UNIVERSITY OF MUMBAI

Bachelor of Engineering

Information Technology (Second Year – Sem. III & IV)

Revised course (REV- 2012)

From Academic Year 2013 -14

Under

FACULTY OF TECHNOLOGY

(As per Semester Based Credit and Grading System)

From Dean's Desk:

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education.The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited. In line with this Faculty of Technology of University of Mumbai has taken a lead in incorporating philosophy of outcome based education in the process of curriculum development.

Faculty of Technology, University of Mumbai, in one of its meeting unanimously resolved that, each Board of Studies shall prepare some Program Educational Objectives (PEO's) and give freedom to affiliated Institutes to add few (PEO's) and course objectives and course outcomes to be clearly defined for each course, so that all faculty members in affiliated institutes understand the depth and approach of course to be taught, which will enhance learner's learning process. It was also resolved that, maximum senior faculty from colleges and experts from industry to be involved while revising the curriculum. I am happy to state that, each Board of studies has adhered to the resolutions passed by Faculty of Technology, and developed curriculum accordingly. In addition to outcome based education, semester based credit and grading system is also introduced to ensure quality of engineering education.

Semester based Credit and Grading system enables a much-required shift in focus from teacher-centric to learner-centric education since the workload estimated is based on the investment of time in learning and not in teaching. It also focuses on continuous evaluation which will enhance the quality of education. University of Mumbai has taken a lead in implementing the system through its affiliated Institutes and Faculty of Technology has devised a transparent credit assignment policy and adopted ten points scale to grade learner's performance.Credit assignment for courses is based on 15 weeks teaching learning process, however content of courses is to be taught in 12-13 weeks and remaining 3-2 weeks to be utilized for revision, guest lectures, coverage of content beyond syllabus etc.

Credit and grading based system was implemented for First Year of Engineering from the academic year 2012-2013. Subsequently this system will be carried forward for Second Year Engineering in the academic year 2013-2014, for Third Year and Final Year Engineering in the academic years 2014-2015 and 2015-2016 respectively.

Dr. S. K. Ukarande
Dean,
Faculty of Technology,
Member - Management Council, Senate, Academic Council
University of Mumbai, Mumbai

Preamble

The engineering education in India in general is expanding in manifolds. Now, the challenge is to ensure its quality to the stakeholders along with the expansion. To meet this challenge, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education and reflects the fact that in achieving recognition, the institution or program of study is committed and open to external review to meet certain minimum specified standards. The major emphasis of this accreditation process is to measure the outcomes of the program that is being accredited. Program outcomes are essentially a range of skills and knowledge that a student will have at the time of graduation from the program. In line with this Faculty of Technology of University of Mumbai has taken a lead in incorporating philosophy of outcome based education in the process of curriculum development.

I, as Chairman, Board of Studies in Information Technology of University of Mumbai, happy to state here that, Program Educational Objectives were finalized in a meeting where more than 30 members from different Institutes were attended, who were either Heads or their representatives of Information Technology Department. The Program Educational Objectives finalized for undergraduate program in Information Technology are listed below;

1. To prepare Learner's with a sound foundation in the basics of engineering fundamentals.
2. To prepare Learner's to use effectively modern programming tools to solve real life problems.
3. To prepare Learner's for successful career in Indian and Multinational Organisations and to excel in Postgraduate studies
4. To encourage and motivate Learner's for entrepreneurship.
5. To inculcate professional and ethical attitude, good leadership qualities and commitment to social responsibilities in Learners.
6. To encourage Learner to use best practices and implement technologies to enhance information security and enable compliance, ensuring confidentiality, information integrity, and availability.

In addition to Program Educational Objectives, for each course of undergraduate program, objectives and expected outcomes from learner's point of view are also included in the curriculum to support the philosophy of outcome based education. I believe strongly that small step taken in right direction will definitely help in providing quality education to the stake holders.

Dr. J. W. Bakal
Chairman, Board of Studies in Information Technology,
University of Mumbai, Mumbai

S. E. (Information Technology) Sem.-III

Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut	Theory	TW/Pract	Tut	Total
SEITC301	Applied Mathematics – III *	4		1	4		1	5
SEITC302	Data Structure and Algorithm Analysis	4			4			5
SEITC303	Object Oriented Programming Methodology*	4			4			5
SEITC304	Analog and Digital Circuits	4			4			5
SEITC305	Database Management Systems	3			3			4
SEITC306	Principles of Analog and Digital Communication.	3			3			4
SEITL302	Data Structure and Algorithm Analysis		2			1		
SEITL303	Object Oriented Programming Methodology*		2			1		
SEITL304	Analog and Digital Circuits		2			1		
SEITL305	Database Management Systems		2			1		
SEITL306	Principles of Analog and Digital Communication		2			1		
	TOTAL	22	10	1	22	5	1	28

Examination Scheme

Course Code	Course Name	Theory					Term work	Pract /Oral .	Total
		Internal Assessment			End sem exam	Exam duration (in Hrs)			
		TEST1	TEST 2	AVG.					
SEITC301	Applied Mathematics-III*	20	20	20	80	3	25	--	125
SEITC302	Data Structure & Algorithm Analysis	20	20	20	80	3	25	25	150
SEITC303	Object Oriented Programming Methodology*	20	20	20	80	3	25	25	150
SEITC304	Analog & Digital Circuits	20	20	20	80	3	25	25	150
SEITC305	Database Management Systems	20	20	20	80	3	25	25	150
SEITC306	Principles of Analog & Digital Communication.	20	20	20	80	3	25	25	150
	Total	120	120	120	480		150	125	875

* Common with Computer Engineering.
Tutorials will be evaluated as term work.

S. E. (Information Technology) Sem.-IV

Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Th	Pract	Tut	Th.	Pract/	Tut	Total
SEITC401	Applied Mathematics-IV*	4		1	4		1	5
SEITC402	Computer Networks	4			4			5
SEITC403	Computer Organization and Architecture*	4			4			4
SEITC404	Automata Theory	3		1	3		1	4
SEITC405	Web Programming	4			4			5
SEITC406	Information Theory and Coding	4		1	4		1	5
SEITL402	Computer Networks		2			1		
SEITL405	Web Programming		2			1		
	Total	23	4	3	23	2	3	28

Examination Scheme

Course Code	Course Name	Theory					Term work	Pract/ Oral	Total
		Internal Assessment			END SEM EXAM	EXAM DURATION (in Hrs)			
		TEST1	TEST 2	AVG.					
SEITC401	Applied Mathematics-IV*	20	20	20	80	3	25	--	125
SEITC402	Computer Networks	20	20	20	80	3	25	25	150
SEITC403	Computer Organization and Architecture*	20	20	20	80	3	25	25	150
SEITC404	Automata Theory	20	20	20	80	3	25	--	125
SEITC405	Web Programming	20	20	20	80	3	25	25	150
SEITC406	Information Theory and Coding	20	20	20	80	3	25	--	125
	Total	120	120	120	480		150	75	825

* Common with Computer Engineering.

Tutorials will be evaluated as term work.

Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/ Practical	Tutorial	Total
SEITC301	Applied Mathematics - III*	04	--	01	04	-	01	05

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test1	Test2	Avg. Of Test1 and Test2					
SEITC301	Applied Mathematics -III*	20	20	20	80	25	-	-	125

Course Objective

(1) Complex Variable (2) Laplace Transform (3) Fourier Series (4) Discrete Structures (5) Z-transform

These topics involve the study of analytic function and mapping of complex function, Laplace transform, Inverse Laplace transform and application of Laplace transform to solve differential equations, finding Fourier series, Sine and cosine Fourier integral and Z-transform. These topics help them to solve many engineering problems arising in course of their further studies and also while working in the practical life situations.

Student Learning Outcomes:

Students in this course will apply the Procedure and methods to solve technical problems.

Details of the Syllabus:-

Sr.No.	Topics	Hrs
Module 01	Complex Variable & mapping 1.1 Functions of a complex variable, Analytic functions, Cauchy-Riemann equations in Cartesian co-ordinates, Polar co-ordinates. 1.2 Harmonic functions, Analytic method and Milne Thomson methods to find f(z), Orthogonal trajectories. 1.3 Conformal Mapping, Linear, Bilinear transformations, Cross ratio, fixed points and standard transformation such as rotation and magnification, invertion, translation.	(10)
Module 02	Laplace Transform 2.1 Introduction, Definition of Laplace transform, Laplace transform of constant, trigonometrical, exponential functions. 2.2 Important properties of Laplace transform: First shifting theorem, Laplace transform of $L\{t^n f(t)\}$, $L\{f(t)/t\}$, $L\left\{\frac{d^n}{dt^n} f(t)\right\}$, $L\{\int_0^t f(u)du\}$, L{f(at)} without proof. 2.3 Unit step function, Heavi side function, Dirac-delta function, Periodic function and their Laplace transforms, Second shifting theorem. 2.4 Inverse Laplace transform with Partial fraction and Convolution theorem (without proof). 2.5 Application to solve initial and boundary value problem involving ordinary differential equations with one dependent variable and constant coefficients.	(10)
Module 03	Fourier series 3.1 Dirichlet's conditions, Fourier series of periodic functions with period 2π and 2L. 3.2 Fourier series for even and odd functions. 3.3 Half range sine and cosine Fourier series, Parsevel's identities (without proof). 3.4Orthogonal and Ortho-normal functions, Complex form of Fourier series. 3.5 Fourier Integral Representation.	(10)
Module 04	Vector Algebra and Calculus 4.1 Vector Algebra: Scalar and vector product of three and four Vectors and their	(10)

	properties. 4.2 Vector Calculus: Vector differential operator ∇ , Gradient of a scalar point function, Diversions and Curl of Vector point function, $\nabla (uv)$, $\nabla.(\phi \bar{u}), \nabla \times (\phi \bar{u}), \nabla \times (\bar{u} \times \bar{v})$. 4.3 Vector Integration: Line integral; conservative vector field, Green's theorem in a plane (Without proof) 4.4 Gauss-Divergence theorem & Stokes' theorem (Without proof and no problems on verification of above theorems).	
Module 05	Z transform 5.1 Z-transform of standard functions such as $Z(a^n)$, $Z(n^p)$. 5.2 Properties of Z-transform :Linearity, Change of scale, Shifting property, Multiplication of K, Initial and final value, Convolution theorem (all without proof) 5.3 Inverse Z transform: Binomial Expansion and Method of Partial fraction.	(8)

Term work:
Term work shall consist of minimum four SCILAB practicals and six tutorials.

SCILAB practicals :	08 marks
Tutorials :	12 marks
Attendance :	05 marks
Total :	25 marks

Recommended Books:

1. Higher Engineering Mathematics by Grewal B. S. 38th edition, Khanna Publication 2005.
2. Advanced Engineering Mathematics by Kreyszig E. 9th edition, John Wiley.
3. A Text Book of Applied Mathematics Vol. I & II by P.N.Wartilar & J.N.Wartikar, Pune, Vidyarthi Griha Prakashan., Pune.
4. Vector Calculus by Shanti Narayan, S Chand & Co.

Reference Books:

1. Advanced Engg. Mathematics by C. Ray Wylie & Louis Barrett.TMH International Edition.
2. Mathematical Methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
3. Lapplace Treansforms by Murray R. Spiegel, Schaun's out line series-McGraw Hill Publication.
4. Vector Analysis by Murray R. Spiegel, McGraw Hill publication.

Theory Examination :

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tut.	Theory	TW/Pract	Tut	Total
SEITC302	Data Structure and Algorithm Analysis	04	02	-	04	01	-	05

Subject code	Subject Name	Examination Scheme							
		Theory Marks				TW	Pract	Oral	Total
		Internal Assessment			End Semester Exam				
SEITC302	Data Structure and Algorithm Analysis	Test1	Test2	Average of Test1 and Test2					
		20	20	20	80	25	25	-	150

Objectives:

- To teach efficient storage mechanisms of data for an easy access.
- To design and implementation of various basic and advanced data structures and algorithm analysis.
- To introduce various techniques for representation and analysis of the data in the real world.
- To develop application using data structures and algorithm and analysis.
- To teach the concept of protection and management of data.
- To improve the logical ability

Outcomes:

- Student will be able to choose appropriate data structure as applied to specified problem definition and analysis the algorithm.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures and algorithm analysis.
- Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

Module	Detailed Contents	Hours
1	**Introduction:** Introduction, Mathematics Review, Exponents, Logarithms, Series, Modular Arithmetic, The P Word, A Brief Introduction to Recursion, Recursion and Induction.	3
2	**Algorithm Analysis:** Mathematical Background, Model, What to Analyze, Running Time Calculations, General Rules, Solutions for the Maximum Subsequence Sum Problem, Logarithms in the Running Time, Euclid's Algorithm, Exponentiation, Checking Your Analysis, A Grain of Salt.	4
3	**Stacks, Queues and List** Stacks, Queues, Linked Lists, Double-ended Queues. Abstract Data Type (ADT), The List ADT, Simple Array Implementation of Lists, Linked Lists, Programming Details, Common Errors, Doubly Linked Lists, Circularly Linked Lists, Examples, Cursor Implementation of Linked Lists, The Stack ADT, Implementation of Stacks, Applications, The Queue ADT, Array Implementation of Queues, Applications of Queues.	10
4	**Trees and Search Trees:** Tree, Implementation of Trees, Tree Traversals with an Application, Binary Trees, Expression Trees, the Search Tree ADT-Binary Search Trees, AVL Trees, Single Rotation, Double Rotation, Red-Black Trees, External searching in B-Trees, Tree Traversals, B-Trees	10
5	**Priority queues:** The priority queues Abstract data Type, Implementing a Priority queues with a List, Heaps, Adaptable priority queues.	6
8	**Sorting Sets, and Selection:** Insertion Sort, Shellsort, Heapsort, Quicksort, Bucket Sort, Merge Sort and radix Sort, and A Lower Bound on comparison-based Sorting and radix Sort, the complexity of some sorting algorithms, comparison of Sorting Algorithms, The Set ADT and union / file Structures	6
9	**Graphs:** The graph Abstract Data Type, Data Structures for Graphs, Graph Traversals Directed Graphs, Weighted Graphs, Shortest Paths, and Minimum spanning Trees. Applications of DFS and BSF, Shortest-Path Algorithms, Dijkstra's Algorithm, Graphs with Negative Edge Costs, Acyclic Graphs, Network Flow Problems, Minimum Spanning Tree.	9

TEXT BOOKS:

1. Mark Allien Weiss, “Data Structure and Algorithm Analysis in C”, Person.
2. Micheal Goodrict, Roberto Tamassia,”Data Structure and Algorithm in C++”, Wiley India

3. Data Structures A Psedocode Approach with C, Richard F. Gilberg & Behrouz A. Forouzan, second edition, CENGAGE Learning.
4. Data Structures Using C & C++, Rajesh K. Shukla, Wiley- India
5. Data Structures using C, Reema Thareja, Oxford University press.
6. Introduction to Data Structure and its Applications Jean-Paul Tremblay, P. G. Sorenson

REFERENCE BOOKS:

1. Ellis horowitz, Sarataj Sahni, S.Rajsekaran," Fundamentals of computer algorithm", University Press .
2. Mark Allen Weiss,"Data Structure & algorithm Analysis in C++", 3rd Edition, Pearson Education
3. Micheal Goodrict, Roberto Tamassia,"Data Structure and Algorithm in C++", Wiley India.
4. Data Structures Using C, ISRD Group, Second Edition, Tata McGraw-Hill
5. Data Structure Using C, Balagurusamy
6. C & Data Structures, Prof. P.S. Deshpande, Prof. O.G. Kakde, Dreamtech press.
7. Data Structures, Adapted by: GAV PAI, Schaum's Outlines
8. Mark Allen Weiss,"Data Structure & algorithm Analysis in C++", 3rd Edition, Pearson Education

Term Work:

Term Work shall consist of at least 12 programs based on the below list.
Note: The star (*) marks experiments are mandatory.

Linked List
1. Implementations of Linked Lists menu driven program. 2. * Implementation of different operations on linked list – copy, concatenate, split, reverse, count no. of nodes etc 3. Representation of Sparse matrix using multilinked structure. Implementation of sparse matrix multiplication. 4. Implementation of polynomials operations (addition, subtraction) using Linked List. 5. *Implementations of Linked Lists menu driven program (stack and queue) 6. Implementations of Double ended queue using Linked Lists. 7. Implementation of Priority queue program using Linked List.
Stack
1. Implementations of stack menu driven program 2. Implementation of multistack in one array. 3. * Implementations of Infix to Postfix Transformation and its evaluation program. 4. Implementations of Infix to Prefix Transformation and its evaluation program. 5. Simulation of recursion
Queue

1. Implementations of circular queue menu driven program 2. * Implementations of double ended queue menu driven program 3. Implementations of queue menu driven program 4. Implementation of Priority queue program using array. 5. Implementation of Johnsons Algorithm 6. Implementation of Simulation Problem
Tree
1. *Implementations of Binary Tree menu driven program 2. Implementation of Binary Tree Traversal program. 3. *Implementation of construction of expression tree using postfix expression. 4. Implementations of Huffman code construction 5. Implementations of BST program 6. Implementation of various operations on tree like – copying tree, mirroring a tree, counting the number of nodes in the tree, counting only leaf nodes in the tree. 7. Implementations of B-tree menu driven program 8. Implementations of B+ tree program 9. Implementation of Preorder traversal of a threaded binary tree. **10.** *Implementations of AVL Tree menu driven program
Sorting
1. Implementations of Shell sort, Radix sort and Insertion sort menu driven program **2.** *Implementations of Quick Sort, Merge sort and Heap Sort menu driven program
Searching
1. Implementations of searching methods (Index Sequential, Interpolation Search) menu driven program **2.** Implementation of hashing functions with different collision resolution techniques
Graph
1. * Implementations of Graph menu driven program

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tut.	Theory	TW/Pract	Tut	Total
SEITC303	Object Oriented Programming Methodology *	04	02	-	04	01	-	05

Subject code	Subject Name	Examination Scheme							
		Theory Marks				TW	Pract	Oral	Total
		Internal Assessment			End Semester Exam				
SEITC303	Object Oriented Programming Methodology*	Test1	Test2	Average of Test1 and Test2					
		20	20	20	80	25	25	-	150

Course Objectives

- To understand Object oriented concepts like data abstraction, encapsulation, etc.
- To solve the real world scenarios using top down approach.
- To understand various Java programming constructs.

Course Outcomes

- Students will be able to solve computational problems using basic constructs like if-else, control structures, array, strings.
- Student can understand how to model real world scenario using class diagram.
- Students will exhibit communication between 2 objects using sequence diagram.
- Students will be able to implement relationships between classes.
- Students will be able to demonstrate various collection classes.
- The students will be able to demonstrate programs on exceptions, multithreading and applets.

Detailed Syllabus:

Sr. No.	Topic	No of Hours
1	Programming Approach from proceduaral to Object Orientation OO methodologies: Grady Booch Methodology of OO development	4
2	OO Concepts: Object, Class, Encapsulation or information hiding, Inheritance, Polymorphism, Message communication, Abstraction, Reuse, Coupling and Cohesion, Sufficiency Completeness and Primitiveness, Meta class	5
3	Object Oriented Programming: Java Evolution: History, How java differs from others Overview of Java language: Introduction, Installing and implementing Java, JVM	3
4	Constants, variables and data types Operators and Expressions Revision of Branching and looping	6
5	Class Object and Method: member, method, Modifier, Selector, constructer, destructor, iterator, State of an object, Method Overloading, Inheritance, Method Overriding ,Final class, abstract class and method	6
6	Classes and Relationships : Implementation of Association and Aggegation using simple scenarios	2
7	Array, String, Vector	6
8	Interfaces : variables in Interfaces, Extending an Interface, Difference between an Abstarct class and an Interface	4
9	Multithread programming	4
10	Grouping of classes for deployment and reuse: Built-in Packages: java.lang: wrapper classes java.util: ArrayList and LinkedList Creating and using User defined packages	3
11	Managing Error and Exception	3
12	Applet programming	2

Text Books:

1. Ralph Bravaco , Shai Simoson , “Java Programing From the Group Up” ,Tata McGrawHill
2. Grady Booch, Object Oriented Analysis and Design ;
3. Jaime Nino, Frederick A. Hosch, ‘An introduction to Programming and Object Oriented Design using Java’, Wiley Student Edition.

Reference Books:

1. Java: How to Program, 8/e, Dietal, Dietal, PHI
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language
ser Guide", Pearson Education
3. Sachin Malhotra, Saurabh Chaudhary "Programming in Java", Oxford University Press, 2010

Suggested list of Programming Assignments /Laboratory Work

Divide laboratory work into 3 parts

Part - A

Basic Java structural components and Conditional and control statements:

· To demonstrate the use of command line argument.
· To demonstrate various ways of accepting data through keyboard.
· To understand the working of an array.
· To understand string class and demonstrate its various functions.

Part - B

Perform following practical on some case study like Banking Application, Library Application etc.

· Find out classes, objects and their properties.
· Create and display objects found in above.
· Add methods to classes and implement.
· Refine above objects by adding constructors and local variables.
· Show communication between the objects by calling instance of one object from another class.
· Find relationships like inheritance, association, aggregation, composition.
· Implement above relationships.

Part - C

1. To implement user defined exceptions in Java.
2. Demonstrate the use collection classes like ArrayList/LinkedList/HashSet/TreeSet/Map.
3. To illustrate Multithreading in Java.
4. Simple programs on Applets and AWT.

TermWork:

Students will submit Term Work in the form of a journal that will include at least 15 programming assignments. Each programming assignment will consist of an algorithm or class diagram/sequence diagram (if applicable), program listing with proper documentation and snapshot of the output.

Practical Examination will be based on the term work and questions will be asked to judge understanding of the assignments at the time of the examination.

Term Work: 25 Marks (total marks) = 15 Marks (Experiment) + 5 Marks (Assignment) + 5 (Attendance (theory + practical))

Theory `Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tut.	Theory	TW/Pract	Tut	Total
SEITC304	Analog and Digital Circuits	04	02	-	04	01	-	05

Subject code	Subject Name	Examination Scheme							
		Theory Marks				TW	Pract	Oral	Total
		Internal Assessment			End Semester Exam				
SEITC304	Analog and Digital Circuits	Test1	Test2	Average of Test1 and Test2					
		20	20	20	80	25	25	-	150

Course Objective:

1) To provide concepts that underpins the disciplines of Analog circuits, digital electronics and Microprocessor systems.
2) To provide the concept of various components
3) To provide basic knowledge of designing Analog and digital circuits

Course outcomes:

1) Knowledge and Awareness of various components.
2) Design of stable analog circuits.
3) Circuit simulation.
4) Binary and hexadecimal calculations and conversions.
5) Design of combinational and sequential circuits.
6) Translate real world problems into digital logic formulations.
7) Awareness in Design of digital systems and concepts of Microprocessor and Microcontroller systems.

Detailed Syllabus:

Module	Detailed Contents	Hours
1	Voltage Regulator and components: Zener diode. Series and Shunt Regulator. Regulator ICs 78XX, IC 79XX.Light Emitting diode(LED), Schottky diode, Varactor diode, power diode, Photodiodes, Liquid-crystal Displays, Solar cells, Thermistor.	06
2	Biasing of BJT: DC operating point, BJT characteristics & parameters,	08

	all biasing circuits, analysis of above circuits and their design, variation of operation point and its stability. Differential Amplifier, constant current source, current mirror. Introduction to FET and comparison with BJT.	
3	Operational Amplifiers and linear applications: Block diagram representation, Ideal Op-amp, Equivalent circuit, Open-loop configuration, Transfer characteristics. Op-amp with negative feedback, Frequency response. Op-amp IC 741 specifications. Basic op-amp applications: Adder, Scalar, Subtractor, Difference amplifier, I-V converter, V-I converters, Integrator, Differentiator, Instrumentation amplifier using 2 and 3 op-amp stages. IC 555 Timer, Astable, and Monostable Multivibrator.	10
4	Number Systems and Codes: Binary, Octal, Decimal and Hexadecimal number Systems and their conversion, Binary Addition and Subtraction , Gray Code, BCD Code, Excess-3 code, ASCII Code.	04
5	Boolean Algebra and Logic Gates: Theorems and Properties of Boolean Algebra, Standard SOP and POS form, Reduction of Boolean functions using Algebric method, K -map method (2,3,4 Variable). Basic Digital Circuits: NOT,AND,OR,NAND,NOR,EX-OR,EX-NOR Gates.	04
6	Combinational Logic Design: Introduction, Half and Full Adder, Half and Full Subtractor, Four Bit Binary Adder, One digit BCD Adder, code conversion, Multiplexers and Demultiplexers, Decoders, 4-bit Magnitude Comparator IC 7485 and ALU IC74181.	06
7	Sequential Logic Design: Flip Flops: SR, D, JK, JK Master Slave and T Flip Flop, Truth Tables and Excitation Tables, Flip-flop conversion. Counters: Design of Asynchronous and Synchronous Counters, Modulo Counters, UP- DOWN counter .IC 74193 Shift Registers: Shift Register IC 7496 , SISO, SIPO,PIPO,PISO, Bidirectional Shift Register , Universal Shift Register, Ring and Johnson Counter.	06
8	Introduction to VHDL: Introduction , Library, Entity, Architecture, Modeling Styles, Concurrent and sequential statements, Data objects and Data types, attributes. Design Examples for combinational circuits.	04

TERMWORK MARKS: 1. Attendance (Theory and Practical) - 05
2. Laboratory work (Experiments and Journal) -15
3. Assignments -05

The final certification and acceptance of TW ensures the satisfactory performance of Laboratory Work and Minimum Passing in the term work.

LABORTARY WORK:

1. Laboratory work should consist of at least 10 Experiments.

The Experiments should be based on following topics (Any Ten):

1) Zener diode as Regulator.
2) BJT Biasing Method.
3) OP-amp as Inverting and Non-inverting amplifier.
4) Applications of Op-amp.
5) IC 555 as astable Multivibrator.
6) Simulation of any circuit using Pspice.
7) Logic Gates.
8) Code Conversion.
9) Multiplexer, Demultiplexer.
10) Flip-flops using gates and ICs.
11) Design of Sequential circuits.
12) VHDL for Combinational logic.

Text Books:

1. Robert L. Boylestad, Louis Nashelsky, "Electronic devices and circuit Theory", PHI
2. Ramakant A. Gaikwad, "Op-amp and linear Integrated circuits", PHI
3. R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill.
4. M. Morris Mano, "Digital Logic and computer Design", PHI.
5. J. Bhasker." VHDL Primer", Pearson Education

Reference Books:

1. Martin s. Roden, Gordon L. Carpenter, William R. Wieserman "Electronic Design-From Concept to Reality", Shroff Publishers and Distributors.
2. D.roy Choudhury,shail B.jain, "Linear integrated Circuits", New age International Publisher.
3. Subrata Ghosal, "Digital Electronics", Cengage Learning.
4. Anil K. Maini, "Digital Electronics Principles and Integrated Circuits", Wiley India
5. Donald p Leach, Albert Paul Malvino, "Digital principles and Applications", Tata McGraw Hill.

Theory Examination :

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
SEITC305	Database Management System	03	02	--	03	01	--	04

Sub. Code	Subject Name	Examination Scheme							
		Theory Marks				TW	Pract.	Oral	Total
		Internal Assessment			End Semester Exam				
SEITC305	Database Management System	Test 1	Test 2	Avg. of Test1 & Test2					
		20	20	20	80	25	25	-	150

Objective:

- Learn and practice data modeling using the entity-relationship and developing database designs.
- Understand the use of Structured Query Language (SQL) and learn SQL syntax.
- Apply normalization techniques to normalize the database
- Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Outcome: The student should be able:

- To describe data models and schemas in DBMS
- To understand the features of database management systems and Relational database.
- To use SQL- the standard language of relational databases.
- To understand the functional dependencies and design of the database.
- To understand the concept of Transaction and Query processing.

Detailed Syllabus:

Module	Detailed content	Hours
1	**Introduction Database Concepts:** Introduction, Characteristics of databases, File system V/s Database system, Users of Database system, Concerns when using an enterprise database, Data Independence, DBMS system architecture, Database Administrator,	02
2	**Entity–Relationship Data Model :** Introduction, Benefits of Data Modeling, Types of Models, Phases of Database Modeling, The Entity-Relationship (ER) Model, Generalization, Specialization and Aggregation, Extended Entity-Relationship (EER) Model.	03
3	**Relational Model and Algebra :** Introduction , Mapping the ER and EER Model to the Relational Model , Data Manipulation , Data Integrity ,Advantages of the	06

	Relational Model, Relational Algebra , Relational Algebra Queries, Relational Calculus.	
4	**Structured Query Language (SQL) :** Overview of SQL , Data Definition Commands, Set operations , aggregate function , null values, , Data Manipulation commands, Data Control commands , Views in SQL, Nested and complex queries .	06
5	**Integrity and Security in Database:** Domain Constraints, Referential integrity, Assertions, Trigger, Security, and authorization in SQL	04
6	**Relational–Database Design :** Design guidelines for relational schema, Function dependencies, Normal Forms- 1NF, 2 NF, 3NF, BCNF and 4NF	04
7	**Transactions Management and Concurrency:** Transaction concept, Transaction states, ACID properties, Implementation of atomicity and durability, Concurrent Executions, Serializability, Recoverability, Implementation of isolation, Concurrency Control: Lock-based , Timestamp-based , Validation-based protocols, Deadlock handling, Recovery System: Failure Classification, Storage structure, Recovery & atomicity, Log based recovery, Shadow paging.	06
8	**Query Processing and Optimization: Overview** ,Issues in Query Optimization ,Steps in Query Processing , System Catalog or Metadata, Query Parsing , Query Optimization, Access Paths , Query Code Generation , Query Execution , Algorithms for Computing Selection and Projection , Algorithms for Computing a Join , Computing Aggregation Functions , Cost Based Query Optimization .	05

Text Books:

1. G. K. Gupta :"Database Management Systems", McGraw – Hill.
2. Korth, Slberchatz,Sudarshan, :"Database System Concepts", 6th Edition, McGraw – Hill
3. Elmasri and Navathe, " Fundamentals of Database Systems", 5thEdition, PEARSON Education.
4. Peter Rob and Carlos Coronel, " Database Systems Design, Implementation and Management", Thomson Learning, 5th Edition.

Reference Books :

1. Dr. P.S. Deshpande, SQL and PL/SQL for Oracle 10g,Black Book, Dreamtech Press
2. Mark L. Gillenson, Paulraj Ponniah, " Introduction to Database Management",Wiley
3. Sharaman Shah ,"Oracle for Professional", SPD.
4. Raghu Ramkrishnan and Johannes Gehrke, " Database Management Systems",TMH
5. Debabrata Sahoo "Database Management Systems" Tata McGraw Hill, Schaum's Outline

Term Work:

Assign a case study for group of 2/3 students and each group to perform on their case study following experiments-

1) Problem Definition and draw ER /EER diagram
2) Design Relational Model
3) Perform DDL operation
4) PL/SQL
5) Perform DML and DCL operations
6) Executes- Assertions, Trigger,
7) Implementation ACID properties
8) Draw Query tree
9) Estimate cost of query

Laboratory Syllabus:

1) Problem Definition and draw ER /EER diagram
2) Design Relational Model
3) Perform DDL operation
4) PL/SQL
5) Perform DML and DCL operations
6) Executes- Assertions, Trigger,
7) Implementation ACID properties
8) Draw Query tree
9) Estimate cost of query

Tools used:

Oracle, DB2, MY SQL or any other open source tools.

Theory Examination :

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/ Practical	Tutorial	Total
SEITC306	Principles of Analog and Digital Communication	03	02	--	03	01	--	04

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Avg. of 2 Tests					
SEITC306	Principles of Analog and Digital Communication	20	20	20	80	25	---	25	150

Prerequisite

Basic knowledge of electrical engineering concepts and analog and digital electronics.

Course Objective

To introduce the basic principles and techniques used in analog and digital communications, involving analog and digital modulation techniques, communication receiver and transmitter design, baseband and bandpass communication techniques, line coding techniques, noise analysis and multiplexing techniques.

Course Outcome

The student can analyse analog communication systems, can understand differences between analog and digital representation and transmission of information, trade-offs (in terms of bandwidth, power, and complexity requirements) between basic analog and digital communication systems and can design basic analog or digital communication systems to solve a given communications problem.

Detailed Syllabus:

Module	Topics	Hours
1	**Introduction** Basics of analog communication systems (Block diagram), Sources of information, Baseband and bandpass signals, Types of communication channels, Frequency / Spectrum allocations, Need for modulation and demodulation	03
2	**Fourier Transform and Noise** Introduction to Fourier Transform, its properties, Fourier transform of unit step, delta and gate function. Correlated and uncorrelated sources of noise in communication system, Noise parameters – Signal to noise ratio, Noise factor, Noise figure, Friis formula and Equivalent noise temperature	04
3	**Analog Modulation and Demodulation** Amplitude modulation techniques and its types- DSBFC AM, DSBSC-AM, SSB SC AM- spectrum, waveforms, bandwidth, power calculations. AM Receivers – Block diagram of TRF receivers and Super heterodyne receiver. Receiver characteristics - Sensitivity, Selectivity, Fidelity, Image frequency and its rejection and double spotting **FM transmission and reception**: Principle of FM- waveforms, spectrum, bandwidth. Pre- emphasis and de-emphasis in FM, FM noise triangle,Comparison of AM and FM systems, FM generation: Direct method – Varactor diode modulator, Indirect method (Armstrong method) FM demodulator: Foster Seely discriminator, Ratio detector.	11

4	**Pulse Analog Modulation** Sampling theorem for low pass and bandpass signals with proof, anti aliasing filter, PAM, PWM and PPM generation and degeneration.	04
5	**Digital Modulation Techniques** Introduction to digital communication (Block diagram), Quantization process, Pulse code modulation, Delta modulation, Adaptive delta modulation, Principle of time division multiplexing, Frequency division multiplexing and its applications	04
6	**Bandpass Modulation** Introduction to Line codes, Intersymbol interference, Binary phase shift keying, Differentally encoded phase shift keying, Quadrature phase shift keying, M-ary phase shift keying, Quadrature amplitude shift keying, Binary frequency shift keying, M-ary frequency shift keying, Minimum shift keying. (Block diagram, spectrum and bandwidth calculation and applications in each case)	10
	Total	(12 x 3)= **36 hours**

Internal Assessment (IA):

Two tests must be conducted which should cover at least 80% of the syllabus. The average marks of both the tests will be considered as final IA marks.

Recommended Books

Text Books

[1] Simon Haykin, Michael Moher, Introduction to Analog & Digital Communications, Wiley India Pvt. Ltd., 2nd Ed.

[2] Herbert Taub, Donald L Schilling, Goutam Saha, Principles of Communication Systems, Tata McGraw Hill, 3rdEd.

[3] V Chandrasekar, Communication Systems, Oxford University Press, Ist Ed.

Reference Books

George Kennedy, Bernard Davis, SRM Prasanna, Electronic Communication Systems, Tata McGraw Hill, 5th Ed.

[1] Wayne Tomasi, Electronic Communications Systems, Pearson Publication, 5th Ed.

[2] BP Lathi,Zhi Ding, Modern Digital and Analog Communication Systems, Oxford University Press, 4th Ed.

[4] K Sam Shanmugam, Digital and Analog Communication Systems, Wiley India Pvt. Ltd, 1st Ed.

Suggested Topics of Experiments

1. Amplitude modulation - generation and detection
2. Frequency modulation generation and detection
3. Study of AM/ FM receiver
4. Signal sampling and reconstruction
5 PWM generation
6. PCM coding and decoding
7. Delta modulation and demodulation
8. TDM/ FDM
9. BPSK
10. BFSK
11. BASK
12. QPSK
13. Study of eye pattern

Term Work:

Term work shall consist of at least 08 experiments from the suggested topics. 04 experiments out of these have to be performed on hardware and 04 can be performed using suitable simulation software.

Distribution of marks for term work shall be asfollows:
1. Attendance (Theory and Practical): 05 Marks
2. Laboratory work (Experiments and Journal): 10 Marks
3. Assignments: 10 Marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each mo

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tutorial	Theory	TW/ Pract.	Tutorial	Total
SEITC401	Applied Mathematics - IV *	04	--	01	04	-	01	05

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test1	Test2	Avg.					
SEITC401	Applied Mathematics –IV*	20	20	20	80	25	-	-	125

Course Objective:

This course will present matrix theory, Similar matrices and it's application to find the matrics function. Present methods of computing and using eigen values and eigen vectors. Set up and directly evaluate contour integrals Cauchys integral theorem and formula in basic and extended form. Present Taylor and Laurents series to find singularities zero's and poles also presents residues theory and it's applications. Present theory of probability, Baye's Theorem, Expectation and Moments and it's application. Present probability distribution such as binomial, Poisson and normal distribution with their properties. Present sampling theory and it's application for small and large sample. Present methods of computing optimization using simplex method.

Student Learning Outcomes:

Students in this course will apply the method of solving complex integration and computing residues. Use residues to evaluate various contour integrals. Demonstrate ability to manipulate matrices and compute eigen values and eigenvectors.

Students in this course will apply the Procedure and methods to solve technical problems.

Detailed Syllabus:

Sr.No.	Details	Hrs
Module 01	Complex Integration 1.1 Complex Integration – Line Integral, Cauchy's Integral theorem for simply connected regions, Cauchy's Integral formula(without proof) 1.2 Taylor's and Laurent's series (without proof) 1.3 Zeros, poles of f(z), Residues, Cauchy's Residue theorem 1.4 Applications of Residue theorem to evaluate Integrals of the type $\int_0^{2\Pi} f(\sin\theta,\cos\theta)d\theta, \int_{-\infty}^{\infty} f(x)dx$.	(10)
Module 02	Matrices:- 2.1 Eigen values and eigen vectors 2.2 Cayley-Hamilton theorem(without proof) 2.3 Similar matrices, diagonalisable of matrix. 2.4 Derogatory and non-derogatory matrices ,functions of square matrix.	(08)
Module 03	Correlation 3.1Scattered diagrams, Karl Pearson's coefficient of correlation, covariance, Spearman's Rank correlation. 3.2 Regression Lines.	(04)
Module 04	Probability 4.1 Baye's Theorem, 4.2 Random Variables:- discrete & continuous random variables, expectation, Variance, Probability Density Function & Cumulative Density Function. 4.3 Moments, Moment Generating Function. 4.4 Probability distribution: binomial distribution, Poisson & normal distribution. (For detail study)	(08)
Module 05	Sampling theory 5.1 Test of Hypothesis, Level of significance, Critical region, One Tailed and two Tailed test, Test of significant for Large Samples:-Means of the samples and test of significant of means of two large samples. 5.2 Test of significant of small samples:- Students t- distribution for dependent and independent samples. 5.3 Chi square test:- Test of goodness of fit and independence of attributes, Contingency table.	(08)
Module 06	Mathematical Programming 6.1 Types of solution, Standard and Canonical form of LPP, Basic and feasible solutions, simplex method. 6.2 Artificial variables, Big –M method (method of penalty). 6.3 Duality, Dual simplex method. 6.4 Non Linear Programming:-Problems with equality constrains and inequality constrains (No formulation, No Graphical method).	(10)

Term work:
Term work shall consist of minimum four SCILAB practicals and six tutorials.
SCILAB practicals : 08 marks
Tutorials : 12 marks
Attendance : 05 marks
Total : 25 marks

Recommended Books:

1. Higher Engineering Mathematics by Grewal B. S. 38th edition, Khanna Publication 2005.
2. Operation Research by Hira & Gupta,S Chand.
3. A Text Book of Applied Mathematics Vol. I & II by P.N.Wartilar & J.N.Wartikar, Pune, Vidyarthi Griha Prakashan., Pune.
4. Probability and Statistics for Engineering, Dr. J Ravichandran, Wiley-India.
5. Mathematical Statistics by H. C Saxena, S Chand & Co.

Reference Books:

1. Advanced Engg. Mathematics by C. Ray Wylie & Louis Barrett.TMH International Edition.
2. Mathematical Methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
3. Advanced Engineering Mathematics by Kreyszig E. 9th edition, John Wiley.
4. Operations Research by S.D. Sharma Kedar Nath, Ram Nath & Co. Meerat.
5. Engineering optimization (Theory and Practice) by Singiresu S.Rao, New Age International publication.
6. Probability by Seymour Lipschutz, McGraw-Hill publication.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tutorial	Theory	TW/ Pract.	Tutorial	Total
SEITC402	Computer Networks	04	02	--	04	01	--	05

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Pract.	Oral	Total
		Internal assessment			End Sem. Exam				
		Test1	Test2	Avg. of 2 Tests					
SEITC402	Computer Networks	20	20	20	80	25	---	25	150

Course Objectives:

- To be familiar with the basics of data communication.
- To be familiar with the basics of Computer networks and working of Internet.
- To be familiar with various types of computer networks.
- To have experience in designing communication protocols.
- To be exposed to the TCP/IP protocol suite.
- To understand the working of Packet Switched network (PSN).
- To be familiar with Windows and UNIX networking style.

Course Outcomes:

1. Ability to understand principles of LAN design such as topology and configuration depending on types of users accessing the network.
2. Ability to understand design performance issues like different type of network interfaces network components and choosing appropriate network type and media.
3. Ability to understand network industry standards such as: the OSI & TCP models, Routing Protocols, Address Resolution and Reverse Address Resolution Protocols, IP Addressing and Subnetting, MAC Addressing.
4. Ability to work with network tools.
5. Ability to understand the working of network operating system.

Detailed Syllabus:

Sr. No.	Module	Detailed Content	Hours
1	Introduction	Network Applications, Network Hardware, Network Software, Reference Models.	04
2	The Physical Layer	Guided Transmission Media, Wireless Transmission, Communication Satellites, The Public Switched Telephone Network, The Mobile Telephone System, Cable Television.	06
3	The Data Dink Layer	Data Link Layer Design Issues, Error Detection and correction, Elementary Data Link Protocols, Sliding Window Protocols, Example Data Link Protocols: HDLC: High-Level Data Link Control, The Data Link Layer In The Internet.	08
4	The Medium Access Sub-layer	The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Data Link Layer Switching.	06
5	The Network Layer	Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality Of Service, Internetworking, The Network Layer In The Internet: The IP Protocol, IPv4 header, IP Addressesing, Subnetting, Internet Control Protocols, The Interior Gateway Routing Protocol: OSPF, The Exterior Gateway Routing Protocol: BGP.	10
6	The Transport Layer	The Transport Service, Elements Of Transport Protocols,The Internet Transport Protocol: UDP, The Internet Transport protocol: TCP: -Introduction To TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management, Transactional TCP.	10
7	Case study	Networking using Windows and Linux Operating systems.	04

Text Books:

1. A. S. Tanenbaum,"Computer Networks", 4th edition, Prentice Hall

2. B. F. Ferouzan,"Data and Computer Communication", Tata McGraw Hill.

References:

1. Peterson & Davie, "Computer Networks", 2nd Edition, Morgan Kaufmann.
2. Kurose, Ross, "Computer Networking", Addison Wesley
3. S. Keshav, "An Engg, Approach To Computer Networking", Addison Wesley.
4. W. Richard Stevens, "TCP/IP Volume1, 2, 3", Addison Wesley.
5. D. E. Comer, "Computer Networks And Internets", Prentice Hall.
6. B. F. Ferouzan , "TCP/IP Protocol Suit", Tata McGraw Hill.

Term work

Students are expected to perform 8 programming assignments two case study assignments.

Suggested Practical List

- Network OS installation and configuration.
- Understanding various networking commands like ARP, RARP, ping, tracert, telnet, nslookup.
- Installation and Understanding of Ns-2 simulator.
- Emulation of Sliding window protocol and other data link layer protocols using NS-2.
- Implementation of Routing Algorithms using NS-2.
- Implementation of shortest path algorithms.
- Case Study: Networking using Windows and Linux Operating systems.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
SEITC403	Computer Organization and Architecture *	04	02	-	04	01	-	05

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				TW	Pract	Oral	Total
		Internal Assessment			End Semester Exam				
		Test1(T1)	Test2(T2)	Average of T1 & T2					
SEITC403	Computer Organization and Architecture *	20	20	20	80	25	-	25	150

Pre-requistes: Fundamentals of Computer, Digital Logic Circuits, Programming Languages (C, C++, Java)

Course Educational Objectives (CEO):

CEO 1	To conceptualize the basics of organizational and architectural issues of a digital computer.
CEO 2	To analyze performance issues in processor and memory design of a digital computer.
CEO 3	To understand various data transfer techniques in digital computer.
CEO 4	To analyze processor performance improvement using instruction level parallelism

Course Learning Outcomes:

A	Ability to understand basic structure of computer.
B	Ability to perform computer arithmetic operations.
C	Ability to understand control unit operations.
D	Ability to design memory organization that uses banks for different word size operations.
E	Ability to understand the concept of cache mapping techniques.
F	Ability to understand the concept of I/O organization.
G	Ability to conceptualize instruction level parallelism.

Detail Syllabus:

Module	Detailed Contents	Hours
1	**Overview of Computer Architecture & Organization:** Introduction of Computer Organization and Architecture. Basic organization of computer and block level description of the functional units. Evolution of Computers, Von Neumann model. Performance measure of Computer Architecture. Introduction to buses and connecting I/O devices to CPU and Memory, bus structure.	**04**
2	**Data Representation and Arithmetic Algorithms:** Number representation: Binary Data representation, two's complement representation and Floating-point representation. IEEE 754 floating point number representation. Integer Data computation: Addition, Subtraction. Multiplication: Signed multiplication, Booth's algorithm. Division of integers: Restoring and non-restoring division Floating point arithmetic: Addition, subtraction	**10**
3	**Processor Organization and Architecture:** CPU Architecture, Register Organization , Instruction formats, basic instruction cycle. Instruction interpretation and sequencing. Control Unit: Soft wired (Micro-programmed) and hardwired control unit design methods. Microinstruction sequencing and execution. Micro operations, concepts of nano programming.Introduction to RISC and CISC architectures and design issues. Case study on 8085 microprocessor: Features, architecture, pin configuration and addressing modes.	**12**
4	**Memory Organization:** Introduction to Memory and Memory parameters. Classifications of primary and secondary memories. Types of RAM and ROM, Allocation policies, Memory hierarchy and characteristics. Cache memory: Concept, architecture (L1, L2, L3), mapping techniques. Cache Coherency, Interleaved and Associative memory. Virtual Memory: Concept, Segmentation and Paging , Page replacement policies.	**12**
5	**I/O Organization and Peripherals:** Input/output systems, I/O modules and 8089 IO processor. Types of data transfer techniques: Programmed I/O, Interrupt driven I/O and DMA. Peripheral Devices: Introduction to peripheral devices, scanner, plotter, joysticks, touch pad.	**6**
6	**Introduction to parallel processing systems:** Introduction to parallel processing concepts, Flynn's classifications, pipeline processing, instruction pipelining, pipeline stages, pipeline hazards.	**4**

Text Books:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw-Hill.
2. John P. Hayes, "Computer Architecture and Organization", Third Edition.
3. William Stallings, "Computer Organization and Architecture: Designing for Performance", Eighth Edition, Pearson.
4. B. Govindarajulu, "Computer Architecture and Organization: Design Principles and Applications", Second Edition, Tata McGraw-Hill.

Reference Books:

1. Dr. M. Usha, T. S. Srikanth, "Computer System Architecture and Organization", First Edition, Wiley-India.
2. "Computer Organization" by ISRD Group, Tata McGraw-Hill.
3. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085, Fifth Edition,Penram.

Oral examination will be based on the above syllabus.

There will be at least two assignments covering the above syllabus. Journal must include at least 2 assignments.

Term Work: 25 Marks (Total marks) = 15 Marks (Experiment and Case Studies) + 5 Marks (Assignments) + 5 Marks (Attendance)

Note: The faculty should conduct eight programming practical / experiments based on the above syllabus including two case studies on recent developments covering the above contents.
All the programs should be implemented in C/C++/Java under Windows or Linux environment.
Experiments can also be conducted using available open source tools.
8085 microprocessor should be included only as a sample case study. No questions in University Exams / Class Tests should be asked on 8085 microprocessor.

SUGGESTED LIST OF COA PRACTICAL / EXPERIMENTS :

1. To study Full Adder (7483).
2. To study ALU (74181).
3. To study MASM (Micro Assembler).
4. A program for hexadecimal addition and multiplication.
5. A program for binary multiplication.
6. A program for Hamming code generation , detection and correction.
7. A program for Booth's multiplication
8. A program for LRU page replacement algorithm.
9. A program for FIFO page replacement algorithm.
10. A program to simulate the mapping techniques of Cache memory.

10.1 Direct Mapped cache
10.2 Associative Mapped cache
10.3 Set Associative Mapped cache

11. A program to simulate memory allocation policies.
    11.1 First-fit algorithm
    11.2 Best-fit algorithm

12. A program to implement serial communication (PC - PC communication).
13. A program to implement parallel communication. (PC - Printer communication).
14. A program for printer simulation.
15. A program for keyboard simulation.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/ Practical	Tutorial	Total
SEITC404	Automata Theory	03		01	03	--	01	04

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Avg. of 2 Tests					
SEITC404	Automata Theory	20	20	20	80	25	---	--	125

Course Objectives:

To build up mathematical fundamentals required to understand the theory of computation

1. To formalize mathematical models of computation: basic machines, deterministic and non deterministic machines and pushdown machines and Turing Machines.
2. To learn fundamentals of formal grammars and languages.
3. Develop understanding of different types of Turing machines, their use, capabilities & limitations.
4. Understand the concept of Undecidability

Course Outcomes: After completing the course successfully, students will be able to:

1. Design different types of machines.
2. Compare different types of languages and machines
3. Use the pumping lemma and closure properties to prove that some problems cannot be solved by particular machines.
4. Understand Power and Limitations of theoretical models of Computation.
5. Match constraints of a language to power of machines.

Detailed Syllabus:

Sr. No	Detail contents	Number of Hours
1.	**Basic Mathematical Fundamentals:** Sets, Logic, Functions, Relations and Languages, pigeonhole principle, mathematical induction.	02
2.	**Introduction and Finite Automata:** Alphabets, Strings, Languages, Finite Automata (FA), acceptance of strings, and languages, Deterministic Finite Automata (DFA) and Non Deterministic Finite Automata (NFA), transition diagrams and Language recognizers. Conversions and Equivalence: Equivalence between NFA with and without ε- transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.	06
3.	**Regular Expressions & Languages:** FA and Regular Expressions, Conversion from RE to FA and FA to RE, Pumping lemma for regular languages, Closure properties of regular languages, Equivalence and minimization of Automata.	05
4.	**Context Free Grammars and Languages:** CFG, Leftmost, Rightmost derivations, Ambiguity in grammars and languages. Simplification of Context Free Grammars, Chomsky normal form (CNF), Greiback normal form (GNF), Pumping Lemma for Context Free Languages.	04
5.	**Push Down Automata:** Definition and languages of PDA, Equivalence& conversion of CFG's and PDA's, Deterministic PDA.	06
6.	**Turing Theory:** Turing Machines, definition, model, design of TM, Variations of TM: Multitape TMs, Non Deterministic TM, Universal TM, The Church-Turing thesis.	08
7.	**Undecidability and Recursively enumerable languages: Recursive and** Recursively enumerable languages, Context-Sensitive Languages and the Chomsky Hierarchy. Unsolvable Problems: Halting Problem, Post's Correspondence Problem (PCP).	05

TERM WORK

Journal work should comprise of writing 10 assignments based on the above syllabus.
Use of JFLAP software is desirable for experimenting with formal languages: topics including nondeterministic finite automata, nondeterministic pushdown automata, multi-tape Turing machines, several types of grammars.

TEXT BOOKS

1. Kavi Mahesh, **"Theory of Computation A Problem Solving Approach"**, Wiley India

2. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, **"Introduction to Automata Theory, Languages and Computation",** Pearson Education.

3. J.C.Martin, **"Introduction to languages and the Theory of Computation"**, TMH.

REFERENCES

1. Daniel I.A. Cohen, "**Introduction to Computer Theory"**, John Wiley & Sons.

2. Michael Sipser, **"Theory of Computation",** Cengage Learning.

3. N.Chandrashekhar& K.L.P. Mishra, "Theory of Computer Science, Automata Languages & Computations", PHI publications.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/ Practical	Tutorial	Total
SEITC405	Web Programming	04	02	--	04	01	--	05

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Avg. of 2 Tests					
SEITC405	Web Programming	20	20	20	80	25	---	25	150

Objective:

As the part played by Internet in our daily life increases so does the importance of methods and means of Web site realization. This course is devoted to acquire knowledge and skills for creation of Web site considering both client- and server-side programming.

Outcome:

Student must be able to:

- Learn basics of web architecture and web development.
- Acquire the knowledge of tools used in industry for web application development.
- Create the web application using tools and techniques learned.

Topics:

- Introduction to web technologies
- Client side programming – HTML 5.0, XHTML, CSS, JavaScript
- Server side programming I – ASP.NET and JSP
- Server side programming II -- PHP
- Server side database connectivity
- Web extensions

Detailed Syllabus

Sr. No.	Detail Contents	Weightage	Number of hours
1	Introduction to web technologies: Introduction to OSI layers, Web system architecture- 1,2,3 and n tier architecture, URL, domain name system, overview of HTTP and FTP, Cross browser compatibility issues, W3C Validators,Web Site Design Issues: Planning a Web Site – Objective and Goals, Audience, Organizing contents, Publishing of Web Site. Function of Web Server	05%	03
2	Client Side Programming– HTML 5.0, CSS and JavaScript: Basic HTML, formatting and fonts, Anchors, images, lists, tables, frames and forms, Introduction to CSS, Using CSS for text, background, links and positioning, Introduction to JavaScript, JavaScript language constructs, Objects in JavaScript- Built in, Browser objects and DOM objects, event handling, form validation and cookies. Introduction to JQUERY, The Basics of JQUERY programming, form validation using JQUERY.	25%	12
3	Server side programming I: ASP.NET and JSP Introduction to c# language,ASP.NET essentials, Life cycle of ASP.NET application,Developing web forms using ASP.NET, Using ASP.NET server controls to create web forms, Session tracking , Introduction to servlet and JSP, life cycle of JSP and servlet, Introduction to basic objects in JSP.	35%	16
4	Server side programming II: PHP Introduction to PHP- Data types, control structures, built in functions,Building web applications using PHP- tracking users, Introduction to PHP framework.	10%	08
5	Server side database connectivity: Database connectivity using ADO.Net, JSP &JDBC connectivity with example,PHP and Mysql database connectivity with example.	20%	06
6	Web Extensions: XML, Introducing XSL, XSL elements, transforming with XSLT, Web feeds (RSS), Introduction to web services.	05%	03

Text Books:

1. "Web Technologies: Black Book", Dreamtech publication
2. "Learning PHP 5", David Sklar, O'Reilly Publication
3. "The Web Warior Guide to Web Programming", Bai, zak, Ekedahl,Farrell, CENGAGE Learning Publication

Reference Books:

1. "Internet and world wide web how to program", Deitel&Deitel, Prentice Hall publication
2. "Developing web applications", Ralph Moseley, M.T.Savaliya, Wiley Publication.
3. "Web Programming", Chris Bates, Third edition, Wiley publication
4. "Web Technologies", Uttam K. Roy, Oxford University Press

Suggested Practical List:

1. Web pages using HTML 5.0 using Dreamviewer (Preferred) / Any other HTML editor
2. Web pages using JavaScript illustrating the objects in JavaScript
3. Form validation/ event handling using jQuery
4. Web Application development using ASP.NET
5. Database connectivity with ADO.NET
6. Database connectivity using JDBC and JSP
7. Installation and configuration of WAMP server
8. Introduction of PHP framework(Yii,CakePHP, CodeIgniter) and simple application development using the same.
9. Web application development using PHP
10. Database connectivity with PHP
11. A mini project – Complete web site development using
    a. HTML, CSS, JavaScript and ASP.NET OR
    b. HTML, CSS, JavaScript and PHP

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weightage of marks should be proportional to number of hours assigned to each module.

Sub Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/pract	Tutorial	Total
SEITC406	Information Theory and Coding	4		1	4	--	1	5

Sub Code	Subject Name	Examination Scheme							Total
		Theory				TW	Pr	Oral	
		Internal Assessment			End Sem Exam				
		Test 1	Test 2	Avg. of Test 1 & 2					
SEITC406	Information Theory and Coding	20	20	20	80	25	--	--	125

Course Objective:

To introduce to the students the concept of information and entropy of Information

To give the student the concept of compression of information , error control of Information, and securing information through cryptography.

To give the student the mathematical foundation of compression, error control and security of information.

Course Outcome:

Ability of students to understand true meaning of Information and Entropy

Ability of students to understand three aspects of information i.e. compression, error control and security.

Detailed Syllabus:

Unit. No	Topics	Number of Hours
1	**Information Theory & Source Coding** 1.1. Introduction to Information Theory 1.2. Entropy & Types of Entropy 1.3. Source Coding 1.4. Prefix Coding 1.5. Channel Capacity	**8**
2	**Compression Algorithms** 2.1 Optimal Compression 2.2 Compression Algorithms 2.3 Huffman Coding, Adaptive Huffman Compression 2.4 Dictionary Based Compression 2.5 Speech Compression 2.6 Sliding Window Compression 2.7 LZW,RLE 2.8 Lossy & Lossless Compression Schemes 2.9 Image Compression – GIF,JPEG	**10**
3	**Error Control Coding Techniques** 3.1 Types of Codes 3.2 Error Checking & Correcting Codes 3.3 Linear Block Codes 3.4 Cyclic Codes 3.5 BCH Codes 3.6 Convolution Codes	**10**
4	Basic Number Theory 4.1 Modular Arithmetic 4.2 Solving ax+by=d 4.3 Congruences 4.4 Chinese Remainder Theorem 4.5 Modular Exponentiation 4.6 Fermat's Little and Euler Theorem 4.7 Prime Number Generation 4.8 Random Number Generation 4.9 Primitive Roots 4.10 Legendre and Jacobi Symbols 4.11 Discrete Probability 4.12 Discrete Logarithms	**12**

5	Cryptographic Techniques 5.1 Security Goals, Threats and Attack on Information 5.2 Classic Cryptography 5.3 Symmetric Key Cryptography – Stream Ciphers, Block Cipher, Stream Cipher,DES,Triple DES,AES 5.4 Public and Private Key Cryptography – RSA,Diffie-Hellman 5.5 Hash Function – MD5,SHA-1,Digital Signature	8

Text Books:

1. "Information Theory, Coding and Cryptography" Ranjan Bose, Tata McGrawHill , Second Edition.
2. "Information Coding Techniques" R Avudaiammal, Tata McGrawHill , Second Edition.
3. "Essentials of Error-Control Coding", Jorge Castineira Moreirra, Wiley-India Edition
4. "Introduction to Cryptogrpahy with Coding theory" Trappe and Washington" Pearson

References:

1. Element of information theory: Thomas Cover wiley

2. An introduction to Theory of numbers: Ivan nivan Wiley

Tutorial:

Journal work should comprise of writing 10 assignments based on the above syllabus.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus wherein sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.
- Weightage of marks should be proportional to number of hours assigned to each module.