Faculty of Computer Science and Engineering
Patuakhali Science and Technology University

Phone: +88 04427 56014, Fax: 04427-56009, www.pstu.ac.bd, e-mail: pstu@pstu.ac.bd

14-Mar-2012

Level-I Semester-I			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
PHY 111	Physics-I	3.00	20.25
PHY 112	Physics-I Sessional	0.75	
CHE 111	Chemistry	3.00	
CHE 112	Chemistry Sessional	0.75	
MAT 111	Mathematics-I	3.00	
EEE 111	Basic Electrical Engineering	3.00	
EEE 112	Basic Electrical Engineering Sessional	1.50	
CIT 111	**Programming Language**	3.00	
CIT 112	**Programming Language** Sessional	1.50	
CCE 114	Engineering Drawing	0.75	
Level-I Semester-II			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
PHY 121	Physics-II	3.00	20.75
PHY 122	Physics-II Sessional	0.75	
MAT 121	Mathematics-II	3.00	
CIT 121	Discrete Mathematics	3.00	
LCM 121	Communicative English	2.00	
EEE 121	Electronic Device and Circuits	3.00	
EEE 122	Electronic Device and Circuits Sessional	1.50	
CCE 121	Object Oriented Programming	3.00	
CCE 122	Object Oriented Programming Sessional	1.50	
CCE 124	Computer Programming Contest-I	0.00	
Level-II Semester-I			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
CIT 211	Data Structure and Algorithms	3.00	21.00
CIT 212	Data Structure and Algorithms Sessional	1.50	
CIT 213	Software Engineering	3.00	
CCE 211	Data Communication and Engineering	3.00	
MAT 211	Mathematics-III	3.00	
EEE 211	Electrical Technology	3.00	
EEE 212	Electrical Technology Sessional	1.50	
AIS 211	Accounting and Management	3.00	
Level-II Semester-II			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
CCE 221	Digital Logic Design	3.00	21.00
CCE 222	Digital Logic Design Sessional	1.50	
CCE 223	Database System	3.00	
CCE 224	Database System Sessional	1.50	
AES 221	Government and Economics	3.00	
MAT 221	Mathematics-IV	3.00	
CIT 220	Web Programming Project	1.50	
CIT 221	Information System Analysis and Design	3.00	
CIT 222	Information System Analysis and Design Sessional	1.50	
CIT 224	Computer Programming Contest-II	0.00	

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Level-III Semester-I			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
CIT 311	Microprocessors and Assembly Language	3.00	21.75
CIT 312	Microprocessors and Assembly Language Sessional	1.50	
CIT 313	Computer Organization and Architecture	3.00	
CIT 315	Artificial Intelligence	3.00	
CIT 316	Artificial Intelligence Sessional	1.50	
CCE 310	Software Development Project-I	1.50	
CCE 311	Numerical Methods	3.00	
CCE 312	Numerical Methods Sessional	0.75	
CCE 313	Computer Networks	3.00	
CCE 314	Computer Networks Sessional	1.50	
Level-III Semester-II			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
CIT 320	Software Development Project-II	1.50	21.75
CIT 321	Operating System	3.00	
CIT 322	Operating System Sessional	1.50	
CIT 323	Simulation and Modeling	3.00	
CIT 324	Simulation and Modeling Sessional	1.50	
EEE 321	Digital Electronics and Pulse Techniques	3.00	
EEE 322	Digital Electronics and Pulse Techniques Sessional	0.75	
CCE 320	Computer Programming Contest-III	0.00	
CCE 321	Computer Peripheral and Interfacing	3.00	
CCE 322	Computer Peripheral and Interfacing Sessional	1.50	
CCE 323	Machine Learning	3.00	
Level-IV Semester-I			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
CSE 410	Project/Thesis	3.00	22.00
CSE 412	Industrial Training	1.00	
CCE 411	Algorithm Engineering	3.00	
CCE 413	VLSI Design	3.00	
CCE 415	Network Routing and Switching	3.00	
CCE 416	Network Routing and Switching Sessional	1.50	
CCE 417	Data Warehousing and Mining	3.00	
CIT 411	Compiler Design and Automata Theory	3.00	
CIT 412	Compiler Design and Automata Theory Sessional	1.50	
Level-IV Semester-II			
Course Code	**Course Title**	**Credit Hours**	**Sub Total**
CSE 420	Project/Thesis	3.00	16.50
CSE 421	Seminar	0.75	
CCE 421	Cryptography and Network Security	3.00	
CCE 422	Wireless and Cellular Communication	3.00	
CIT 421	Computer Graphics and Image Processing	3.00	
CIT 422	Computer Graphics and Image Processing Sessional	0.75	
CIT 423	OPTIONAL	3.00	
	Total Course Credit for B.Sc. Engineering in CSE=		**165.00**

Optional Courses			
Course Code	**Course Title**	**Credit Hours**	**Total**
OPTIONAL	Computer Graphics and Image Processing	3.00	3.00
	Parallel Processing and Distributed System	3.00	
	Robotics and Computer Vision	3.00	

Department wise course credits

Total Credit Hours of Computer Science and Information Technology Dept. = 54.75

Total Credit Hours of Computer and Communication Engineering Dept. = 54.00

Total Credit Hours of Electrical and Electronic Engineering Dept. = 17.30

Total Credit Hours of Mathematics Dept. = 12.00

Total Credit Hours of Physics and Mechanical Engineering Dept. = 7.50

Total Credit Hours of other Non-Departmental (Chemistry, Sociology, Accounting, Management, and Economics) courses = 19.45

Total Credit Hours = 165.00

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Chairman, CIT Chairman, CCE Chairman, EEE Chairman, MATH Chairman, PME

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Dean, CSE Faculty

Department of Computer Science and Information Technology
Faculty of CSE
Patuakhali Science and Technology University

Course Content
Effective from Session: 2011-12

CIT 111 Computer Fundamentals and Programming with C/C++
3 Hrs. per week 3 Credits.

Computer Generations and Classification, Data representation, Hardware Components, Software Components, Operating Systems, Computers and Communications.

Programming concepts; Structured programming language: data types, variables, operators, type of expressions, control structures; Functions and program structures: function basics, parameter passing conventions, scope rules and storage classes, recursion; Header files; Preprocessor; Arrays, String and Pointers; User defined data type: structures, unions, enumeration; Input and output: standard input and output, formatted input and output, file access; Dynamic memory allocation, Variable length argument list; Command line parameters; Error handling; Introduction to Graphics routines.

Recommended Books:

1. E.Balagurushamy : "Programming with ANSI C"
2. E.Balagurushamy : "Object-oriented programming with C++"
3. Y. Kanitkar : "Let Us C"
4. H. Schildt : "Teach yourself C".
5. H. Schildt : "C: The Complete Reference".
6. Y. Kanitkar : "Pointers in C"
7. Kernighan & Ritchie : "The C programming language"
8. R. G. dromey : "how to solve it by Computer"

CIT 112 Computer Fundamentals and Programming with C/C++ Sessional
3 Hrs. per week 1.5 Credits

Sessional works based on **CIT 111**

CIT 121 Discrete Mathematics
3 Hrs. per week 3 Credits

Mathematical Logic: Statements and Notation. Connectives: Negation, Conjunction, Disjunction, Statement Formulas and Truth Tables. Conditional and Biconditional. Tautologies. Equivalence of Formulas. Duality Law. Tautological Implications. Functionally Complete Sets of Connectives. Normal Forms, Ordering and Uniqueness of Normal Forms. Rules of Inference. Methods of Proof. Predicate Calculus: Predicates, Statement Function, Variables, and Quantifiers, Predicate Formulas, Free and Bound Variables, The Universe of Discourse. Rules of Inference: Universal Specification,

Existential Specification, Existential Generalization, and Universal Generalization. Mathematical Induction.

Elements of Number Theory: Modular Arithmetic, and The Euclidean Algorithm.

Relations and Functions: Properties of Binary Relations, Composition of Binary Relations, Relation matrix and Graph of a Relation. Functions: Characteristic function, Floor function, Ceiling function and Hashing functions.

Graphs: Introduction, definition and terminology, graph representations, traversals, connected components and spanning trees, shortest path and transitive closure, activity networks, topological sort and critical paths, enumerating all paths.

Trees: Basic terminology, Binary trees, binary tree representations, binary tree traversal; Binary search tree, tree search, Insert into a search tree, tree sort algorithm, deletion from a search tree, Building a binary search tree, Inserting a node, AVL trees, Forming a heap.

Elements of Group Theory: Semigroups, Isomorphism and Homomorphism of Semigroups, Groups, Group Homomorphism.

Books Recommended:

1. Seymor Lipschutz and , Marc Lipson : Schaum's Outline of Discrete Mathematics (Schaum's)
2. Rosen, K. H. : Discrete Mathematics and its Applications
3. Koleman & Busby : Discrete Mathematical Structures for Computer Science
4. Trembley & Manohar : Discrete Mathematical Structures with Applications to Computer Science

CIT 211 Data Structure and Algorithms

3 Hrs. per week 3 Credits

Introduction: Basic Terminology, Elementary Data Organization, Data Structures, Algorithms, and Complexity of Algorithms, elementary data structures, arrays.

Stacks, Queues and Recursion: Fundamentals, Different types of stacks and queues: Circular, dequeues etc.; evaluation of expressions, multiple stacks and queues; Recursion: Direct and indirect recursion, depth of recursion; Simulation of Recursion: Removal of Recursion; Towers of Hanoi.

Elements of Graphs and Trees: Graph Terminology, Paths and Circuits, Connectedness, Matrix Representation of Graph and Isomorphism of graphs. Trees, Rooted trees, Path Lengths in Rooted Trees.

Linked Lists: Single linked lists, Linked stacks and queues, the storage pool, polynomial addition, equivalence relations, sparse matrices, doubly linked lists and dynamic storage management, generalized lists, garbage collection and compaction.

Extended binary trees: 2-trees, internal and external path lengths, Huffman codes/algorithm; Threaded binary trees, binary tree representation of trees; Application of Trees: Set representation, decision trees, game trees; Counting binary trees.

Sorting: Searching, bubble sort, shell sort, insertion sort, selection sort, quick sort, heap sort, 2-way merge sort, sorting on several keys, practical considerations of internal sorting. searching, hash techniques.

Algorithms: Techniques for analysis of algorithms; Algorithmic Techniques: divide-and-conquer, greedy method, dynamic programming, backtracking, branch and bound; Flow algorithms. Topological sorting; Connected components; spanning trees; Shortest paths; Algebraic simplification and transformations; Lower bound theory; NP-completeness; NP-hard and NP-complete problems; Approximation Algorithms; Introduction to parallel algorithms.

Recommended Books:

1. S. Lipschutz : " Theory and Problem of Data Stuctures"
2. E. Horowitz : "Data Structure"
3. D. E. Knuth :"The Art of Computer Programming, Vol. 1, Fundamental Algorithms"
4. D. E. Knuth :"The Art of Computer Programming, Vol. 2, Seminumerical Algorithms"
5. D. E. Knuth :"The Art of Computer Programming, Vol. 3, Sorting and Searching"
6. Goodman : "Introduction to Design and Analysis of Algorithms"
7. Robert Sedgewick :"Algorithms"
8. Ellis Horowitz & Sartaj Sahni : "Fundamentals of Computer Algorithms"

CIT 212 Data Structure and Algorithms Sessional
3 Hrs. per week 1.5 Credits

Sessional works based on **CIT 211**

CIT 213 Software Engineering
3 Hrs. per week 3 Credits

Concepts of software engineering: Overview, definition, requirement, specification, design, language issues, programming practice, testing and debugging, documentation, prototyping, life-cycle models, S/W process models, Large and integrated software, Problem of software modification and maintenance.
Program design tools and techniques: Top-down and bottom-up design, Design representation, structured programming, data directed design techniques, Modular design, Object oriented software engineering, Approaches to programming. Implementation language, Software tools.
Complexity, Storage and processing time analysis: Complexity measures, memory requirements, processing time.
Program testing: Statistics on testing process, Test philosophy and type, different test methods, Comparing different test methods, classification of tests.
Software reliability: Reliability theory, Concept of software repair and availability, Software errors and faults, Estimating number of bugs in a program, reliability models, availability models, Data collection, storage and retrieval.
Management technique: Requirements, specifications and initial design, performance, reliability and quality measures, management and communication skills, Software project Organization, Cost estimation, managing and development process, software maintenance, Computer Aided Software Engineering (CASE) tools, The design and implementation of large, multi-module program systems.

Recommended Books:
1. Reifer :"Software Management 5/e"
2. Thayer :"Software Engineering Project Management 2/e"
3. Wilson :"Software Architecture: Prospective on an Emerging Discipline"
4. Ohezzi, M. Jazayeri and D. Mandrioli :"Fundamentals of Software Engineering"
5. R.S. Pressman :"Software Engineering: A Practitioners Approach, 3rd Ed."
6. R. Wirfs-Brock et.al. :"Designing Object-oriented Software"

CIT 220 Web Programming Project
3 Hrs. per week 1.50 Credits

Internet and World Wide Web application, HTML,CSS, SGML, XML, CGI Programming, JQuery, Java Script, VB Script, Joomla , PHP & MySQL, Codeigniter PHP.

CIT 221 Information System Analysis and Design
3 Hrs. per week 3 Credits

Application Development Policy and Strategies: Planning of Information System, Policy in Information System Development, Strategies for Achieving Information System Goals. Application System Development Life Cycle: Phases in Application System Development, Inter-Relationship Among Each Phase. Feasibility Assessment: Problems and Needs in Information System Development, Preliminary Application Requirements Determination, Feasibility Assessment: Economic, Technical, Operational and Schedule Feasibility

Information Requirements Determination: Strategies for Obtaining Information Requirements, Techniques for Information Requirements Determination, Methods for Providing Assurance that Requirements are Correct and Complete. Structured Systems Analysis: Steps in Structured Systems Analysis, Activity Diagrams and Related Documentation, Data Dictionary, Problem Analysis, Structured Walk Through. Systems Design Methodology: Check List Methodology, Process-Oriented Methodology, Application Generator, Structured Design. Program Development and Testing: Structured Programming, Method for Testing.

Recommended Books:
1. Whitten :"System Analysis and Design Method"
2. D. V. Steward :"Software Engineering with System Analysis and Design"
3. R. F. Thuiraf :"System Analysis and Design "

CIT 222 Information System Analysis and Design Sessional
3 Hrs. per week 1.50 Credits

Sessional works based on **CIT 221**

CIT 224 Computer Programming Contest-II
0.0 Credit

CIT 311 Microprocessors and Assembly Language
3 Hrs. per week 3 Credits

Machine and assembly language programming, Introduction to different types of microprocessors, Architecture, Instruction Format, Instruction Sets, Opcode, Processor status and Flag registers, Addressing modes, Branching and Looping, Interrupt structures, I/O operation, I/O interfacing, Assembly language program writing, Debugging and execution. Programming in Microcomputers, Subroutine and reentrant programs.

Hardware and Software Interfacing in Microcomputer System Design, I/O Design and Total System Design, Microprocessor based system design: Hardware design, Building, Debugging,

Testing and Linking program modules, Programming EPROM. Multiprocessor configurations: coprocessor configurations, Numeric data processor, I/O processors, Advanced Microprogramming: Bit-Slice Microprocessor.

Microcontroller : Intel 8031/8051 Architecture, Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing, Introduction to 16 bit Microcontroller.

Recommended Books:

1. D. V. Hall : "Microprocessors and Interfacing : Hardware and Software"
2. Gibson & Cheu : "Microprocessors and System Design"
3. Md. Rafiquzzaman : "Microprocessor based Design"
4. Scanlon :" Assembly Language Programming"
5. Miller :" Assembly Language Programming Technique in IBM PC"

CIT 312 Microprocessors and Assembly Language Sessional

3 Hrs. per week 1.5 Credit

Sessional works based on **CIT 311**

CIT 313 Computer Organization and Architecture

3 Hrs. per week 3 Credits

Introduction to Computer Hardware and Software. Interrupts, Computer peripherals, DMA, Memory Organization, cache coherence, Cache coherence protocols, Von Neuman SISD organization. RISC and CISC Machines.

Pipelined processor design: pipelining, super-pipelines, advanced pipelines, static and dynamic scheduling, Cache memory, Memory system design, Concurrent processors, Vector processors and multiprocessors, Array processors.

Parallelism in multiprocessors and Multicomputer, Compute-intensive processors and Multicomputers, Automatic Vectorization, Hypercube systems and Key application, Data flow computation.

Recommended Books:

1. V. C. Hamacher, Z. G. Vranesic and S. G. Zaky : Computer Organization
2. Whang : Computer Architecture
3. Raman : Parallel Processing
4. M. J. Quin : Parallel Processing
5. Patterson & Hannesey : Computer Architecture – Quantative
6. J. P. Hayes :Computer Architecture and Organization
7. M. M. Mano : Computer System Architecture
8. Patterson & Hannesey : Computer Architecture – Quantative Approach

CIT 315 Artificial Intelligence
3 Hrs. per week 3 Credits

Introduction: Introduction to AI and intelligent agents.
Problem Solving: Solving Problems by Searching, Search Strategies, Heuristic search techniques, Game Playing.
Knowledge and Reasoning: Building a Knowledge Base Agent, Propositional logic, First order logic, Inference in First order Logic.
Logic Programming: Logic programming using PROLOG, LISP.
Logical Action: Planning, partial order planning, Knowledge Engineering for Planning, Conditional Planning, A Replanning Agent.
Uncertain Knowledge and Reasoning: Uncertainty, Probabilistic Reasoning Systems, Fuzzy Logic, Making Simple Decisions.
Knowledge Acquisition: Overview of different forms of learning, Learning Decision Trees, Neural Networks, Genatic Algorithms, Intelligent Editors, Introduction to Natural Language Processing.
Selected topics in AI: Expert consultation, Development of Expert Systems, Pattern recognition, Computer vision, Robotics.

Books recommended:

1. Stuart Russell and Peter Norvig : "Artificial Intelligence: A Modern Approach"
2. D.W Patterson :"Introduction to Artificial Intelligence and Expert Systems"
3. Rich, E. et al : "Artificial Intelligence"
4. Herbert Schildt :"Advanced Turbo PROLOG"
5. Guy L. Steele Jr. :"Common LISP Language"
6. Townsend : “Introduction to Turbo Prolog”

CIT 316 Artificial Intelligence Sessional
3 Hrs. in every alternate week 0.75 Credit.

Sessional works based on **CIT 315**

CIT 320 Software Development Project-II
3 Hrs. per week 1.5 Credit.

Students will develop structured Programs/Projects with proper documentation in high level languages as assigned by teachers **on the basis of J2SE, Java Swing and Database.**

CIT 321 Operating System
3 Hrs. per week 3 Credits

Introduction. Process management: process synchronization and mutual exclusion, two process solution and Dekker's algorithm, semaphores, examples (producer-consumer, readers-writer, dining philosophers, etc.).
CPU scheduling: multiprogramming and time sharing, scheduling approaches (SJF, FIFO, round robin, etc.).
Input/Output: device controllers and device drivers, disks, other devices.
Memory management: with and without swapping, virtual memory - paging and segmentation, page replacement algorithms, implementation.
File systems: FS services, disk space management, directory and data structure.

Deadlocks: modeling, detection and recovery, prevention and avoidance.
Example Systems: Unix, MSDOS.

Books recommended:

1. J. Peterson, A. Silberschatz, and P. Galvin.Operating System Concepts, Addison Wesley, 3rd Edition, 1989.
2. M. J. Bach.Design of the Unix Operating System, Prentice Hall of India, 1986.
3. A. Silberschatz and P. Galvin.Operating System Concepts, Addison Wesley, 4th Edition, 1994.

CIT 322 Operating System Sessional
3 Hrs. per week 1.50 Credit.

Sessional works based on **CIT 321**

CIT 323 Simulation and Modeling
3 Hrs. per week 3 Credits

Simulation methods: Model building, random number generator, statistical analysis of results, validation and verification techniques. Digital simulation of continuous systems. Simulation and analytical methods for analysis of computer systems and practical problems in business and practice. Introduction to the simulation packages.

Modeling Methods: Introduction to modeling, additive and subtractive modeling; Different methods for Curves and Surfaces modeling, Solid modeling: Representing Solid, Polyhedral modeling with Euler's Formula, Non-polyhedral modeling, Advanced modeling: Procedural models, Factual models, Physically based modeling.

Recommended Books:

1. Byron J. T. Morgan : Elements of Simulation
2. Law, Keltan : Simulation Modeling and Analysis
3. D.S.Hira : System Simulation
4. Geoferry Goedon : System Simulation

CIT 324 Simulation and Modeling Sessional
3 Hrs. per week 1.50 Credit.

Sessional works based on **CIT 323**.

CIT 411 Compiler Design and Automata Theory
3 Hrs. per week 3 Credits

Automata: Finite automata and regular languages, pushdown automata and context-free languages; Turing machines and recursively enumerable sets; linear-bounded automata and context sensitive languages; computability and the halting problem;
Introduction: Phases of a compiler (lexical analyzer, syntax analyzer, semantic analyzer, intermediate code generator, code optimizer, code generator, symbol-table manager & error handler).
Lexical analysis: role, from regular expression to NFA, from NFA to DFA, design of a lexical analyzer generator using LEX.

Syntax analysis: role, CFG, writing a grammar, top-down parsing, bottom-up parsing, operator precedence parsing, LR parser, using ambiguous grammar, parser generators (YACC).
Symbol table, structure and management.
Intermediate code generation: intermediate languages, declarations, assignment statement, Boolean expression, case statements, back patching, procedure calls.
Code generation: issues in the design of a code generator, target machine, runtime storage management, basic blocks and flow graphs, register allocation and assignment, dag representation of basic blocks, peephole optimizations, generating code from dags.
Code optimization: principle of source optimization, optimization of basic blocks, loop in flow graphs, global data flow analysis, iterative solution of data flow equations.

Books recommended:

1. Hopcroft and Ullman : Introduction to Automata Theory, Languages and Computation
2. Adamek : Automata and Algebra
3. Aho and Ullman : Principles of Compiler Design
4. Lewis and Stern : Compiler Design Theory

CIT 412 Compiler Design and Automata Theory Sessional
3Hrs. in every alternate week 1.0 Credit.

Sessional works based on **CIT 411**

CIT 421 Digital Signal Processing
3 Hrs. per week 3 Credits

Discrete time description of signals and systems, Fourier transform of discrete time signals, Discrete Fourier transform.

Z-transform, Digital filter structure, Infinite Impulse Response Filter design techniques, Finite Impulse Response Filter design techniques, Finite precision effects, Inverse filtering.

Recommended Books:
1. A. V. Oppenheim & R. W. Schafe : "Digital Signal Processing"
2. A. V. Oppenheim & R. W. Schafe : "Digital Time Signal Processing"

CIT 422 Digital Signal Processing Sessional
3 Hrs. in every alternate week 0.75 Credit.

Sessional works based on **CIT 421**

CIT 423 OPTIONAL: Computer Graphics and Image Processing
3 Hrs. per week 3 Credits

Introduction to Computer Graphics: Introduction, Presentation graphics, Application Areas, GUI; Graphics Hardware: Display devices Architecture and Input Devices.
Graphic Primitives: Drawing Points, Lines, Circles, Ellipse, Rectangles, Arcs; Polygons: Inside-outside tests, polygon fill algorithms, Character generation.
Two-dimensional Viewing and Clipping: Viewing pipeline, Window to view port transformation, Point, Line, Polygon, Curve and Text clipping.

Transformations of Objects: Basic transformations, Affine Transformations, Translations, Rotations, Scaling, reflection and Shearing, Composite transformations matrices, Transformation of 3D objects (4×4 matrices).
Curve design: B-spline, Bezier curves and Surfaces, Fractal Geometry.
3D Object Representation: 3D Graphics Pipeline, Projection: Different types of Parallel and Perspective Matrices; B-Rep, Constructive Solid Geometry, Hidden lines and Surface detection: Back face Detection, Painters algorithm, Z-buffering; light models.
Rendering: Constant, Goraud and Phong shading; Ray-tracing; Different Types of Color Model.

Image Processing : Introduction; Point operations; Line and Edge detection, labeling, Histograms; Spatial operations; Affine transformations; Image Segmentation, Image Representation and Modelling, Image rectification; Interpolation and other transformations; Contrast enhancement; Convolution operation, Magnification and Zooming; Fourier transform; Edge detection; Boundary extraction and representation; Mathematical morphology.

Pattern Recognition: Statistical, Structural, Neural and Hybrid Techniques, Document Analysis and Optical Character Recognition, Object Recognition, Scene Matching and Analysis.

Recommended Books:
1. R. A. Plastock & G. Kalley :"Theory and Problems of Computer Graphics"
2. Gonzaleg :"Pattern Recognition Principles"
3. Steven Harrington :"Computer Graphics : A Programming Approach"
4. Newmann Sprocell :"Principles of Interactive Computer Graphics"
5. James D. Foley, Andries VanDam, Feiner Steven K. and Hughes John F. Computer Graphics: Principle and Practice,_Addison-Wesley Publishing House.
6.Foley and VanDam._Fundamentals of Interactive Computer Graphics,_Addison- Wesley.

CIT 423 OPTIONAL: Parallel Processing and Distributed System
3 Hrs. per week 3 Credits

Parallel processing: Importance, Architecture, Hardware and software issues; Architectures for parallel processing – Classifications, Comparative study of different architectures; Hardware issues in parallel processing, Parallel Programming.

Distributed Processing: Definition, Impact of distributed processing on organizations, pitfalls in distributed processing. Forms of distributed processing: Function distribution, Hierarchical distributed systems, Horizontal distributed systems; Strategy : Strategies for distributed data processing, control of complexity, problem of incompatibility, centralization vs. decentralization, cost and benefit analysis; Design of distributed data : Distributed data, location of data, multiple copies data, conflict analysis, database management, distributed databases and applications; Software and Network Strategy : Software strategy, the ISO seven layers, architectural interfaces, physical link control, network management etc.

Recommended Books:
1. Crichlow, J. M. :"Distributed and Parallel Computing"

CIT 423 OPTIONAL : Robotics and Computer Vision
3 Hrs. per week 3 Credits

Section A:

Robotics manipulation, direct kinematics: The Arm Equation, Inverse Kinematics: Solving the arm equation, work space analysis and trajectory planning, differential motion and static, manipulator dynamics, robot control, task planning.

Section B:

Relationship between image and world structure, image representation, segmentation pattern, perspective transformation, camera calibration, shape analysis, object recognition and picture languages.

Recommended Books:
1. Robert J Schillin :"Fundamentals of Robotics: Analysis and Control"

Dept. of Computer and Communication Engineering
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Course Content
Effective from Session: 2011-12

CCE 114 Engineering Drawing 0.75

Course Content: Introduction, Scale drawing, Sectional views, Isometric views. Missing line, Auxiliary view, Detail and assembly drawing. Project on Engineering Drawing and CAD using contemporary packages.

Reference Books:
1. Wiley : Mastering AutoCAD 2008 and AutoCAD LT 2008.
2. M. Groover and E. Zimmers : Computer Aided Design and manufacturing.
3. S. Narayanan: CAD/CAM Robotics and Factories of the Future.
4. Tien Chien Chang: Computer Aided Manufacturing.
5. www.blender.org [To perform blender based project in the light of engineering drawing]

CCE 121 Object Oriented Programming 3.00

Course Content: Philosophy of Object Oriented Programming (OOP); Advantages of OOP over structured programming; Concepts of classes and objects, Encapsulation, access specifies, static and non-static members, JAVA applications; event handling; control structures; Methods; Overloaded Methods; Constructors, destructors ; Single Multi-Dimension Arrays; Object Based Programming Object oriented Programming interface; Inheritance: single and multiple inheritance; Polymorphism: overloading, abstract classes, virtual functions and overriding; Exceptions; interface and abstract classes; String manipulation; Introduction to graphical user interface; handling mouse and keyboard events; Exception Handling; Multi-Threading; Client Server programming.

Reference Books:
1. Java™ How to Program, Latest Edition **by** H. M. Deitel - Deitel & Associates, Inc., P. J. Deitel - Deitel & Associates, Inc
2. Liang, Y. D. (2005), Introduction to Java Programming, Comprehensive: International Edition, 5/E, Prentice Hall. ISBN 0-13-185721

Additional Useful Texts

Barnes, D. & Kolling, M. 2005, Objects First with Java: A Practical Introduction using BlueJ, 2nd edn, Pearson.

Farrell, J. 2005, Programming Logic and Design, Comprehensive, 3rd edn, Thomson.

Malik, D. & Nair, P. 2003, Java Programming: From Problem Analysis to Program Design, Thomson.

Robertson, L. 2003, Simple Program Design: A Step-by-Step Approach, 4th edn, Thomson.

Russell, J. 2001, Java Programming for the Absolute Beginner, Premier Press. Shelly, G., Cashman, T., Starks, J. & Mick, M. 2004, Java Programming Comprehensive Concepts and Techniques, Thomson.

Sun Java technology: http://java.sun.com/

Borland JBuilder: http://www.borland.com/jbuilder

Web page for the prescribed text:
http://www.cs.armstrong.edu/liang/intro5e/intro5estudentsolution.html

CCE 122 **Object Oriented Programming Sessional** **1.50**

Course Content: Laboratory works will be based on CCE 121.

CCE 124 **Computer Programming Contest-I** **0.00**

Course Content:
Contest Arranged by: Computer Society
Total Question: Maximum Five problems
Time to solve: Maximum 5 Hours
Problem Setter: CSE Faculty members and or other universities faculty members
Judgment: Auto Judgment by PC^2 software or Manual Judgment by Teachers
Price giving ceremony: Certificate and Prizes for First, Second and Third Position
Supervision and Evaluation: Total supervision by CCE Dept teachers.

CCE 211 **Data Communication and Engineering** **3.00**

Course Content:

Introduction: Communication model, data communication tasks, data communication network standards and organizations. Protocol architecture, communications between layers, peer to peer communication between remote layers, service access points, service primitives and communication between adjacent layers, encapsulation of PDUs, addition of headers on transmission; removal on reception, segmentation & reassembly by protocol layers. **Physical Layer:** Analog and digital data transmission, spectrum and bandwidth, transmission impairments, data rate and channel capacity. **Transmission Medium:** Characteristics and applications of various types of guided medium. **Wireless Transmission:** Characteristics and applications of wireless transmission-terrestrial and satellite microwave, radio waves, propagation mechanism, free space propagation, land propagation, path loss, slow fading, fast fading, delay spread, inter symbol interference, VSAT. **Digital transmission:** Line coding techniquesNRZ, RZ, Manchester, and differential Manchester encoding, AMI, Block coding, analog to digital conversion based on PCM, delta modulation, etc. **Analog transmission:** ASK, FSK, PSK, QPSK, QAM encodings, AM, PM, FM, etc. **Data Transmission:** Synchronous and asynchronous data transmission techniques. **Multiplexing:** FDM, international FDM carrier standards, synchronous TDM, international TDM carrier standards, statistical time division multiplexing. **Spread Spectrum:** Frequency hopping spread spectrum, direct sequence spread spectrum, code division multiple access. **Data Link Layer:** Error Detection and Correction; parity check, CRC, forward error correction technique, linear block code, hamming code, etc. **Data Link Control:** Line configurations, flow control and error control techniques- sliding window, stop and wait ARQ, selective reject ARQ and HDLC protocols.

Reference Books:
1. William Stallings : Data and Computer Communication.
2. Hajkins : Data Communication.
3. Taub : Data Communication .
4. Behrouz A.Forouzan : Data Communications and networking.

CCE 221 **Digital Logic Design** **3.00**

Course Content: Number systems and codes, Digital logic: Boolean algebra, De-Morgan's law, Logic gates and their truth tables, canonical forms, combinational logic circuits, minimization

techniques, Arithmetic and data handling logic circuit, decoders and encoders, Multiplexers and Demultiplexers, Combinational Circuit design, Flip-flops, race around problems, Counters: Asynchronous and Synchronous counters and their applications. Synchronous and asynchronous logic design: state diagram, Mealy and Moore machine, State minimization and assignments. Pulse mode logic, Fundamental mode logic design.

Reference Books
1. M. Morris Mano : Digital logic and Computer Design.
2. Tocci : Digital System Analysis.

CCE 222 **Digital Logic Design Sessional** **1.50**

Course Content
Laboratory works will be based on CCE 221.

CCE 223 **Database System** **3.00**

Course Content
Database Concepts: Files and Databases, Database Management systems, Data models, Relational Data Model: Relations, Domains, Attributes and Tuple, Anomalies, Functional Dependency, First, Second and third normal forms, Boyce-Codd Normal form
Relational Calculus Based Languages: SQL, Relational algebra and Set operations.

Relational Database Design: Relational design criteria, Lossless decomposition, decomposition algorithms, synthesis algorithms.
Advance Database Concepts: Fourth and fifth normal forms, Object-oriented databases. Entity-Relationship (ER) approach: The ER model and its constructs, ER modeling in logical database design. Transformation of the ER model to SQL, Distributed database design.
Optimization and evaluation of relational queries: conjunctive query optimization, optimization of queries involving union and difference operators, algorithms for performing joins.

Reference Books
As per course teachers recommendations

CCE 224 **Database System Sessional** **1.50**

Course Content
Laboratory works will be based on CCE 223.

CCE 310 **Software Development Project-I** **1.50**

Course Content
Project based on Programming Language C/C++ or VC or C#

CCE 311 **Numerical Methods** **3.00**

Course Content
Introduction,
Solution of algebraic and transcendental equations: Method of iteration, False position method, Newton-Rhapson method,
Solution of simultaneous linear equations: Cramer's rule, Iteration method, Gauss-Jordan Elimination method, Choleski's process,
Interpolation: Diagonal and horizontal differences, Differences of a polynomial, Newton's formula for forward and backward interpolation, Spline interpolation,

Integration: General quadrature formula, Trapezoidal rule, Simpson's rule, Weddle's

rule,
Solution of ordinary differential equations: Euler's method, Picard's method, Milne's method, Taylor's series method, Runge-Kutta method.

Least squares approximation of functions: Linear and polynomial regression, Fitting exponential and trigonometric functions.

Reference Books: As per course teachers recommendations

CCE 312 **Numerical Methods Sessional** **0.75**

Course Content: Laboratory works will be based on CCE 311.

CCE 313 **Computer Networks** **3.00**

Course Content: Introduction: network applications, network hardware, network software, reference models, example networks

The physical layer: the theoretical basis for data communication, guided transmission media, wireless transmission, communication satellites, the public switched telephone network, the mobile telephone system, cable television

The data link layer: data link layer design issues, error detection and correction, elementary data link protocols, sliding window protocols, protocol verification, example data link protocols

The medium access sublayer: the channel allocation problem, multiple access protocols, Ethernet, wireless LAN, broadband wireless, Bluetooth, data link layer switching
The network layer: network layer design issues, routing algorithms, , congestion control algorithms, quality of service, internetworking, the network layer in the internet

The transport layer: the transport service, elements of transport protocols, a simple transport protocol, the internet transport protocols: UDP, the internet transport protocols: TCP

The application layer: DNS--domain name system, electronic mail, the world wide web, multimedia

Spread spectrum, circuit switching and packet switching, asynchronous transfer mode(ATM), local area network overview, high-speed LAN

Reference Books:
1. Computer Networks: Andrew S. Tanenbaum
2. Data and Computer Communications: William Stallings

CCE 314 **Computer Networks Sessional** **1.50**

Course Content: Laboratory works will be based on CCE 313.

CCE 320 **Computer Programming Contest-III** **0.00**

Course Content: Contest Arranged by: Computer Society
Total Question: Maximum Five problems
Time to solve: Maximum 5 Hours
Problem Setter: CSE Faculty members and or other universities faculty members
Judgment: Auto Judgment by PC^2 software or Manual Judgment by Teachers
Price giving ceremony: Certificate and Prizes for First, Second and Third Position
Supervision and Evaluation: Total supervision by CCE Dept teachers.

CCE 321 **Computer Peripheral and Interfacing** **3.00**

Course Content: Design and operation of interface between computer and the outside world, Sensors, transducers ad signal conditioning circuits, interfacing memory and I/O devices-such as monitors, printers, disc drives, optical displays, some special purpose interface cards, stepper motors and peripheral devices. IEEE-488, RS-232 and other buses, Study and applications of peripheral chips including 8212, 8155, 8255, 8251

Reference Books: Jyoti Snehi: Computer Peripherals and Interfacing
Amit Karma: Computer Peripherals and Interfacing

CCE 322 **Computer Peripheral and Interfacing Sessional** **1.50**

Course Content: Laboratory works will be based on CCE 321.

CCE 411 **Algorithm Engineering** **3.00**

Course Content: Computational complexity, Parameterized complexity, Algorithms for combinatorial optimization, practical computing and heuristics, Approximation algorithms, LP based approximation algorithms, randomized algorithms, Experimental algorithmic, Algorithms in state-of-the-art fields like Bioinformatics, Grid Computing, VLSI design etc.

Reference Books: 1. Thomas H. Cormen: Introduction to Algorithms
2. Ellis Horowitz & Sartaj Sahni : Fundamentals of Computer Algorithms

CCE 413 **VLSI Design** **3.00**

Course Content: VLSI design methodology: top-down design approach, technology trends and design automation algorithms; Introduction to CMOS inverters and basic gates; Brief overview of CMOS fabrication process: layout and design rules; Basic CMOS circuit characteristics and performance estimation; Buffer circuit design; Complex CMOS gates, CMOS building blocks: adder, multiplier; data path and memory structures

Hardware modeling: hardware modeling languages, logic networks, state diagrams, data-flow and sequencing graphs, behavioral optimization.
Architectural Synthesis: circuit specification, strategies for architectural optimization, data-path synthesis, control unit synthesis and synthesis of pipelined circuits. ASIC design using FPGA and PLDs.

Reference Books: As per course teachers recommendations

CCE 415 **Network Routing and Switching** **3.00**

Operation of Data Networks: Purpose and functions of network devices , OSI and TCP/IP models , Common networking applications , Impact of voice and video on a network

Implementing a small switched network: Layer 2 LAN technologies, Network segmentation and traffic management , Basic switch and operation of Cisco switches, Implement basic switch security
Implementing an IP addressing scheme: Assignment of valid IP addresses in a network, Introduction to NAT, Introduction to DNS , Private & Public addressing , Using Cisco SDM for DHCP and DNS
Routing: WANs and Routers, Introduction to Routers, Configuring a Router, Learning About Other Devices, Managing Cisco IOS Software, Routing and Routing Protocols, Distance Vector Routing Protocols. TCP/IP Suite Error and Control Messages ,Basic Router Troubleshooting, Intermediate TCP/IP
Access Control Lists ,Case Study – Router Case Study

CCE 415 **Network Routing and Switching Sessional** **1.50**

Course Content: Laboratory works will be based on CCE 415.

CCE 417 **Data Warehousing and Mining** **3.00**

Course Content: Motivation, importance, Data type for Data Mining : relation Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major
Data Warehouse and OLAP Technology for Data Mining: Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.
Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization.
Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from Frequent items, Improving the efficiency of Apriory, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint-Based Association Mining.
Classification & Prediction and Cluster Analysis: Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, and Applications & Trends in Data Mining: Data Mining Applications, currently available tools.

Reference Books:

1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Pub.
2. Berson “Dataware housing, Data Mining & DLAP, @004, TMH.
3. W.H. Inmon “ Building the Datawarehouse, 3ed, Wiley India.
4. Anahory, “Data Warehousing in Real World”, Pearson Education.
5. Adriaans, “Data Mining”, Pearson Education.
6. S.K. Pujari, “Data Mining Techniques”, University Press, Hyderabad.

CCE 421 **Cryptography and Network Security** **3.00**

Course: Introduction: The OSI Security Architecture, Security Attacks, Security Services,

Content

Security Mechanisms, A Model for Internetwork Security, Internet Standards the Internet Society

Symmetric Encryption and Message Confidentiality: Symmetric Encryption Principles, Symmetric Encryption Algorithms, Cipher Block Modes of Operation, Location of Encryption Devices, Key Distribution

Public-Key Cryptography and Message Authentication: Approaches to Message Authentication, Secure Hash Functions and HMAC, Public Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management

Authentication Applications: Kerberos, X.509 Directory Authentication Service
, Public Key Infrastructure

Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME

IP Security: IP Security Overview, IP Security Architecture, Authentication, Header, Encapsulating Security Payload, Combining Security Associations, Key Management.

Web Security: Web Security Requirements, Secure Sockets Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Network Management Security: Basic Concepts of SNMP, SNMPv1 Community Facility
, SNMPv3

INTRUDERS: Intruders, Intrusion Detection, Password Management

Reference Books

1. William Stallings: Network security essentials : applications and standards

CCE 423 **Wireless and Cellular Communication** **3.00**

Course Content

Wireless Network concepts: frequency reuse, handoff strategies, interference and system capacity, grade of service, improving capacity and coverage;

Wireless LAN Technology;

IEEE 802.11: standard, protocol architecture, physical layer and media access control; Mobile IP; Wireless Application Protocol; IEEE 802.16 Broadband Wireless Access;

Modern Wireless Communication Systems: Second generation (2G) Cellular networks, third generation (3D) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks (WLANs), Bluetooth Personal area networks (PANs).

The cellular Concept-System Design Fundamentals: Introduction, frequency reuse, channel assignment, strategies, handoff strategies, interference and system capacity, trunking and grade of service, improving coverage and capacity in cellular systems.

Mobile Radio Propagation - Large scale path loss: Introduction to radio wave propagation, free space propagation model, relating power to electric field, basic propagation mechanisms, reflection, ground reflection, diffraction, scattering, outdoor and indoor propagation models.

Mobile Radio Propagation - Small scale Fading and Multi-path: Small scale multi-path propagation, Impulse response model of a multi-path channel, small-scale multi-path measurements, parameters of mobile multi-path channels, types of small scale fading, Rayleigh and Ricean distributions, statistical models for multi path fading channels, theory of multi-path shape factors for small scale fading wireless channels.

Modulation techniques for mobile radio: Frequency modulation, amplitude modulation, angle modulation, digital modulation, line coding, pulse shaping techniques, geometric representation of modulation signals, linear modulation techniques.

Equalization, Diversity and Channel Coding: Introduction, fundamentals of

	equalization, linear inequalities, nonlinear equalization, algorithms for adaptive equalization, diversity techniques, interleaving, fundamentals of channel coding.
Reference Books	As per course teachers recommendations

EEE 111 Basic Electrical Engineering

3 Hrs. per week 3 Credits

Fundamental electric concepts and measuring units, D.C. voltage, Current, Resistance and power, Laws of electrical circuits and methods of network analysis, Principles of D.C. measuring apparatus, Laws of magnetic fields and methods of solving simple magnetic circuits.

Electromagnetism : Magnetic fields, Maxwell's equations. Ampere's law, Faraday's law, Lenz's law, Inductance - Self and mutual inductance. Magnetic Properties of matter : Magneto-motive force, Magnetic field intensity, Permeability and susceptibility, Classification of magnetic material, Magnetization curves of Ferromagnetic materials, Magnetic circuits, Magnetostriction.

Alternating current - instantaneous and r.m.s. current, Voltage and power, Average power for various combinations of R,L and C circuits, Phasor representation of sinusoidal quantities. Single phase AC circuit analysis.

Recommended Books:

1. B.L. Theraja : A text book of Electrical Technology, Volume: I
2. V.K. Mehta : Principles of Electrical Engineering and Electronics
3. G.F. Corcoran : Alternating Current Circuits

EEE 112 Basic Electrical Engineering Sessional

3 Hrs. per week 1.50 Credit.

Laboratory works based on **EEE 111.**

EEE 121 Electronic Devices and Circuits

3 Hrs. per week 3 Credits

Introduction to semiconductors, p-type and n-type semiconductors; p-n junction diode characteristics; Diode applications: half and full wave rectifiers, clipping and clamping circuits, regulated power supply using zener diode.

Bipolar Junction Transistor (BJT): principle of operation, I-V characteristics; Transistor circuit configurations (CE, CB, CC), BJT biasing, load lines; BJTs at low frequencies; Hybrid model, h parameters, simplified hybrid model; Small-signal analysis of single and multi-stage amplifiers, frequency response of BJT amplifier.

Field Effect Transistors (FET): principle of operation of JFET and MOSFET; Depletion and enhancement type NMOS and PMOS; biasing of FETs; Low and high frequency models of FETs, Switching circuits using FETs; Introduction to CMOS. Operational Amplifiers (OPAMP):

linear applications of OPAMPs, gain, input and output impedances, active filters, frequency response and noise.

Introduction to feedback, Oscillators, Silicon Controlled Rectifiers (SCR), TRIAC, DIAC and UJT: characteristics and applications; Introduction to IC fabrication processes.

Recommended Books:

1. V.K. Mehta : Principles of Electronics
2. R.L. Boylestad : Electronic Devices and Circuit Theory
3. Millman & Halkias: Electronic Devices and Circuits

EEE 122 Electronic Devices and Circuits Sessional

3 Hrs. per week 1.50 Credit.

Laboratory works based on **EEE 121.**

EEE 211 Electrical Technology

3 Hrs. per week 3 Credits

Introduction to three phase circuits, alternators and transformers; Principles of operation of DC, synchronous, induction, universal, and stepper motors; DC Generator, Thyristor and microprocessor based speed control of motors.

Instrumentation amplifiers: differential, logarithmic and chopper amplifiers; Frequency and voltage measurements using digital techniques; Recorders and display devices, spectrum analyzers and logic analyzers; Data acquisition and interfacing to microprocessor based systems; Transducers: terminology, types, principles and application of photovoltaic, piezoelectric, thermoelectric, variable reactance and opto-electronic transducers; Noise reduction in instrumentation.

Recommended Books:

1. B.L. Theraja : A text book of Electrical Technology, Volume: II
2. Bhattacharya :Electrical Machines
3. Rosenblatt : Direct and Alternating Current Machinery
4. A.K. Sawhney : Electrical and Electronic Measurements and Instrumentation

EEE 212 Electronic Devices and Circuits Sessional

3 Hrs. per week 1.50 Credit.

Laboratory works based on **EEE 211.**

EEE 321 Digital Electronics and Pulse Techniques

3 Hrs. per week 3 Credits

Diode logic gates, transistor switches, transistor gates, MOS gates, Logic Families: TTL, ECL, IIL and CMOS logic with operation details. Propagation delay, product and noise immunity. Open collector and High impedance gates. Electronic circuits for flip-flop, counters and register, memory system, PLAs and PLDs. A/D., D/A converters with applications. S/H circuits, LED, LCD and optically coupled oscillators. Non-linear applications of OP AMPs. Analog switches.

Linear wave shaping : diode wave shaping techniques, clipping and clamping circuits. Comparator circuits, switching circuits. Pulse transformers, pulse transmission. Pulse generator; monostable, bistable and astable multivibrators; Schmitt trigger; Blocking oscillators and time-base circuit. Timing circuits. Simple voltage sweeps, linear current sweeps.

Recommended Books:

1. R.P. Jain : Modern Digital Electronics
2. J. Millman :Pulse, Digital and Switching Waveforms

EEE 322 Digital Electronics and Pulse Techniques Sessional

3 Hrs. in every alternate Week 0.75 Credit.

Laboratory works based on **EEE 321.**

Department of Mathematics
Faculty of CSE
Patuakhali Science and Technology University

Course Content
Effective from Session: 2011-12

MAT 111 **Mathematics-I** **3.00**

Course Content

Differential Calculus:

Limit, continuity and differentiability, successive differentiation of various types of functions, Leibnitz's rule, Taylor's theorem in finite and infinite forms. Maclaurin's theorem in finite and infinite forms. Lagrange's form of remainders. Expansion of functions. Evaluation of limit of indeterminate forms by L' Hospital's rule. Partial differentiation, Euler's theorem. Equations of Tangent and normal. Determination of maximum and minimum values of functions and points of inflexion. Applications, curvature, radius of curvature and center of curvature.

Matrix:

Definition of Matrix, equality of two matrices. Addition, Subtraction and Multiplication of Matrices. Transpose of matrices, Inverse of matrix and Rank of matrices. Characteristic equation and roots of a matrix. Caylay-Hamilton theorem.

Co-ordinate Geometry :

Change of axes, transformation of co-ordinates and simplification of equations of curves. Pair of straight lines, conditions under which general equations of the second degree may represent a pair of straight lines. Homogeneous equations of second degree. Angle between the pair of lines. Pair of lines joining the origin to the point of intersection of two curves. Standard equations of circle, parabola, ellipse and hyperbola with explanations.

Conic together with its Cartesian and po1ar equations. Discussions of the general equation of second degree in x and y for for representing a conic. Representation of a point in a space. Rectangular Cartesian co-ordinates. Distance and Division formulae. Direction cosines and direction ratios of a line. Angle between two lines. Projection of a segment. Projection of the joint of two points on a line. The equation of a plane, its normal form and intercept form. Angle between two planes. The equation of a line in symmetrical form. Equations of sphere, paraboloid and ellipsoid.

Reference Books

1. S.P. Gordon : Calculus and the Computer.
2. L.I. Holder : Calculus and Analytic Geometry.
3. J.F. Hurley : Calculus.
4. Willard, Stephen : Calculus and its Application.
5. J. Stewart : Calculus.
6. S.L. Loney : Analytical Co-ordinate Geometry.
7. M. L. Khanna : Theory of Matrices
8. P. N. Chatterjee : Theory of Matrices

MAT 121 **Mathematics-II** **3.00**

Course Content

Complex Variable:

Complex number system. General functions of a complex variable. Limits and continuity of a functions of a complex variable and related theorems. Complex differentiation and the Cauchy-Riemann equations. Mapping by elementary functions. Line integral of a complex function. Cauchy's integral theorem, Cauchy's

integral formula, Liouville's theorem. Taylor's and Laurent's theorems. Singular points. Residue, Cauchy's residue theorem Evaluating of residues,contour integration, conformal mapping.

Laplace Transform :

Definition, Laplace transformation of some elementary functions. Sufficient conditions for existence of Laplace transforms. Inverse Laplace transforms of derivatives. The unit step function. Periodic Function's. Some special theorems on Laplace transforms. Partial fraction. Solutions of differential equations by Laplace transforms. Evaluation of improper integrals.

Difference Equations:

The z-transforms; Application of the z-transforms to the solution of linear difference equations.

Reference Books

1. E. T. Capson : An Introduction to the theory of Function of a Complex Variable.
2. V. Churchill : Complex Variable.
3. Charchill : Fourier Series and Boundary Value Problems.
4. M.R. Spiegel : Laplace Transform.
5. Goyal and Gupta : Functions of Complex variaable

MAT 211 Mathematics-III 3.00

Course Content

Probability:

Probability theory, discrete and continuous probability distributions, sampling theory and estimation, test of hypothesis, regression and correlation analysis, analysis of variance, decision making using probabilities, decision trees, application of game theory.

Statistics:

Introduction and introductory concepts, Variable and Frequency distribution. Central tendency & its measures, Dispersion & its measures, nature and shape of frequency distribution, Probability and Probability Theory, Regression and correlation, Sampling and sample survey, Test of hypothesis.

Reference Books

1. Murray R. Spiegel : Statistics
2. Ahmed and Bhuiya : Methods of Statistics
3. Shil and Debnath : An Introduction to Theory of Statistics
4. Md. Abu Yusuf : Mathematical Method and tensor Analysis

MAT 221 Mathematics-IV 3.00

Course Content

Fourier Series:

Definition, Fourier Co-efficient, half-range Fourier Series, Fourier series in different intervals.

Fourier Series, convergence of Fourier Series, Fourier Analysis, Fourier integral. Z-Transformation and its application. Application of Laplace Transforms and Fourier series in Circuits.

Fourier Transform:

The finite fourier sin and cosine transform. Inverse finite Fourier sin and cosine transform.Fourier Transform, Inverse Fourier transform. Fourier sin and cosine transform. Inverse Fourier sin and cosine transform, Relation between Fourier transforms and Laplace Transform Convolution Theorem.

Vector Analysis:

Definition of vectors. Equality of vectors. Addition and multiplication of vectors. Linear dependence and independence of vectors. Differentiation and integration of vectors together with elementary applications. Definitions of line, surface and volume integrals. Gradient of a scalar function. Divergence and curl of a vector function. Physical significance of gradient, divergence and curl. Various formulae. Integral forms of gradient, divergence and curl. Divergence theorem. Stoke's theorem, Green's theorem and Gauss's theorem.

Reference Books

1. M. R. Spiegel : Vector Analysis
2. S. A. Sattar : Vector Analysis
3. M. L. Khanna : Vector Analysis
4. Frank Ayres : Theory of Matrices
5. Charchill : Fourier series and Boundary Value Problems.

Dept. of Agricultural Chemistry
Patuakhali Science and Technology University

Course Content
Effective from Session: 2011-12

CHE 111	**Chemistry**	**3.00**
Course Content	Atomic structure, quantum numbers, electronic configuration, periodic table. Properties and uses of noble gases. Different types of chemical bonds and their properties. Molecular structures of compounds. Selective organic reactions, Different types of solutions and their compositions. Phase rule, phase diagram of mono component system. Properties of dilute solutions. Thermo chemistry, chemical kinetics, chemical equilibrium, Ionizations of water. and pH concept. Electrical properties of solutions.	
Reference Books	As per course teacher's recommendation	
CHE 112	**Chemistry**	**0.75**
	Laboratory works will be based on CHE 112.	