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of programming.
	PSO2	Graduates will be able to gain the ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.
CO7	PSO1	Graduates will be able to develop the ability to identify, analyze and design solutions for real time applications by understanding the core principles and concepts of Concurrent programming.
	PSO2	Graduates will be attaining the ability to develop new Concurrent systems and apply the fundamentals of programming paradigms in competitive research.

CS405 COMPUTER SYSTEM ARCHITECTURE
COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Computer System Architecture**	Course code**: CS 204**
L-T-P**: 3-1-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY% MARKS
I	Parallel computer models – Evolution of Computer Architecture, System Attributes to performance, Amdahl's law for a fixed workload. Multiprocessors and Multicomputers, Multivector and SIMD computers, Architectural development tracks, Conditions of parallelism.	**6**	15
II	Processors and memory hierarchy – Advanced processor technology- Design Space of processors, Instruction Set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar and vector processors, Memory hierarchy technology.	**8**	15
III	Multiprocessors system interconnects - Hierarchical bus systems, Cross bar switch and multiport memory, Multistage and combining networks. Cache Coherence and Synchronization Mechanisms, Cache Coherence Problem, Snoopy Bus Protocol, Directory Based Protocol, Hardware Synchronization Problem	**7**	15
IV	Message Passing Mechanisms-Message Routing schemes, Flow control Strategies, Multicast Routing Algorithms .Pipelining and Superscalar techniques – Linear Pipeline processors and Nonlinear pipeline processors	**8**	15
V	Instruction pipeline design, Arithmetic pipeline deign - Super Scalar Pipeline Design	**8**	20
VI	Multithreaded and data flow architectures - Latency hiding techniques, Principles of multithreading – Multithreading Issues and Solutions, Multiple context Processors, Fine-grain Multicomputer- Fine-grain Parallelism. Dataflow and hybrid architecture	**8**	20

TEXT BOOKS:

1	K. Hwang and NareshJotwani, Advanced Computer Architecture, Parallelism, Scalability, Programmability, TMH, 2010.

REFERENCES:

1	H P Hayes, Computer Architecture and Organization, McGraw Hill, 1978.
2	K. Hwang & Briggs , Computer Architecture and Parallel Processing, McGraw Hill International, 1986
3	M J Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing House, 2012.
4	M Sasikumar, D Shikkare and P Raviprakash, Introduction to Parallel Processing, PHI, 2014.
5	P M Kogge, The Architecture of Pipelined Computer, McGraw Hill, 1981.
6	P V S Rao, Computer System Architecture, PHI, 2009.
7	Patterson D. A. and Hennessy J. L., Morgan Kaufmann, Computer Organization and Design: The Hardware/Software Interface, Morgan Kaufmann Pub, 4/e, 2010.

PREREQUISITES:

CS202	Computer Organization and Architecture
CS305	Microprocessors and Microcontrollers

COURSE OBJECTIVES:

1	To impart a basic understanding of the parallel architecture and its operations
2	To introduce the key features of high performance computers

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Summarize different parallel computer models
2	Analyze the advanced processor technologies
3	Interpret memory hierarchy
4	Compare different multiprocessor system interconnecting mechanisms

5	Interpret the mechanisms for enforcing cache coherence
6	Analyze different message passing mechanisms
7	Analyze different pipe lining techniques
8	Appraise concepts of multithreaded and data flow architectures

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3															
CO2		3														
CO3		3		2										2	2	
CO4		3														
CO5		2													2	
CO6			2													
CO7		3	2											2		
CO8			3												2	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	Students gain the ability to form the foundations for designing high performance computers and for the development of supporting software and applications
CO2	PO2	Students are able to identify the instruction set architectures like CISC and RISC, Superscalar, VLIW, Super pipelined, Vector and Symbolic Processors
CO3		Students can analyze the parameters such as access time, memory size, cost per byte, transfer bandwidth, and unit of transfer in hierarchical memory technology
CO4		Students are able to identify the the best interconnection mechanisms for Multiprocessor system.
CO5		The students are able to select and apply the appropriate interconnection techniques for a multiprocessor system.
CO7		Students will be able to identify and analyse different message passing mechanisms.
CO6	PO3	Students will be able to develop solutions for multicomputer message passing mechanisms by analyzing different schemes used in it.

CO7		Students will be able to analyse the performance of super pipelining and superscalar design techniques.
CO8		Students will be able to design and develop specific techniques for building instruction pipelines, arithmetic pipelines etc
CO3	PO4	Students will be able to develop massively parallel processing systems (MPP) once they understand the concepts of multithreaded and dataflow architectures.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO3	PSO1	Students will be able to identify the appropriate Design of memory systems
	PSO2	Students will be able to solve memory design problems
CO5	PSO2	Students will be able to identify the appropriate mechanisms used for enforcing cache coherence.
CO7	PSO1	Various Pipelining designs like arithmetic pipelining, super scalar pipelining etc.
CO8	PSO2	Students will be able to solve problems on efficiency calculations of multithreading

CS409 CRYPTOGRAPHY AND NETWORK SECURITY

COURSE INFORMATION SHEET

PROGRAMME: **COMPUTER SCIENCEANDENGINEERING**	**DEGREE: BTECH**
COURSE: **CRYPTOGRAPHY AND NETWORK SECURITY**	SEMESTER: VII CREDITS:3
COURSECODE: **CS409** REGULATION: 2016	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: PROBLEM SOLVING	CONTACT HOURS: **3 hours/Week.**
CORRESPONDING LAB COURSE CODE (IF ANY): N.A	LAB COURSE NAME: N.A

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Symmetric Cipher Models- Substitution techniques- Transposition techniques- Rotor machines-Steganography. Simplified DES- Block Cipher principles- The Data Encryption Standard, Strength of DES Differential and linear Cryptanalysis. Block Cipher Design principles- Block Cipher modes of operations.	7	15
II	IDEA: Primitive operations- Key expansions- One round, Odd round, Even Round- Inverse keys for decryption. AES: Basic Structure- Primitive operation- Inverse Cipher- Key Expansion, Rounds, Inverse Rounds. Stream Cipher –RC4.	7	15
III	Public key Cryptography: - Principles of Public key Cryptography Systems, Number theory- Fundamental Theorem of arithmetic, Fermat's Theorem, Euler's Theorem, Euler's Totient Function, Extended Euclid's Algorithm, Modular arithmetic. RSA algorithm-Key Management - Diffie-Hellman Key Exchange, Elliptic curve cryptography	7	15
IV	Authentication requirements- Authentication functions- Message authentication codes- Hash functions- SHA -1, MD5, Security of Hash functions and MACs- Authentication protocols-Digital signatures-Digital signature standards.	7	15
V	Network security: Electronic Mail Security: Pretty good privacy-S/MIME. IP Security: Architecture- authentication Header- Encapsulating Security payload- Combining Security associations- Key management.	7	20

VI	Web Security: Web Security considerations- secure Socket Layer and Transport layer Security- Secure electronic transaction.Firewalls-Packet filters- Application Level Gateway- Encrypted tunnels.	7	20

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw-Hill. 2010
T	William Stallings, Cryptography and Network Security, Pearson Education, 2014
	B. Schneier, Applied Cryptography, Protocols, Algorithms, and Source Code in C, 2nd

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
	NIL		

COURSE OBJECTIVES:

1	To introduce fundamental concepts of symmetric and asymmetric cipher models..
2	To introduce fundamental concepts of authentication.
3.	To introduce network security and web security protocols.

COURSE OUTCOMES: Students will be able to

CO's	DESCRIPTION
1	summarize different classical encryption techniques (Level 3)
2	identify mathematical concepts for different cryptographic algorithms. (Level 4)
3	demonstrate cryptographic algorithms for encryption/key exchange(Level 4)
4	summarize different authentication and digital signature schemes.(Level 3)
5	identify security issues in network, transport and application layers and outline appropriate security protocols (Level 4)

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P0 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2	2	-	-	2	1	1		3	3	1	-
CO2	3	3	2	2	2	-	-	1	1	1		2	3	2	-
CO3	2	3	2	2	2	-	-	2	2	2		3	3	1	-
CO4	3	2	2	3	3	-	-	2	1	1		1	3	2	-
CO5	2	2	2	2	2	-	-	2	1	1		1	3	2	-

JUSTIFICATIONS FOR CO-PO MAPPING

CO's	PO's	Justification
CO1	PO1	The knowledge in different encryption techniques helps in designing solutions for complex engineering problems.
CO1	PO2	The knowledge in different encryption techniques helps in analysis of performance of solutions to complex problems
CO2	PO1	The knowledge helps in designing solutions for complex engineering problems.
CO2	PO2	The knowledge helps in analysis of performance of solutions to complex problems
CO2	PO8	This knowledge helps us to use effective engineering practices such as testing , survey etc before choosing the best algorithm
CO2	PO9	This knowledge helps as to do research in different encryption algorithms effectively.
CO2	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
CO2	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.
CO3	PO1	The knowledge helps in designing solutions for complex engineering problems.
CO3	PO2	The knowledge helps in analysis of performance of solutions to complex problems
CO3	PO8	This knowledge helps us to use effective engineering practices such as testing , survey etc before choosing the best algorithm
CO3	PO9	This knowledge helps as to do research in different encryption algorithms effectively.
CO3	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
CO3	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.
CO4	PO1	The knowledge helps in designing solutions for complex engineering problems.
CO4	PO2	The knowledge helps in analysis of performance of solutions to complex problems
CO4	PO8	This knowledge helps us to use effective engineering practices such as testing , survey etc before choosing the best algorithm
CO4	PO9	This knowledge helps as to do research in different encryption algorithms effectively.
CO4	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
CO4	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO3	The knowledge in different encryption techniques help in designing solutions and analyzing its complexity.
CO2	PSO3	The knowledge help in designing solutions and analyzing its complexity.
CO2	PSO3	This knowledge helps to design good and efficient algorithms.
CO2	PSO3	This knowledge helps in identifying the best tools needed to develop the algorithm
CO2	PSO3	The knowledge help in designing solutions and analyzing its complexity.
CO2	PSO1	The knowledge can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
CO2	PSO2	The knowledge can be used to have products of industry standard
CO2	PSO3	The knowledge helps in research areas such as designing block chain etc.
CO3	PSO3	The knowledge help in designing solutions and analyzing its complexity.
CO3	PSO3	This knowledge helps to design good and efficient algorithms.
CO3	PSO3	This knowledge helps in identifying the best tools needed to develop the algorithm
CO3	PSO1	The knowledge can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
CO3	PSO2	The knowledge can be used to have products of industry standard
CO3	PSO3	The knowledge helps in research areas such as designing block chain etc.
CO4	PSO3	The knowledge help in designing solutions and analyzing its complexity.
CO4	PSO3	This knowledge helps to design good and efficient algorithms.
CO4	PSO3	This knowledge helps in identifying the best tools needed to develop the algorithm
CO4	PSO1	The knowledge can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.

CS465 BIOINFORMATICS

COURSE INFORMATION SHEET:

Program: **Computer Science and Engineering**	Degree :**B-Tech**
Course**: Bioinformatics**	Course code**: CS 465**
L-T-P**: 3-0-0-3**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Bioinformatics and Computational Biology, Nature & Scope of Bioinformatics. The central dogma of molecular biology and bio-sequences associated with it, RNA classification –coding and non coding RNA-mRNA, tRNA, miRNA and sRNA, RNAi. DNA and RNA structure – Nucleic Acid structure and function, Genetic Code, Genes and Evolution	6	15%
II	Importance of databases - Biological databases-primary sequence databases, Composite sequence databases-Secondary databases- nucleic acid sequence databases - Protein sequence data bases - structure databases, Types of databases, Data retrieval tools - Entrez	6	15%
III	Sequence alignment – local/global, pairwise sequence alignment, scoring methods. Needleman and Wunsch algorithm, global and local alignments. Multiple sequence alignment. Scoring matrices: basic concept of a scoring matrix, Matrices for nucleic acid and proteins sequences, PAM and BLOSUM series, principles based on which these matrices are derived. Differences between distance & similarity matrix.	7	15%
IV	Introduction, Advantages, Phylogenetic Trees, Tree topologies, Methods for phylogenetic analysis- Distance Matrix methods, Character based methods. HMM (Hidden Markov Model): Introduction to HMM, Forward algorithm, Viterbi algorithm, applications in Bioinformatics	7	15%
V	General introduction to Gene expression in prokaryotes and eukaryotes- Prokaryotic Genomes – Gene structure, GC content, Gene Density, Eukaryotic Genomes- Gene structure, GC content, Gene Density,Gene Expression, Transposition, Gene prediction approaches.	8	20%
VI	Protein and RNA structure Prediction: Predicting RNA secondary structure – Nussinov Algorithm, Energy minimisation methods – Zuker Algorithm. Amino Acids, Polypeptide Composition, Protein Structures, Algorithm for protein folding, Structure prediction	8	20%

TEXT BOOKS:

1	S C Rastogi, N Mendiratta and P Rastogi, " Bioinformatics: Methods and Applications" ,ISBN : 978-81-203- 4785-4, published by PHI Learning Private Limited, New Delhi,2015

REFERENCES:

1	D E Krane and M L Raymer, Fundamental Concepts of Bioinformatics, ISBN 978-81-7758-757-9, Pearson Education, 2006
2	Andreas D.Baxevanis, B F Francis Ouellette, "Bioinformatics - A Practical Guide to the Analysis of Genes and Proteins", Third Edition, 2005-2006, ISBN: 978-81-265-2192-0,published by John Wiley & Sons INC. , U.K.
3	Neil C Jones and Pavel A Pevzner, An Introduction to Bioinformatics Algorithms, MITpress, 2004.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce concepts and data representations in bioinformatics	
2	To introduce fundamentals of Sequence alignment and Gene Recognition	
3	To discuss predictive methods using DNA and Protein Sequences	

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Interpret the concepts of bioinformatics
2	Identify different types of biological sequence
3	Analyse multiple sequences and find conserved regions
4	Predict RNA and Protein secondary structures
5	Analyze genomic sequences and identify encoded gene regions

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CS465. 1	_	3	_	1	_	_	_	_	_	_	_	_	2	-	_
CS465. 2	2	3	-	-	_	_	_	_	_	_	_	_	2	-	-
CS465. 3	-	3	-	3	_	_	_	_	_	_	_	_	2	-	-
CS465. 4	_	_	2	_	2	_	2	_	_	_	_	_	_	_	1
CS465. 5	_	3	-	3	2	_	_	_	_	_	_	1	1	_	-

CO-PO MAPPING JUSTIFICATION:

CS364	**CO1**	**PO2**	**3**	By gaining the ability to identify bioinformatics concepts, the students will be able to analyze complex problems related to biology and information technology.
		PO4	**1**	The students will get an insight to use research based knowledge to interpret bioinformatics data, and synthesis of information to provide valid conclusions.
	CO2	**PO1**	**2**	The students will be able to apply the knowledge of mathematics, science, engineering fundamentals, to identify biological sequences.
		PO2	**3**	The students will be able o identify biological sequences using principles of mathematics, natural sciences, and engineering sciences.
	CO3	**PO2**	**3**	By understanding the principles of mathematics, natural sciences, and engineering sciences the students will be able to identify and analyze multiple sequences and find conserved regions.
		PO4	**3**	By designing experiments, analysis and interpretation of data, and synthesis of the information the students will be able to identify and analyze multiple sequences and find conserved regions.
	CO4	**PO3**	**2**	Students will be able to predict protein and RNA structure that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
		PO5	**2**	By selecting , and applying appropriate techniques, resources, and modern engineering and IT tools students will be able to predict protein and RNA structure
		PO7	**2**	Students will be able to use protein and RNA structure in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development..
	CO5	**PO2**	**3**	Students will be able to identify genomic sequences using first principles of mathematics, natural sciences, and engineering sciences.
		PO4	**3**	Enables students to use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to analyze genomic sequences and identify encoded gene regions
		PO5	**2**	The usage of appropriate techniques, resources, and modern engineering and IT tools enables the students to analyze genomic sequences and identify encoded gene regions.
		PO12	**1**	Students get the ability to engage in independent and lifelong learning regarding genes, proteins and RNA structure and analysis.

CO-PSO MAPPING JUSTIFICATION:

CS364	CO1	PSO1	2	The students will gain the ability to identify and design problems related to bioinformatics
	CO2	PSO1	2	The students will be able to identify, analyze and design different types of biological sequences by understanding the core principles and concepts of computer science and biology and thereby engage in national grand challenges.
	CO3	PSO1	2	The students will be able to identify, analyze and design multiple sequences and find conserved regions by understanding the core principles and concepts of computer science and biology and thereby engage in national grand challenges
	CO4	PSO3	1	Students will be gain the ability to predict protein and RNA structure by applying the fundamentals of computer science in competitive research to meet the societal needs thereby evolving as an eminent researcher.
	CO5	PSO1	1	The students will get the ability to analyze genomic sequences by understanding the core principles and concepts of computer science and thereby engage in national grand challenges.

CS467 MACHINE LEARNING

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Machine Learning**	Course code**: CS467**
L-T-P**:3-0-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to Machine Learning, Examples of Machine Learning applications - Learning associations, Classification, Regression, Unsupervised Learning, Reinforcement Learning. Supervised learning- Input representation, Hypothesis class, Version space, Vapnik-Chervonenkis (VC) Dimension	6	15
II	Probably Approximately Learning (PAC), Noise, Learning Multiple classes, Model Selection and Generalization, Dimensionality reduction- Subset selection, Principle Component Analysis.	8	15
III	Classification- Cross validation and re-sampling methods- K fold cross validation, Boot strapping. Measuring classifier performance- Precision, recall, ROC curves. Bayes Theorem, Bayesian classifier, Maximum Likelihood estimation, Density functions, Regression.	8	15
IV	Decision Trees- Entropy, Information Gain, Tree construction, ID3, Issues in Decision Tree learning- Avoiding Over-fitting, Reduced Error Pruning, The problem of Missing Attributes, Gain Ratio, Classification by Regression (CART). Neural Networks- The Perceptron, Activation Functions, Training Feed Forward Network by Back Propagation.	6	15
V	Kernel Machines- Support Vector Machine- Optimal Separating hyper plane, Soft-margin hyperplane, Kernel trick, Kernel functions. Discrete Markov Processes, Hidden Markov models, Three basic problems of HMMs- Evaluation problem, finding state sequence, Learning model parameters. Combining multiple learners, Ways to achieve diversity, Model combination schemes, Voting, Bagging, Booting	8	20
VI	Unsupervised Learning - Clustering Methods - K-means, Expectation-Maximization Algorithm, Hierarchical Clustering Methods, Density based clustering	6	20

TEXT BOOKS: NIL

REFERENCES:

1	Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
2	Ethem Alpaydın, Introduction to Machine Learning (Adaptive Computation and Machine Learning), MIT Press, 2004.
3	Margaret H. Dunham. Data Mining: introductory and Advanced Topics, Pearson, 2006
4	Mitchell. T, Machine Learning, McGraw Hill.
5	Ryszard S. Michalski, Jaime G. Carbonell, and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Tioga Publishing Company.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce the prominent methods for machine learning
2	To study the basics of supervised and unsupervised learning
3	To study the basics of connectionist and other architectures

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Differentiate various learning approaches, and to interpret the concepts of supervised learning.
2	Compare the different dimensionality reduction techniques.
3	Evaluation methods of Classification and Measuring Classifier Performance
4	Bayesian classifier to label data points and regression models
5	Apply theoretical foundations of decision trees to identify best split
6	Illustrate the working of classifier models like SVM, Neural Networks and identify classifier model for typical machine learning applications
7	Identify the state sequence and evaluate a sequence emission probability from a given HMM

8	Illustrate and apply clustering algorithms and identify its applicability in real life problems

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	3	3	1											2	2
CO2	3	3	3	1												2
CO3	3	3	3	2												2
CO4	3	3	3												2	2
CO5	3	3	3												2	2
CO6	3	3	3											2	2	1
CO7	3	3	3	2										2	2	2
CO8	3	3	3	2										2	2	2

CO-PO MAPPING JUSTIFICATION:

CO1	PO1	3	Differentiating various learning approaches will help to find the solution of complex engineering problems.
	PO2	3	Differentiating various learning approaches will help in analyzing engineering problems
	PO3	3	Differentiating various learning approaches will help to design solutions for complex engineering problems
	PO4	1	Differentiating various learning approaches will help to investigate on different problems
CO2 CO3	PO1	3	Help to find the solution for complex engineering problems using dimensionality reduction techniques and methods of Classification and Measuring Classifier Performance
	PO2	3	Help in analyzing engineering problems using dimensionality reduction techniques and methods of Classification and Measuring Classifier Performance
	PO3	3	Help to design solutions for complex engineering problems using dimensionality reduction techniques and methods of Classification and Measuring Classifier Performance
	PO4	1	Help to investigate on different problems using dimensionality reduction techniques and methods of Classification and Measuring Classifier Performance
CO4 CO5	PO1	3	Theoretical foundations of decision trees and Bayesian classifiers will help to find the solution of complex engineering problems.
	PO2	3	Decision trees Bayesian classifier for labeling data points will help in analyzing engineering problems
	PO3	3	Decision trees and Bayesian classifier will help to design solutions for complex engineering problems
CO6	PO1	3	Classifier models will help to find the solution of complex engineering problems.
	PO2	3	SVM, Neural Networks are used for finding the solutions and analyzing the solutions
	PO3	3	Identifying classifier model for typical machine learning applications will help to

			design solutions for complex engineering problems.
CO7	**PO1**	**3**	Identifying the state sequence will help to find the solution of complex engineering problems.
	PO2	**3**	Evaluate a sequence emission probability from a given HMM will help in analyzing engineering problems
	PO3	**3**	HMM approach will help to design solutions for complex engineering problems
	PO4	**2**	Hidden Markov Model will help to investigate on different problems
CO8	**PO1**	**3**	Clustering algorithms will help to find the solution of complex engineering problems.
	PO2	**3**	Clustering algorithms will help in analyzing engineering problems
	PO3	**3**	Clustering algorithms will help to design solutions for complex engineering problems
	PO4	**3**	Clustering algorithms will help to investigate on different problems

CO-PSO MAPPING JUSTIFICATION:

CO1	**PSO2**	**2**	Various learning approaches Acquire skills to design, analyze and develop algorithms and implement them using high-level programming languages.
	PSO3	**2**	Knowledge of supervised learning concepts contribute skills in computing and knowledge engineering domain
CO2 CO3	**PSO3**	**2**	Knowledge of different dimensionality reduction techniques Acquire skills to design, analyze and develop algorithms and implement them using high-level programming languages.
CO4 CO5	**PSO3**	**2**	Theoretical foundations of decision trees to identify best split and Bayesian classifier Acquire skills to design, analyze and develop algorithms and implement them using high-level programming languages
	PSO2	**2**	Theoretical foundations of decision trees and Bayesian classifier contribute skills in computing and knowledge engineering domain
CO6	**PSO3**	**1**	Study of classifier model working acquire skills to design, analyze and develop algorithms and implement them using high-level programming languages
	PSO2	**2**	Identification of classifier model application area contribute skills in computing and knowledge engineering domain
	PSO1	**2**	Classifier model working knowledge contribute to develop strong skills in developing IT solutions for different domains which helps in the betterment of life
CO7	**PSO1**	**2**	HMM working knowledge contribute to develop strong skills in developing IT solutions for different domains which helps in the betterment of life
	PSO2	**2**	HMM model application area contribute skills in computing and knowledge engineering domain
	PSO3	**2**	Study of HMM model working acquire skills to design, analyze and develop algorithms and implement them using high-level programming languages
CO8	**PSO1**	**2**	The clustering and its methods contribute to develop strong skills in developing IT solutions for different domains which helps in the betterment of life
	PSO2	**2**	Clustering application area contribute skills in computing and knowledge engineering domain
	PSO3	**2**	Study of Clustering methods working acquire skills to design, analyze and develop algorithms and implement them using high-level programming languages

CS 431 COMPILER DESIGN LAB

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course **: Compiler Design Lab**	Course code**: CS 431**
L-T-P**: 0-0-3**	Credit**:1**

SYLLABUS:

12 Experiments are Mandatory

1. Design and implement a lexical analyzer for given language using C and the lexical analyzer should ignore redundant spaces, tabs and new lines.
2. Implementation of Lexical Analyzer using Lex Tool
3. Generate YACC specification for a few syntactic categories.
   a) Program to recognize a valid arithmetic expression that uses operator +, – , * and /.
   b) Program to recognize a valid variable which starts with a letter followed by any number of letters or digits.
   c) Implementation of Calculator using LEX and YACC
   d) Convert the BNF rules into YACC form and write code to generate abstract syntax tree
4. Write program to find ε – closure of all states of any given NFA with ε transition.
5. Write program to convert NFA with ε transition to NFA without ε transition.
6. Write program to convert NFA to DFA
7. Write program to minimize any given DFA.
8. Develop an operator precedence parser for a given language.
9. Write program to find Simulate First and Follow of any given grammar.
10. Construct a recursive descent parser for an expression.
11. Construct a Shift Reduce Parser for a given language.
12. Write a program to perform loop unrolling.
13. Write a program to perform constant propagation.
14. Implement Intermediate code generation for simple expressions.
15. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using an 8086 assembler.

TEXT BOOKS /REFERENCES:

1	Aho A Ravi Sethi and J D Ullman, Compilers Principles Techniques and Tools, Addison Wesley
2	Kenneth C Louden, "Compiler Construction Principles and Practice", Cenage Learning Indian Edition
3	D M Dhamdhare, System programming and operating system, Tata McGraw Hill & Company
4	Tremblay and Sorenson, The Theory and Practice of Compiler Writing - Tata McGraw Hill & Company

PREREQUISITE : Compiler Design, System Software

COURSE OBJECTIVES:

1	To implement the different Phases of compiler.
2	To implement and test simple optimization techniques.
3	To give exposure to compiler writing tools.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will able to implement the techniques of Lexical Analysis and Syntax Analysis.
2	Students will able to apply the knowledge of Lex & Yacc tools to develop programs
3	Students will be able to **generate** intermediate code
4	Students will be able to **implement** Optimization techniques and generate machine code

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	2		-	-	2	-		-	-	-	-	-	1	-	3	2
CO2	2		-	-	2	-		-	-	-	-	-	1	-	3	2
CO3	2	2	-	-		-		-	-	-	-	-	-	-	2	-
CO4	2	2	-	-		-		-	-	-	-	-	-	-	3	3

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	They are able to use LEX tool for developing lexical analyzer.
	PO6	Programming in LEX helps to understand basic principles of lexical analysis
CO2	PO1	Programming in YACC helps to understand basic parsing principles.
	PO5	They are able to use YACC tool for developing syntax analyzer.
CO3	PO1	Knowledge of various intermediate representations helps to generate efficient target code.
	PO2	Selection of suitable intermediate representation helps to reduce register usage
CO4	PO1	Studies about various assemblers helps to distinguish its features and helps to design a two pass assembler
	PO2	Knowledge about the design of an assembler helps to understand the structure of symbol table.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO2	Usage of LEX tool helps to understand how to design the lexical analyser
CO1	PSO3	Programming in C and with LEX tool helps to understand how to design the lexical analyser
CO2	PSO2	Usage of YACC tool helps to understand how to design the syntax analyzer.
CO2	PSO3	Programming in C and with YACC tool helps to understand how to design the syntax analyzer.
CO3	PSO3	Knowledge of various intermediate representations helps to generate memory efficient code.
CO4	PSO2	Understanding the basic steps of an assembler helps to design a 2 pass assembler.
CO4	PSO3	Knowledge about the structure of symbol table helps to develop efficient assemblers.

CS451 SEMINAR

COURSE INFORMATION SHEET:

Program: **Computer Science & Engineering**	Degree : **B-Tech**
Course**:** Seminar	Course code**: CS 451**
L-T-P**:0-1-4**	Credit**:2**

PREREQUISITE:

ALL SUBJECTS TILL S7

COURSE OBJECTIVES:

1	To develop skills in doing literature survey, technical presentation and report preparation.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Understand the recent technologies relating to Computer Science & Engineering.
2	To identify engineering problems through detailed literature survey and to develop a solution.
3	Develop communication and presentation skills during the presentation phase
4	Develop ethical writing skills during the report submission

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	2								3			2		1		
CO2	3	3	3	2		2	2		3		3	3			1	
CO3								2	3	3				2		
CO4								3	3	3				2		

CO-PO MAPPING JUSTIFICATION:

CO1	**PO1**	**2**	Apply engineering fundamentals in order to understand the recent developments.
	PO9	**3**	Individual contributions for seminar and project.
	PO12	**2**	Lifelong learning is achieved by analyzing the future scope of the recent technology
CO2	**PO1**	**3**	Apply the knowledge of mathematics, and engineering fundamentals, to the solution of engineering problems.
	PO2	**3**	Analyze engineering problems to arrive at substantiated conclusions
	PO3	**3**	Students will be able to design systems/solutions for engineering problems by considering public health, safety and environment.
	PO4	**2**	Use research-based knowledge from the literature survey which helps to provide valid conclusions.
	PO6	**2**	The topic identified, formulated and analysed should benefit engineering society.
	PO7	**2**	The domain studied must benefit the society in environmental context.
	PO9	**3**	Individual contributions for seminars and effective team work for projects are mandatory.
	PO11	**3**	Scheduling and budget estimation is done in the initial phase through literature survey.
	PO12	**3**	Lifelong learning is achieved in various stages like literature survey, methodology and future scope.
CO3	**PO8**	**2**	Discussions communicated through presentation should abide ethical principles.
	PO9	**3**	Individual contributions for seminars and effective team work for projects are mandatory during the presentation phase.
	PO10	**3**	Communicate effectively on complex engineering activities with effective presentations.
CO4	**PO8**	**3**	Existing results and discussion communicated through the report should abide professional ethics.
	PO9	**3**	Individual contributions for seminar and effective team work for projects are mandatory for report submission.
	PO10	**3**	Communicate effectively on complex engineering activities with effective reports and design documentation.

CO-PSO MAPPING JUSTIFICATION:

CO1	**PSO1**	**1**	Graduates develop the skills to understand the latest technologies in the field of computer science
CO2	**PSO2**	**1**	Graduates possess the ability to identify the problem after attaining the foundation of mathematical problems
CO3	**PSO1**	**2**	Graduates will be able to develop professional skills like oral communication skills and effective presentation skills
CO4	**PSO1**	**2**	Graduates possess writing skills which is required for effective report writing

CS451 PROJECT PRILEMINARY

COURSE INFORMATION SHEET:

Program: **Computer Science and Engineering**	Degree :**B-Tech**
Course**: Project Prileminary**	Course code**: CS 451**
L-T-P**:0-1-4**	Credit**:2**

SYLLABUS:

CONTENT
Identify suitable project relevant to the branch of study. Form project team (not exceeding fourVstudents). The students can do the project individually also. Identify a project supervisor. Present the project proposal before the assessment board (excluding the external expert) and get it approved by the board. The preliminary work to be completed: (1) Literature survey (2) Formulation of objectives (3) Formulation of hypothesis/design/methodology (4) Formulation of work plan (5) Seeking funds (6) Preparation of preliminary report Note: The same project should be continued in the eighth semester by the same project team.

PREREQUISITE:

NIL

COURSE OBJECTIVES:

1	To develop skills in doing literature survey, technical presentation and report preparation
2	To enable project identification and execution of preliminary works on final semester project
3	To develop skills in doing literature survey, technical presentation and report preparation

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Develop skills in doing literature survey, technical presentation and report preparation
2	Analyze a current topic of professional interest and present it before an audience
3	Determine an engineering problem, analyse it and propose a work plan to solve it
4	Identify a project and execute its preliminary works on final semester project

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	2		2										3	1	3
CO2	3	3		3										3		3
CO3	3	2	3	2					3					3		
CO4	3	3	2	3					3					3	2	
CO5	3	2		2										3	1	3
CO6	3	3		3										3		3

CO-PO MAPPING JUSTIFICATION:

CO	PO'S	JUSTIFICATION
CO1	PO1	Students could apply the knowledge of various engineering fundamentals to develop skills in doing literature survey, technical presentation and report preparation.
	PO2	Students could review research literature for technical presentation and report preparation.
	PO4	Students could use research-based knowledge to identify a project and execute its preliminary works on final semester project
CO2	PO1	Students could apply the knowledge of various engineering fundamentals to analyse a current topic of professional interest
	PO2	Students could review research literature to analyse a current topic of professional interest and present it before an audience
	PO4	Students could use research-based knowledge to analyse a current topic of professional interest.
CO3	PO1	Students could apply the knowledge of various engineering fundamentals to identify an engineering problem and analyse it and propose a work plan
	PO2	Students could review research literature to analyse a problem and prepare work plan.

	PO3	H Use research-based knowledge and research methods including analysis and interpretation of data to analyse a problem.
	PO4	Students could use research-based knowledge to analyse a problem and prepare work pan.
	PO9	Students could function effectively as an individual, and as a member or leader in diverse teams to prepare work plan.
CO4	**PO1**	Students could apply the knowledge of various engineering fundamentals
	PO2	Students could review research literature to identify a problem and execute its preliminary works
	PO3	Use research-based knowledge and research methods including analysis and interpretation of data to identify a problem.
	PO4	Students could use research-based knowledge to identify a problem and prepare preliminary works..
	PO9	Function effectively as an individual, and as a member or leader in diverse teams to start preliminary works.

CO-PSO MAPPING JUSTIFICATION:

CO	PO'S	JUSTIFICATION
CO1	**PSO1**	The graduates of the program are able to develop skills in doing literature survey, technical presentation and preparation and technical communication
	PSO2	The graduates of the program have a broad understanding in economical ,environmental societal and safety factors involved in infrastructural development
	PSO3	The graduates of the program will develop an ability to demonstrate with in multidisciplinary teams with competence in modern softwares
CO2	**PSO1**	The graduates of the program will have a sound knowledge in analyze a current topic of professional interest.
	PSO3	The graduates of the program will develop an ability to demonstrate with in multidisciplinary teams with competence in modern softwares.
CO3	**PSO1**	The graduates of the program will be able to determine an engineering problem and analyse it using fundamental mathematics and basic science
CO4	**PSO1**	The graduates of the program will be able to excute its preliminary work on final semester project using a sound knowledge in analysis, design, laboratory investigation and construction aspects of civil engineering infrastructure.
	PSO2	The graduates of the program will be able to identify a project by understanding economical ,environmental societal and safety factors involved in infrastructural development

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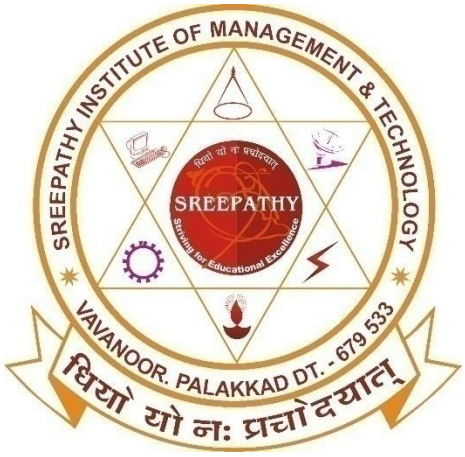

COURSE HANDBOOK

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SEMESTER VIII

CS402 DATAMINING AND WAREHOUSING

COURSE INFORMATION SHEET:

Program:**Computer Science & Engineering**	Degree :**B-Tech**
Course**: Data Mining And Warehousing**	Course code**: CS402**
L-T-P**:3-0-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Data Mining: - Concepts and Applications, Data Mining Stages, Data Mining Models, Data Warehousing (DWH) and On-Line Analytical Processing (OLAP), Need for Data Warehousing, Challenges, Application of Data Mining Principles, OLTP Vs DWH, Applications of DWH	6	15
II	Data Preprocessing: Data Preprocessing Concepts, Data Cleaning, Data integration and transformation, Data Reduction, Discretization and concept hierarchy.	6	15
III	Classification Models: Introduction to Classification and Prediction, Issues regarding classification and prediction, Decision Tree- ID3, C4.5, Naive Bayes Classifier.	6	15
IV	Rule based classification- 1R. Neural Networks-Back propagation. Support Vector Machines, Lazy Learners-K Nearest Neighbor Classifier. Accuracy and error Measures - evaluation. Prediction: -Linear Regression and Non-Linear Regression.	6	15
V	Association Rules Mining: Concepts, Apriori and FP Growth Algorithm. Cluster Analysis: Introduction, Concepts, Types of data in cluster analysis, Categorization of clustering methods. Partitioning method: K-Means and K-Medoid Clustering.	8	20
VI	Hierarchical Clustering method: BIRCH. Density-Based Clustering –DBSCAN and OPTICS. Advanced Data Mining Techniques: Introduction, Web Mining- Web Content Mining, Web Structure Mining, Web Usage	8	20

	Mining. Text Mining. Graph mining: - Apriori based approach for mining frequent subgraphs. Social Network Analysis: -characteristics of social networks. Link mining: - Tasks and challenges.		

TEXT BOOKS:

1	Dunham M H, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2003.
2	Jaiwei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Elsevier, 2006.

REFERENCES:

1	M Sudeep Elayidom, "Data Mining and Warehousing", 1st Edition, 2015, Cengage Learning India Pvt. Ltd.
2	Mehmed Kantardzic, "Data Mining Concepts, Methods and Algorithms", John Wiley and Sons, USA, 2003.
3	Pang-Ning Tan and Michael Steinbach, "Introduction to Data Mining", Addison Wesley, 2006.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce the concepts of data Mining and its applications
2	To understand investigation of data using practical data mining tools.
3	To introduce Association Rules Mining
4	To introduce advanced Data Mining techniques

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Identify the key process of Data mining and Warehousing
2	Apply appropriate techniques to convert raw data into suitable format for practical

	datamining tasks
3	Analyze and compare various classification algorithms and apply in appropriate domain
4	Evaluate the performance of various classification methods using performance metrics
5	Make use of the concept of association rule mining in real world scenario
6	Select appropriate clustering and algorithms for various applications
7	Extend data mining methods to the new domains of data

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	2	2					1							2	
CO2	2	3	1		2											2
CO3	3	2	3	2										2		
CO4	2	3	2		1											2
CO5	3	2	3	2												3
CO6	3	2	2													3
CO7			3								2				2	2

CO-PO MAPPING JUSTIFICATION:

CO1	**PO1**	**3**	Apply the knowledge of mathematics, science, engineering fundamentals to understand the key process of Data mining and Warehousing
	PO2	**2**	Identify the key process of Data mining and Warehousing and apply them into real word applications
	PO3	**2**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs using KDD process
	PO8	**1**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice while using the data mining concepts
CO2	**PO1**	**2**	Apply the knowledge of mathematics, science and engineering

			fundamentals for the appropriate techniques to convert raw data into suitable format for practical datamining tasks
	PO2	**3**	Analyze the techniques to convert raw data into suitable format for practical datamining tasks
	PO3	**1**	Design or develop appropriate techniques to convert raw data into suitable format for practical datamining tasks
	PO5	**2**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
CO3	**PO1**	**3**	Apply the knowledge of mathematics, science and engineering fundamentals to analyze and compare various classification algorithms and apply in appropriate domain
	PO2	**2**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and Engineering sciences for various classification algorithm
	PO3	**3**	Design Classification algorithm solutions for complex engineering problems and design system components or processes that meet the specified needs
	PO4	**2**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
CO4	**PO1**	**2**	Apply the knowledge of mathematics, science and engineering fundamentals to evaluate the performance of various classification methods using performance metrics
	PO2	**3**	Evaluation of the performance of various classification methods using performance metricshelps to identify, formulate, review research literature, and analyze complex engineering problems
	PO3	**2**	Evaluation of the performance of various classification methods using performance metricshelps to Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration
	PO5	**1**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
CO5	**PO1**	**3**	Apply the knowledge of mathematics, science and engineering fundamentals to analyze and compare various Association mining algorithms and apply in appropriate domain
	PO2	**3**	Identify, formulate, review research literature, and analyze complex

			engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and Engineering sciences for various association mining algorithm
	PO3	**3**	Design Association algorithm solutions for complex engineering problems and design system components or processes that meet the specified needs
	PO4	**2**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
CO6	**PO1**	**3**	Apply the knowledge of mathematics, science and engineering fundamentals to select appropriate clustering and algorithms for various applications
	PO2	**2**	Selection of appropriate clustering and algorithms for various applications helps students to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and Engineering .
	PO3	**2**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs
CO7	**PO3**	**3**	Extension of data mining methods gives opportunity to design solutions for complex engineering problems and design system components or processes that meet the specified needs.
	PO11	**2**	Demonstrate knowledge and understanding of the engineering management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

CO-PSO MAPPING JUSTIFICATION:

CO1	**PSO2**	2	With the knowledge of Data mining and warehousing, the students will be able to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of OOP
CO2	**PSO3**	2	The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry, practicing the various data conversion techniques.
CO3	**PSO1**	**2**	The students will be able to develop ability to apply the fundamentals of computer science in competitive research, by comparing various classification algorithms and applying them in appropriate domain.
CO4	**PSO3**	2	Efficient evaluation of classification methods, will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service.

CO5	**PSO3**	3	Application of Association rule mining in real world scenario methods, will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service
CO6	**PSO3**	3	Selection of appropriate clustering algorithms for various applications, will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service.
CO7	**PSO2**	2	Extension of data mining methods to new domains of data will make students to Identify, formulate, review research literature, and analyze complex engineering problems
CO7	**PSO3**	2	Extension of data mining methods to new domains of data, will enable the students to apply the fundamentals of computer science in competitive research and to develop an efficient data product or service.

CS 404 EMBEDDED SYSTEMS

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Embedded Systems**	Course code**: CS 404**
L-T-P**: 3-1-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Fundamentals of Embedded Systems- complex systems and microprocessors- Embedded system design process .Specifications- architecture design of embedded system design of hardware and software components- structural and behavioural description	6	15
II	Hardware Software Co-Design and Program Modelling – Fundamental Issues, Computational Models- Data Flow Graph, Control Data Flow Graph, State Machine, Sequential Model, Concurrent Model, Object oriented model, UML	9	15
III	Design and Development of Embedded Product – Firmware Design and Development – Design pproaches, Firmware Development Languages.	6	15
IV	Integration and Testing of Embedded Hardware and Firmware- Integration of Hardware and Firmware. Embedded System Development Environment – IDEs, Cross Compilers, Disassemblers, Decompilers, Simulators, Emulators and Debuggers.	6	15
V	RTOS based Design – Basic operating system services. Interrupt handling in RTOS environment. Design Principles. Task scheduling models. How to Choose an RTOS. Case Study – MicroC/OS-II.	9	20
VI	Networks – Distributed Embedded Architectures, Networks for embedded systems, Network based design, Internet enabled systems. Embedded Product Development Life Cycle – Description – Objectives -Phases – Approaches1. Recent Trends in Embedded Computing.	6	20

TEXT BOOKS:

1	Shibu K.V., Introduction to Embedded Systems, McGraw Hill Education (India), 2009.

REFERENCES:

1	J Staunstrup and Wayne Wolf, Hardware / Software Co-Design: Principles and Practice, Prentice Hall..
2	Jean J. Labrose, Micro C/OS II: The Real Time Kernel, 2e, CRC Press, 2002
3	Raj Kamal, Embedded Systems: Architecture, Programming and Design, Third Edition, McGraw Hill Education (India), 2014.
4	Steave Heath, Embedded System Design, Second Edition, Elsevier.
5	Wayne Wolf , Computers as Components-Principles of Embedded Computer System Design, Morgan Kaufmann publishers, Third edition, 2012.

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce the technologies behind embedded computing systems.
2	To introduce and discuss various software components involved in embedded system design and development.
3	To expose students to the recent trends in embedded system design.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Demonstrate the role of individual components involved in a typical Embedded system.
2	Analyze the characteristics of different computing elements and select the most appropriate one for an embedded system.
3	Model the operation of a given embedded system.
4	Substantiate the role of different software modules in the development of an embedded system.
5	Develop simple tasks to run on an RTOS.
6	Examine the latest trends prevalent in embedded system design.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	3	2	1	2	2	2	-	-	2	-	3		2	3	2
CO2	3	3	3	2	3	2	2	-	-	2	-	3		3	3	2
CO3	3	3	3	2	3	2	2	-	-	3	-	3		3	3	2

CO4	2	2	2	2	2	2	2	-	-	3	-	3		2	3	2
CO5	3	3	3	3	2	2	2	-	-	2	-	2		2	2	2
CO6	2	2	2	2	2	2	2	-	-	2	-	2		2	2	2

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
	PO2	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
	PO3	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
	PO4	This knowledge helps to identify the best embedded component.
	PO5	This knowledge helps in identifying the best tools needed to develop the embedded system
	PO6	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
	PO7	This knowledge helps as to do research in different embedded component effectively.
	PO10	This knowledge helps to communicate our ideas and suggestion ina more effective manner to the community.
	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.
CO2	PO1	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
	PO2	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
	PO3	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
	PO4	This knowledge helps to identify the best embedded component.
	PO5	This knowledge helps in identifying the best tools needed to develop the embedded system
	PO6	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
	PO7	This knowledge helps as to do research in different embedded component effectively.
	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.

	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.
CO3	PO1	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
	PO2	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
	PO3	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
	PO4	This knowledge helps to identify the best embedded component.
	PO5	This knowledge helps in identifying the best tools needed to develop the embedded system
	PO6	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
	PO7	This knowledge helps as to do research in different embedded component effectively.
	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.
CO4	PO1	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
	PO2	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
	PO3	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
	PO4	This knowledge helps to identify the best embedded component.
	PO5	This knowledge helps in identifying the best tools needed to develop the embedded system
	PO6	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
	PO7	This knowledge helps as to do research in different embedded component effectively.
	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.
	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.

	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
CO5	PO1	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
	PO2	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
	PO3	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
	PO4	This knowledge helps to identify the best embedded component.
	PO5	This knowledge helps in identifying the best tools needed to develop the embedded system
	PO6	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded system.
	PO7	This knowledge helps as to do research in different embedded component effectively.
	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.
	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
CO6	PO1	The knowledge in different embedded systems components helps in designing solutions for complex engineering problems.
	PO2	The knowledge in different embedded systems components helps in analysis of performance of solutions to complex problems
	PO3	The knowledge in different embedded systems components help in designing solutions and analyzing its complexity.
	PO4	This knowledge helps to identify the best embedded component.
	PO5	This knowledge helps in identifying the best tools needed to develop the embedded system
	PO6	This knowledge helps us to use effective engineering practices such as requirement gathering and specification etc. before choosing the best components for embedded

		system.
	PO7	This knowledge helps as to do research in different embedded component effectively.
	PO10	This knowledge helps to communicate our ideas and suggestion in a more effective manner to the community.
	PO12	These concepts are fundamental to CS and can be used in research and other innovative ideas.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
CO2	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
CO3	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
CO4	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.

CO5	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.
CO6	PSO1	The knowledge in different components in embedded system can be applied to design solutions to complex engineering problems in multidisciplinary areas. They belong to the core concepts of CS.
	PSO2	The knowledge of embedded system can be used to have products of industry standard
	PSO3	The knowledge of embedded system helps in research areas such as designing & developing different embedded products etc.

CS464 ARTIFICIAL INTELLIGENCE

COURSE INFORMATION SHEET

Program: **Computer Science & Engineering**	Degree :**B-Tech**
Course**: Artificial Intelligence**	Course code**: CS 464**
L-T-P**: 3-1-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	**Introduction**: What is AI, The foundations of AI, History and applications, Production systems. Structures and strategies for state space search. Informed and Uninformed searches.	5	15
II	**Search Methods:** data driven and goal driven search. Depth first and breadth first search, DFS with iterative deepening. Heuristic search-best first search, A * algorithm.AO* algorithm, Constraint Satisfaction. Crypt Arithmetic Problems	8	15
III	**AI representational schemes**- Semantic nets, conceptual dependency, scripts, frames, introduction to agent based problem solving, Machine learning-symbol based-a frame work for symbol based learning.	6	15
IV	**Advanced Search:** Heuristics in Games, Design of good heuristic-an example. Min-Max Search Procedure, Alpha Beta pruning,	6	15
V	**Learning Concepts:** Version space search. Back propagation learning. Social and emergent models of learning-genetic algorithm, classifier systems and genetic programming.	9	20
VI	**Expert Systems:** rule based expert systems. Natural language processing-natural language understanding problem, deconstructing language. Syntax stochastic tools for language analysis, natural language applications	9	20

TEXT BOOKS:

1	E Rich, K Knight, Artificial Intelligence, 3/e, Tata McGraw Hil, 2009.
2	George.F.Luger, Artificial Intelligence- Structures and Strategies for Complex Problem Solving, 4/e, Pearson Education. 2002.

REFERENCES:

1	D. Poole and A. Mackworth. Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010
2	Dan W Patterson, Introduction to Artificial Intelligence,Pearson,2009
3	Deepak Khemeni,A First course in Artificial Intelligence,Tata McGraw Hill,2013
4	Maja J. Mataric ,Robotics Primer,MIT press,2007
5	Patrick Henry Winston,Artificial intelligence,Addisson wessley,1992
6	Stefan Edelkamp, Stefan Schroedl, Heuristic Search: Theory and Applications, Morgan Kaufman, 2011.
	Stuart Jonathan Russell, Peter Norvig, Artificial intelligence, A modern approach,3rd edition, pearson,2010

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	To introduce basic principles that drive complex real world intelligence applications.
2	To introduce and discuss the basic concepts of AI Techniques and Learning

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	The Student will be able to identify the scope and limits of the artificial intelligence (AI) field
2	The Student will be able to assess the applicability, strengths, and weaknesses of the basic knowledge representation
3	The Student will be able to interpret the role of knowledge representation, problem solving, and learning
4	The Student will be able to explain various search algorithms (uninformed, informed, and heuristic) for problem solving
5	The Student will be able to comprehend the fundamentals of Natural Language Processing

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	-		3	-	-
CO2	2	-	2	2	-	2	-	-	-	-	-	-		2	-	-
CO3	2	-	2	2	-	2	-	-	-	-	-	-		2	-	-
CO4	2	2	2	-	-	-	-	-	-	-	-	-		2	-	-
CO5	-	2	2	2	-	2	-	-	-	-	-	-		2	-	-

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	PO1	By knowing the scope and limits of AI Students can identify the solvable and unsolvable problems.
	PO2	With suitable state space representation complex engineering problems can be solved easily.
	PO3	By knowing the scope and limits of AI students can develop creative solutions for problems.
CO2	PO1	Students can apply knowledge of mathematics and engineering fundamentals to strengthen AI knowledge representations.
	PO3	Good knowledge representation helps to design/develop solutions in better ways.
	PO4	Different properties of knowledge representation help for better analysis and interpretation of data hence to provide valid conclusions.
	PO6	Knowledge representations like semantic nets, conceptual dependency helps to asses societal, health, safety etc in systematic way.
CO4	PO1	To implement search algorithm mathematical knowledge is needed
	PO2	To reach substantiated conclusions to different problems , students should have an idea about different search techniques.
	PO3	Idea about heuristic type searching is required to develop optimal solutions.
CO5	PO2	Natural language understanding required for problem analysis.
	PO3	Natural language understanding required to design solutions to problems.
	PO4	Conduct investigation on problems idea about NLP is needed.
	PO6	To apply reasoning informed by the contextual knowledge to asses societal needs student should have an idea about language processing.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	PSO1	Students can identify, analyze and design complex engineering problems by knowing the basic concepts of AI.
CO2	PSO1	Good knowledge representation helps to make good solution to complex problems.
CO3	PSO1	Idea about different search algorithms helps to design good solution for complex engineering problems.
CO4	PSO1	Idea about different search algorithms helps to design good solution for complex engineering problems.
CO5	PSO1	Natural Language understanding is required to analyze and design solutions.

CS468 CLOUD COMPUTING

COURSE INFORMATION SHEET

PROGRAMME: **COMPUTER SCIENCE & ENGINEERING**	DEGREE: **BTECH**
COURSE: **Cloud Computing**	SEMESTER: **VIII** CREDITS: **3**
COURSE CODE: **CS468**	COURSE TYPE: **ELECTIVE**
COURSE AREA/DOMAIN: **Cloud**	CONTACT HOURS: **3-0-0(L-T-P) hours/Week**.
CORRESPONDING LAB COURSE CODE: **NIL**	LAB COURSE NAME: **NIL**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	**INTRODUCTION TO VIRTUALIZATION** Virtual Machines and Virtualization Middleware – Data Center Virtualization for Cloud Computing – Implementation Levels of Virtualization – Virtualization Structures/Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices	7	15
II	INTRODUCTION TO CLOUD COMPUTING System Models for Distributed and Cloud Computing – Software Environments for Distributed Systems and Clouds – Cloud Computing and Service Models – Public – Private – Hybrid Clouds – Infrastructure-as-a-Service (IaaS) – Platform-as-a- Service (PaaS) - Software-as-a-Service (SaaS)-Different Service Providers	8	15

III	CLOUD ARCHITECTURE AND RESOURCE MANAGEMENT Architectural Design of Compute and Storage Clouds – Public Cloud Platforms: GAE – AWS – Azure- Emerging Cloud Software Environments – Eucalyptus- Nimbus – Open Stack – Extended Cloud Computing Services – Resource Provisioning and Platform Deployment – Virtual Machine Creation and Management.	8	15
IV	CLOUD PROGRAMMING Parallel Computing and Programming Paradigms – Map Reduce –Twister – Iterative Map Reduce – Hadoop Library from Apache –Pig Latin High Level Languages- Mapping Applications to Parallel and Distributed Systems – Programming the Google App Engine – Google File System (GFS) – Big Table – Google's NOSQL System	7	15
V	SECURITY IN THE CLOUD Security Overview – Cloud Security Challenges – Security - as-a- Service – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security –Application Security – Virtual Machine Security.	6	20
VI	USING CLOUD SERVICES : Email Communications – Collaborating on To-Do Lists – Contact Lists – Cloud Computing for the Community- Collaborating on Calendars – Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Project Management -Word Processing – Databases .	6	20

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
	Text Books: 1. Kai Hwang , Geoffrey C Fox, Jack J Dongarra : "Distributed and Cloud Computing – From Parallel Processing to the Internet of Things" , Morgan Kaufmann Publishers – 2012.
	References: 1.James E. Smith and Ravi Nair: Virtual Machines: Versatile Platforms for Systems and Processes, Morgan Kaufmann, ELSEVIER Publication, 2006. 2. John W Rittinghouse and James F Ransome , "Cloud Computing: Implementation – Management – and Security", CRC Press, 2010. 3. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Pearson Education, 2009. 4. Richard N. Katz, "The Tower and The Cloud", Higher Education in the Age of Cloud Computing, 2008. 5. Toby Velte, Anthony Velte and Robert Elsenpeter: "Cloud Computing – A Practical Approach", TMH, 2009.

COURSE PRE-REQUISITES: NIL

COURSE OBJECTIVES:

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

CO's	DESCRIPTION
1	The students will be able to identify the significance of implementing virtualization techniques
2	The students will be able to interpret the various cloud computing models and services.
3	The students will be able to compare the various public cloud platforms and software environments.
4	The students will be able to apply appropriate cloud programming methods to solve big data problems.
5	The students will be able to appreciate the need for security mechanisms in the cloud.
6	The students will be able to illustrate the use of various cloud services available online.

CO-PO AND CO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		2				3						2	1			
CO2	1				2											
CO3		2														
CO4		2														
CO5		2						2								
CO6					2											

CO-PO MAPPING JUSTIFICATION

	CO'S	PO'S		Justification
	CO1	PO2	2	Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and

				engineering sciences.
		PO6	**3**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
		PO12	**2**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
	CO2	**PO1**	**3**	Apply the basic knowledge of translators and its working process to develop compilers for different languages.
		PO5	**2**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
	CO3	**PO2**	**2**	Analyze the language constructs using different analysis techniques.
		PO3	**2**	Develop the parser systems to meet the particular language constructs.
		PO5	**2**	Apply the modern tools available to minimize the complexity of system software development.
	CO4	**PO2**	**2**	Formulate and analyze the different phases of the compiler for better development of system software.
		PO3	**3**	Develop the system software by associating the front end with the back end.
		PO5	**2**	Apply the modern tools available for better optimality and maintenance of system software.
	CO5	**PO2**	**2**	The students will be able to appreciate the need for security mechanisms and analyse different phases of engineering
		PO8	**2**	Ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice while doing security implementation
	CO6	**PO5**	**1**	Create, select, and apply appropriate techniques, resources for implementing security in cloud

CO-PSO MAPPING JUSTIFICATION

	CO'S	**PSO'S**		**Justification**
CS468	CO1	**PSO1**	**2**	Attain the ability to design and develop hardware and software based systems for the proper implementation of virtualization

CS472 PRINCIPLES OF INFORMATION SECURITY

COURSE INFORMATION SHEET

PROGRAMME: **COMPUTER SCIENCE &ENGINEERING**	DEGREE: **BTECH**
COURSE: **PRINCIPLES OF INFORMATION SECURITY**	SEMESTER: **VIII** CREDITS: **3**
COURSE CODE:**CS472**	COURSE TYPE: **ELECTIVE**
COURSE AREA/DOMAIN: **SECURITY**	CONTACT HOURS: **3-0-0(L-T-P) hours/Week**.
CORRESPONDING LAB COURSE CODE: **NIL**	LAB COURSE NAME: **NIL**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY% MARKS
I	**Introduction**: Overview of computer security, Security concepts, Need of Security- Threats- Deliberate software attacks, Deviation in quality of service, Attacks- malicious code, brute force, Timing attack, sniffers. **Access Control Mechanisms** - Access Control, Access control matrix, Access control in OS-Discretionary and Mandatory access control, Role-based access control, case study SELinux	7	15
II	**Security policies and models**: confidentiality policies, Bell-LaPadula model, Integrity policies, Biba model, Clark-Wilson models, Chinese wall model, waterfall model	7	15
III	**Software vulnerabilities**: Buffer and stack overflow, Crosssite scripting(XSS), and vulnerabilities, SQL injection and vulnerabilities, Phishing.	6	15
IV	**Malware**: Viruses, Worms and Trojans. Topological worms. Internet propagation models for worms.	6	15
V	**Security in current domains:** Wireless LAN security – WEP details. wireless LAN vulnerabilities – frame spoofing. Cellphone security - GSM and UMTS security. Mobile malware - bluetooth security issues.	8	20
VI	**Secure Electronic transactions: F**ramework, strength and weakness, Security in current applications: Online banking, Credit Card Payment Systems. **Web Services security**: XML, SOAP, SAML, RFID	8	20

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
	Text Books: 1. Bernard Menezes, Network security and Cryptography, Cengage LearningIndia, 2010. 2. M Bishop, Computer Security: Art and Science, Pearson Education,2003.
	References: 1. E Whiteman and J Mattord, Principles of information security 4th edn, Cengage Learning 2. V K Pachghare, Cryptography and information security,PHI 3. Behrousz A Forouzan, D Mukhopadhyay, Cryptography and networkSecurity, McGraw Hill 4. W Mao, Modern Cryptography: Theory & Practice, Pearson Education,2004. 5. C P. Fleeger and S L Fleeger, Security in Computing, 3/e, Pearson Education,2003.

COURSE PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To introduce fundamental concepts ofsecurity.
- To introduce and discuss the relevance of security in operating system, web servicesetc.
- To introduce fundamental concepts of secure electronictransactions.

COURSE OUTCOMES:

CO's	DESCRIPTION
CO1	appreciate the common threats faced today
CO2	interpret the foundational theory behind information security
CO3	design a secure system
CO4	identify the potential vulnerabilities in software
CO5	appreciate the relevance of security in various domains
CO6	develop secure web services and perform secure e-transactions

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	1			1									2		
CO2		3		2									2		
CO3			3										2		2
CO4	1			3									2		
CO5	1			1									2		
CO6			3		2								2		2

JUSTIFATIONS FOR CO-PO MAPPING

CO's	PO's	JUSTIFICATION
CO1	PO1	Students will be able to use engineering knowledge to identify and appreciate the common threats faced today.
CO1	PO4	Students will be able to research based knowledge to identify threats in the information system.
CO2	PO2	Students gain the capability to identify, formulate and review the theory behind information security.
CO2	PO4	Students can conduct investigations to analyze and understand the theory behind information security.
CO3	PO3	Students gain enough knowledge on designing a secure system.
CO4	PO1	Students are able to use engineering knowledge to identify potential vulnerabilities in software.
CO4	PO4	Students are able to conduct investigations in software to identify vulnerabilities in them.
CO5	PO1	Students are able to apply engineering knowledge to determine the relevance of security.
CO5	PO4	Students are able to conduct investigations to problems sos as to identify the relevance of security in them.
CO6	PO3	Students will be able to design and develop secure web services.
CO6	PO5	Students will be able to use modern tools to develop secure web services and transactions.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	**PSO1**	Students gain knowledge on identifying threats in a computer system.
CO2	**PSO1**	Students gain knowledge on foundational theory behind computer science systems security.
CO3	**PSO1**	Students attain the capability to design a computer science specific skill of designing a secure system.
CO3	**PSO3**	Students are made able to design innovative and secure systems.
CO6	**PSO2**	Explore the technical knowledge and development of professional methodologies in the design of OP-AMP circuits.
CO4	**PSO1**	Students are able to identify vulnerabilities in computer science specific software systems.
CO5	**PSO1**	Students are able to apply their knowledge in identifying the relevance of security in computer science.
CO6	**PSO1**	Students will be able to apply computer science knowledge to develop services and transactions that are secure.
CO6	**PSO3**	Students can develop innovative products using their knowledge in security.

IE488 TOTAL QUALITY MANAGEMENT

COURSE INFORMATION SHEET:

Program: **Gloabal Elective**	Degree :**B-Tech**
Course**: Total Quality Management**	Course code**: IE 488**
L-T-P**:3-1-0**	Credit**:4**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction-Need for quality, Definition of quality, Major contributions of Deming, Juran and Crossby to Quality Management, Quality control tools, Cost of Quality, Taguchi loss function.	7	15
II	Basic concepts of Total Quality Management - Evolution of TQM, TQM framework, Barriers to TQM, Principles of Total Quality Management- Quality statements, Customer focus, Customer orientation, Customer satisfaction, Customer complaints, Customer retention, Total quality control, total waste elimination, total employee involvement.	7	15
III	Quality assurance- Total quality assurance, Management principles in quality assurance, Objectives of quality assurance system, Hierarchical planning for Quality Assurance, Vendor rating, Quality improvement: elements, programmes – KAIZEN, PDCA cycle,5S, Quality circles.	7	15
IV	Quality planning- SWOT analysis, Strategic planning, strategic grid, organizational culture, Total Quality Culture, Quality function deployment- QFD concept, the voice of customer, developing a QFD matrix, QFD process.	7	15
V	Six sigma approach–Methodology, Training, application to various industrial situations, Failure mode & effect analysis- Concepts, Types & Applications in TQM.	7	20
VI	TPM–Concepts, Improvement needs, Performance measures, BPR, Quality standards – Need of standardization, ISO 9000 series, ISO 14000 series, Other contemporary standards.	7	20

REFERENCES:

1	Sharma D D, Total Quality Management, Sultan Chand & Sons, 2014

2	R.P. Mohanty & R R Lakhi, Total Quality Management, Jaico Pub, New Delhi, 1994
3	Poornima M.Charantimath , Total Quality Management, Pearson Education, 2011.
4	Lon Roberts , Process Re-Engineering , Tata McGraw Hill, New Delhi, 1994
5	Mohamed Zairi , TQM for Engineers , Gulf Pub. Co., 2nd Edition, New

PREREQUISITE:

NIL

COURSE OBJECTIVES:

1	To impart knowledge on principles and practices of TQM to achieve quality.
2	To enable use of TQM tools for continuous quality improvement.
3	To provide ideas on implementation of quality standards.
4	To introduce the latest TQM tools and techniques.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Understand the principles and practices of TQM.
2	Use various TQM tools for continuous quality improvement.
3	Implement quality standards.
4	Become aware of the latest TQM tools and techniques.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1																
CO2			2													
CO3			2													
CO4			2													
CO5			2													

CO6							1									

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO2	**PO3**	Understand the principles and practices of TQM to develop solutions
CO3	**PO3**	Develop techniques for quality assurance so that different solutions can easily be made/.
CO4	**PO3**	To solve different quality control problems by understanding the quality planning techniques
CO5	**PO3**	Become aware of the six sigma approach to make accurate solutions
CO6	**PO7**	Implementation of quality standards such as ISO14000 will ensure the sustainability of the environment.

CS492 PROJECT

COURSE INFORMATION SHEET:

Program: **Computer Science and Engineering**	Degree: **B-Tech**
Course**: Project**	Course code**: CS 492**
L-T-P**:0-0-6**	Credit**:6**

SYLLABUS:

CONTENT
In depth study of the topic assigned in the light of the preliminary report prepared in the seventh semester Review and finalization of the approach to the problem relating to the assigned topic Preparing a detailed action plan for conducting the investigation, including team work Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed Final development of product/process, testing, results, conclusions and future directions Preparing a paper for Conference presentation/Publication in Journals, if possible Preparing a report in the standard format for being evaluated by the dept. assessment board Final project presentation and viva voce by the assessment board including external expert Evaluation: Maximum Marks: 100 (i) Two progress assessments 20% by the faculty supervisor(s) (ii) Final project report 30% by the assessment board (iii) Project presentation and viva voce 50% by the assessment board Note: All the three evaluations are mandatory for course completion and for awarding the final grade.

PREREQUISITE:

NIL

COURSE OBJECTIVES:

1	To apply engineering knowledge in practical problem solving
2	To foster innovation in design of products, processes or systems
3	To develop creative thinking in finding viable solutions to engineering problems

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Contrast innovations on the development of components, products, processes or technologies in the engineering field.
2	Apply knowledge in solving real life engineering problems

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	-	-	3	3	3	-	1	-	2	-	-	-		3	1	3
CO2	-	3	3	1	2	-	-	-	1	-	-	-		3	1	3

CO-PO MAPPING JUSTIFICATION:

CO	PO'S	JUSTIFICATION
CO1	PO3	Design solutions for different engineering problems and design system components to meet the specifications with consideration.
	PO4	Research-based knowledge including design, analysis and interpretation of data to provide valid conclusions.
	PO5	Apply appropriate techniques, resources, and modern engineering softwares and IT tools for analyzing, modeling and designing to complex engineering activities with an understanding of the limitations.
	PO7	Analyse the impact of the professional engineering solutions in societal and environmental contexts.
	PO9	Perform effectively as an individual, and as a team member.
CO2	PO2	Analyze engineering problems and arrive at substantiated conclusions using mathematical, natural, and engineering sciences and through experiments.
	PO3	Design solutions for engineering problems by analyzing it through different methods.
	PO4	Research-based knowledge including analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	Apply modern engineering IT tools to complex engineering activities with an understanding of the limitations.
	PO9	Perform effectively as an individual, and as a team member.

CO-PSO MAPPING JUSTIFICATION:

CO	PSO'S	JUSTIFICATION
CO1	PSO1	Graduates shall demonstrate knowledge in modelling, analysis, design, laboratory investigations of civil engineering infrastructures.

	PSO2	Graduates will have a broad knowledge to evaluate economical and safety factors involved in infrastructural development.
	PSO3	Graduates can perform effectively as a team member and leader and using modern tools and techniques.
CO2	**PSO1**	Graduates acquire knowledge in analysis, design, laboratory investigations on civil engineering infrastructure.
	PSO2	Graduates will have a broad knowledge to evaluate economical and safety factors involved in infrastructural development.
	PSO3	Graduates can perform effectively as a team member and leader and using modern tools and techniques.