ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY
Guwahati

Course Structure and Syllabus

COMPUTER SCIENCE AND ENGINEERING (CSE)

Semester IV / CSE / B.TECH

Sl. No.	Subject Code	Subject	Hrs/week			Credit
			L	T	P	C
	Theory					
1	MA131401	Numerical Methods and Computation	3	2	0	4
2	CS131402	Basic Graph theory	3	0	0	3
3	CS131403	Operating Systems	3	0	0	3
4	CS131404	Computer Organization and Architecture	3	2	0	4
5	CS131405	Principles of Programming Language	3	2	0	4
6	HS131406	Economics and Accountancy	4	0	0	4
	Practical					
7	MA131411	Numerical Methods and Computation Lab	0	0	2	1
8	CS131413	Operating Systems Lab	0	0	2	1
9	CS131415	Principles of Programming Language Lab	0	0	2	1
TOTAL			19	6	6	**25**
Total Contact Hours : 31						
Total Credits : **25**						

Course Title : NUMERICAL METHODS AND COMPUTATION
Course Code: MA131401
L-T:: C 3-2 =4

ClassHours/week	4
Expected weeks	12
Total hrs. of classes	36+12 =48

MODULE	TOPIC	COURSE CONTENT	HOURS
1	**Approximation in numerical computation**	Truncation and rounding errors, fixed and floating point arithmetic, Propagation of errors.	4
2	**Interpolation**	Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation	12
3	**Numerical Integration**	Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule. Expression for corresponding error terms.	8
4	**Numerical solution of linear equations**	Gauss elimination method, matrix inversion, LU factorization method, Gauss-Seidel iterative method.	7
5	**Numerical solution of Algebraic and transcendental equation**	Bisection method, Regula-Falsi method, Newton-Raphson method.	7
6	**Numerical solution of Ordinary differential equation**	Euler's method, Runge-Kutta methods, Predictor-Corrector methods and Finite Difference method.	10
		TOTAL	48

REFERENCE BOOKS:

1. Numerical Methods, SukhenduDey, Shishir Gupta, McGraw Hill Education (India) private Limited
2. Numerical Algorithms. E. V. Krishnamurthy, S. K. Sen. Affilated East-West Press
3. Computer Programming & Numerical Analysis by N Dutta, University Press.
4. Numerical Methods. E. Balagurusamy, Tata McGraw - Hill Education (1999)
5. Numerical & Statistical Methods With Programming in c by SujathaSinha
6. Numerical Methods In Eng. & Science, Dr. B. S. Grewal, Khpub publication
7. Numerical Methods for Scientific and Engineering Computation by R. K. Iyengar, New Age International
8. Numerical Mathematical Analysis by J. B. Scarborough, Oxford

Course Title : BASIC GRAPH THEORY
Course Code: CS131402
L-T:: C 3-0 =3

ClassHours/week	3
Expected weeks	12
Total hrs. of classes	36

MODULE	TOPIC	COURSE CONTENT	HOURS
1	**Graph incidence and degree**	**(a)** Definition of Graph, Application of Graphs Finite and Infinite graphs **(b)** Incidence and degree of a graph, Isolated Vertex, Pendent Vertex, Null Graph.	2
2	**Paths and circuits**	**(a)** Isomorphism; Sub graphs and Union of Graphs, walks, Paths and Circuits, **(b)** Connected Graphs, disconnected graphs and components, **(c)** Eulerian graph, Chinese postman problem, Konigsberg Bridge Problem, **(d)** Operations on Graphs, Arbitrarily traceable graphs, Fleury's algorithms, **(e)** Hamilton graph-necessary and sufficient conditions, Complete Graph, Traveling salesman, bipartite graph.	7
3	**Tree**	**(a)** Definition of tree, Properties of tree, Pedant vertices in a tree; Center of a tree **(b)** Rooted binary trees, On counting trees, Fundamental circuits; **(c)** Spanning trees, Spanning algorithms Spanning trees of a weighted graph, algorithms for shortest Spanning tree.	5
4	**Cut-sets and cut-vertices**	**(a)** Cut-sets and cut-vertices; Some properties of Cut-Set, Fundamental Circuits and cut-sets **(b)** Connectivity and separativity and different theorems; **(c)** Network flow, max-flow min-cut theorem, 1-isomorphism and 2-isomorphism.	4
5	**Planner graph**	**(a)** Combinatorial and geometric graphs, planar graphs, Geometric and Combinatorial dual; **(b)** Kuratowski graph; detection of planarity; Thickness and crossings.	4
6	**Matrix representation of graph**	Incidence; Adjacency; Circuit, Cut-Set, Path matrices and their properties.	2
7	**Coloring, covering and partitioning**	**(a)** Chromatic number; Chromatic Partitioning, Chromatic polynomial, Coverings, minimization of Switching	4

		Functions. **(b)** Four Color theorem, five color theorems	
8	**Directed graph**	**(a)** Digraphs, different types of digraphs, Binary relations, **(b)** Directed graphs and connectedness, Euler Digraph, **(c)** Tree with directed graph, Arborescence an Polish method	4
9	**Enumeration of graphs**	**(a)** Types of Enumerations, Counting labeled an Unlabelled trees **(b)** Counting Methods, Polay Counting Theory.	4
		TOTAL	36

TEXT/ REFERENCE BOOKS:

1. Narasingh Deo: “Graph Theory with applications to Engineering and Computer Science”, Phi Publications.
2. Franck Harary: “Graph Theory”, Phi (EEE).

Course Title : OPERATING SYSTEMS
Course Code: CS131403
L-T:: C 3-0 =3

ClassHours/week	3
Expected weeks	12
Total hrs. of classes	36

MODULE	TOPIC	COURSE CONTENT	HOURS
1	**Introduction to OS**	Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel. Operating system structure (simple, layered, virtual machine), O/S services, system calls.	3
2	**Processes & Threads**	Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication. Overview of threads, benefits of threads, user and kernel threads.	3
3	**CPU scheduling**	Scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, and priority), algorithm evaluation, multi-level queue scheduling and multilevel feedback queue scheduling.	4
4	**Process Synchronization**	Data Access and control synchronization, critical section problem, critical region, Race conditions in process synchronization , classical problems of synchronization,semaphores, Interprocess communication through message passing mechanism.	4
5	**Deadlocks**	System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.	3
6	**Memory Management**	Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging	3
7	**Virtual Memory**	Background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.	3
8	**File Systems Management**	File concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.	4

9	**I/O Management**	I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.	3
10	**Disk Management**	Disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN), disk reliability, disk formatting, boot block, bad blocks.	3
11	**Protection & Security**	Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.	3
		TOTAL	36

TEXT/ REFERENCE BOOKS:

1. Milenkovie M., "Operating System: Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley.
7. M. J. Bach - The Design of the UNIX Operating System, Prentice Hall of India, 1994.

Course Title : COMPUTER ORGANIZATION AND ARCHITECTURE
Course Code: CS131404
L-T:: C 3-2 =4

ClassHours/week	4
Expected weeks	12
Total hrs. of classes	36+12 =48

MODULE	TOPIC	COURSE CONTENT	HOURS
1	**Basic organization of computers**	Block level description of the functional units as related to the execution of a program; Fetch, decode and execute cycle.	7
2	**Machine instructions**	Instruction set architectures, Assembly language programming, addressing modes, instruction cycles, registers and storage, addressing modes; discussions about RISC versus CISC architectures; Inside a CPU.	9
3	**Information representation**	Floating point representation (IEEE 754), computer arithmetic and their implementation; Fixed-Point Arithmetic: Addition, Subtraction, Multiplication and Division, Arithmetic Logic Units control and data path, data path components, design of ALU and data path, controller design; Hardwired and Microprogrammed Control.	10
4	**Memory Technology**	Static and dynamic memory, Random Access and Serial Access Memories, Cache memory and Memory Hierarchy, Address Mapping, Cache updation schemes, Virtual memory and memory management unit.	8
5	**I/O subsystems**	Input-Output devices such as Disk, CD-ROM, Printer etc.; Interfacing with IO devices, keyboard and display interfaces; Basic concepts Bus Control, Read Write operations, Programmed IO, Concept of handshaking, Polled and Interrupt-driven I/O, DMA data transfer.	8
6	**Pipeline Processing**	Instruction and Arithmetic Pipeline, Pipeline hazards and their resolution, Parallel Processing.	6
		TOTAL	48

TEXT/ REFERENCE BOOKS:

1. John P Hayes - Computer Architecture & Organization, Mc Graw Hill Book Company.

2. M. Mano - Computer System Architecture, Prentice-Hall of lndia.

Course Title : PRINCIPLES OF PROGRAMMING LANGUAGE
Course Code: CS131405
L-T:: C 3-2 =4

ClassHours/week	4
Expected weeks	12
Total hrs. of classes	36+12 =48

MODULE	TOPIC	COURSE CONTENT	HOURS
1	**Introduction**	Introduction to various programming paradigms and their implementation issues. Characteristics of programming Languages, Factors influencing the evolution of programming language, Development in programming methodologies, desirable features and design issues. Introduction to mathematical foundations and semantics of programming languages.	8
2	**Programming language processors**	Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.	6
3	**Data types and abstraction**	Properties of types and objects – elementary data types – structured data types, Abstract data types – encapsulation by subprograms – type definition – storage management.	6
4	**Sequence control**	Implicit and explicit sequence control – sequencing with arithmetic and non-arithmetic expressions – sequence control between statements, Subprogram sequence control – attributes of data control – shared data in.	6
5	**Imperative programming**	Block structure, scoping rules, parameter passing etc. in languages like C, PASCAL and FORTRAN.	4
6	**Object oriented programming**	Abstraction, hiding, objects, classes, inheritance etc. in languages like C++ and Modular JAVA.	6
7	**Functional programming**	Functions, Recursion, types, polymorphism, storage allocation in languages like LISP, ML Scheme.	4
8	**Logic programming**	Horn clauses, SLD resolution etc. in languages like PROLOG.	4

9	**Concurrent programming**	Expressing parallelism, communication, synchronization etc. in languages like Ada, CSP and Linda.	4
		TOTAL	48

TEXT BOOKS:

1. Terrance W. Pratt, And Marvin V. Zelkowitz, "**Programming Languages, Design And Implementation**", Prentice-Hall Of India.

REFERENCES:

1. Ravi Sethi, "**Programming Languages – Concepts And Constructs**", Addison-Wesley.
2. Allen B. Tucker, Robert Noonan, "**Programming Languages: Principles And Paradigms**", Tata Mcgraw-Hill.
3. E. Horowitz, "**Fundamentals Of Programming Languages**", Galgotia Publishers.
4. A.B. Tucker, Robert, Noonan, "**Programming Languages**", Mcgraw-Hill.

   Robert W. Sebesta, "**Concepts Of Programming Languages**", Addison Wesley.

Course Title : ECONOMICS AND ACCOUNTANCY
Course Code: HS131406
L-T ::C 4-0 = 4

ClassHours/week	4
Expected weeks	12
Total hrs. of classes	48

MODULE	TOPIC	COURSE CONTENT	HOURS
1	**Introduction to Economics**	i) Nature and Scope of Economics ii) Concepts of micro and macro economics, economic good and free good.	4
2	**Demand and Supply Analysis**	i) Law of Demand and determinants of demand. ii) Categories and Types of Elasticity of Demand- price elasticity, income elasticity, cross elasticity. iii) The determinants of elasticity, Demand elasticity and Revenue. iv) Law of Supply and Elasticity of Supply.	8
3	**The Theory of Production and Cost**	i) Iso-quant and Iso-cost line. ii) Law of Return to Scale and Law of Variable Proportion. iii) Types of Cost – total, average and marginal cost, fixed cost & variable cost, long run and short run cost, private & social cost, economist's cost & accountant's cost, opportunity cost.	8
4	**Market**	i) Features of perfect competition and monopoly. ii)Price-Output determination under--perfect competition, simple problems of perfect competition.	5
5	**Concepts of Accountancy**	Various concepts like Journal, ledger and preparation of trial balance.	8

6	**Preparation of Final Account**	Trading Account, Profit and Loss account, Balance Sheet.	8
7	**Depreciation**	Depreciation Policy, Causes of Depreciation, straight line method.	4
8	**Cash Book**	Single, Double and Triple Column.	3
		TOTAL	48

REFERENCE BOOKS:

1. Managerial Economics by Yogesh Maheswary, PHI Learning.

2. Mankiw Gregory N.(2002), *Principles of Economics,* Thompson Asia.

3. Misra, S.K. and Puri (2009), *Indian Economy,* Himalaya.

4. Engineering Economics by Dr. Afajuddin Ahmed, G Begum, Chandra Prakash.

5. Book Keeping and Accountancy, K.R. Das, Lawyer's Books Stall.

PRACTICALS

NUMERICAL METHODS AND COMPUTATION LAB

SUBJECT	NUMERICAL METHODS AND COMPUTATION LAB
CODE	MA131411
L-T-P-C	0-0-2-1
CLASS HOUR	3hrs/week
TOTAL NO. OF CLASS	5 (APPROX)
EXPECTED NO. OF WEEKS	5 (APPROX)

EXPERIMENT NO.	TITLE OF THE EXPERIMENT	HOURS
1	Write a C program to solve algebraic equations by using Method of Bisection.	3
2	Write a C program to solve algebraic equations by using Method of False position.	3
3	Write a C program to solve algebraic equations by using Newton Raphson Method.	3
4	Write a C program to solve linear system of equations by using Gauss Jordan Method.	3
5	Write a C program to solve linear system of equations by using Gauss Seidal Method.	3
	TOTAL	15

Course Title: OPERATING SYSTEMS LAB
Course Code: CS131413
L-T-P:: C 0-0-2:: 1

EXPERIMENT NO.	TITLE OF THE EXPERIMENT	HOURS
1	**Shell programming:** creating a script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands).	3
2	**Process:** starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.	3
3	**Signal:** signal handling, sending signals, signal interface, signal sets.	3
4	**Semaphore** : programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).	3
5	**POSIX Threads**: programming with pthread functions(viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel)	3
6	**Inter-process communication** : pipes (use functions pipe, popen, pclose), named pipes(FIFOs, accessing FIFO)	3
	TOTAL	18

Course Title: PRINCIPLES OF PROGRAMMING LANGUAGE LAB
Course Code: CS131415
L-T-P:: C 0-0-2:: 1

EXPERIMENT NO.	TITLE OF THE EXPERIMENT	HOURS
1	Write a C program to read and integer array and display the maximum element.	1
2	Write a C program to reverse the content of an array data structure.	1
3	Write a C program to swap two elements using function	1
4	Write a C program to add two matrices using function	1
5	Write a C program to illustrate the *type conversion* function.	1
6	Write a C program to demonstrate the use of *structure* data type.	1
7	Write a C++ program to illustrate the use of function overloading	1
8	Write a C++ program to illustrate the use of operator Overloading	1
9	Write a C++ program to illustrate the use inline function	1
10	Write a C++ program to illustrate the use of virtual base class.	1
11	Write a C++ program to illustrate the use of single inheritance (Public/Private)	1
12	Write a C++ program to illustrate the use of file *open()* and *close()* operation	1
13	Write a Java Program to add two numbers and display the result	1
14	Write a Java program to reverse a number.	1
15	Write a Java program to find out whether a number is Fibonacci or not.	1
16	Write a Java program to find out the factorial of a number.	1

17	Write a program to display a list using functional programming (LISP/ML)	1
18	Write a program to calculate the factorial of a given number using functional programming	1
19	Write a program to print “hello world” using functional programming.	1
20	Write a program to add two numbers and display the sum and average using functional programming.	1
21	Write a program to illustrate the use of *make date()* data structure using PROLOG	1
22	Write a program to illustrate the use of *list()* data structure using PROLOG	1
23	Write a program to illustrate the use of PROLOG logical statement.	1
	TOTAL	23

****