

BANGABANDHU SHEIKH MUJIBUR RAHMAN SCIENCE AND TECHNOLOGY UNIVERSITY, GOPALGANJ-8100

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101010 VBScript Transact-SQL Prolog ColdFusion Fortran 01

10101 Java C/C++ C# Python Assembly JavaScript Scheme C++11 C++14 C++17 C++20

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Java by Example for Java Developers

191 Berg et al. / *Effect of Pesticides on Egg Production*

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Faculty of Engineering
Department of Computer Science and Engineering

Department of Computer Science and Engineering
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Syllabus for B.Sc. Engineering Session : 2016-2017

**BANGABANDHU SHEIKH MUJIBUR RAHMAN
SCIENCE AND TECHNOLOGY UNIVERSITY,
GOPALGANJ**



Faculty of Engineering

Department of Computer Science and Engineering

CSE

**Syllabus for B.Sc. Engineering
Session 2016-2017**

Examinations

2017[1st Year 1st Semester & 2nd Semester]

2018[2nd Year 1st Semester & 2nd Semester]

2019[3rd Year 1st Semester & 2nd Semester]

2020[4th Year 1st Semester & 2nd Semester]

Semester Wise B.Sc. Engineering Courses

First Year, First Semester

Course Code	Course Title	Contact Hours	Credits
CSE 101	Introduction to Computer Systems	39	3
CSE 102	Introduction to Computer Systems Lab	26	1
CSE 103	Structured Programming Language	39	3
CSE 104	Structured Programming Language Lab	78	3
ENG 105	Technical English Language	13	1
ENG 106	Technical English Language Lab	26	1
MAT 105	Differential Calculus and Integral Calculus	39	3
EEE 105	Electrical Circuit Analysis	26	2
EEE 106	Electrical Circuit Analysis Lab	26	1
Total			18

First Year, Second Semester

Course Code	Course Title	Contact Hours	Credits
CSE 151	Object Oriented Programming	39	3
CSE 152	Object Oriented Programming Lab	78	3
CSE 153	Discrete Computational Theory	39	3
CSE 156	Technical Writing and Presentation	26	2
MAT 155	Co-ordinate Geometry & Ordinary Differential Equation	39	3
BST 155	Bangabandhu in Science and Technology	26	2
EEE 155	Electronic Devices and Circuits	26	2
CSE 178	Project	26	1
Total			19

Second Year, First Semester

Course Code	Course Title	Contact Hours	Credits
CSE 201	Data Structure	39	3
CSE 202	Data Structure Lab	52	2
CSE 203	Digital Logic Design	39	3
CSE 204	Digital Logic Design Lab	26	1
CSE 205	Java Technology	39	3
CSE 206	Java Technology Lab	26	1
STA 205	Applied Statistics and Queuing	39	3
MAT 205	Vector, Matrix and Fourier Analysis	39	3
Total			19

Second Year, Second Semester				
Course Code	Course Title	Contact Hours	Credits	
CSE 251	Algorithms Design and Analysis	39	3	
CSE 252	Algorithms Design and Analysis Lab	52	2	
CSE 253	Introduction to Digital Systems	26	2	
CSE 254	Introduction to Digital Systems Lab	26	1	
CSE 255	Theory of Computing	26	2	
CSE 258	Engineering Drawing Lab	26	1	
MAT 255	Complex Variables and Laplace Transformation	39	3	
LAW 255	Cyber and Intellectual Property Law	26	2	
AIS 255	Industrial Management and Accountancy	26	2	
CSE 278	Project	26	1	
	Total			19

Third Year, First Semester				
Course Code	Course Title	Contact Hours	Credits	
CSE 301	System Analysis and Design	39	3	
CSE 302	Analytical Programming Lab	26	1	
CSE 303	Operating System and System Programming	39	3	
CSE 304	Operating System and System Programming Lab	26	1	
CSE 305	Computer Architecture and Organization	39	3	
CSE 307	Compiler Design	39	3	
CSE 308	Compiler Design Lab	26	1	
CSE 309	Database Management Systems	39	3	
CSE 310	Database Management Systems Lab	26	1	
CSE 311	Industrial Attachment	26	1	
	Total			20

Third Year, Second Semester				
Course Code	Course Title	Contact Hours	Credits	
CSE 351	Computer Graphics	39	3	
CSE 352	Computer Graphics Lab	26	1	
CSE 353	Computer Networks	39	3	
CSE 354	Computer Networks Lab	26	1	
CSE 355	Numerical Methods for Engineers	26	2	

CSE 356	Numerical Methods for Engineers Lab		
CSE 357	Microprocessor and Microcontroller	26	1
CSE 358	Microprocessor and Microcontroller Lab	39	3
CSE 359	Software Engineering	26	1
CSE 360	Software Engineering Lab	39	3
CSE 378	Project	26	1
		Total	52
			2
			21

Fourth Year, First Semester

Course Code	Course Title	Contact Hours	Credits
CSE 401	Artificial Intelligence	39	3
CSE 402	Artificial Intelligence Lab	26	1
CSE 403	Computer Simulation and Modeling	39	3
CSE 404	Computer Simulation and Modeling Lab	26	1
CSE 405	Digital Signal Processing	39	3
CSE 406	Digital Signal Processing Lab	26	1
CSE 407	Digital System Design	39	3
CSE 408	Digital System Design Lab	26	1
Option I	Theory: Should be selected from Table-I	39	3
Option I	Lab course based on Option-I	26	1
CSE 478	Project/Thesis	26	1
		Total	21

Table-I: Option I

1	CSE 409	Design of VLSI Circuits and Systems	3
	CSE 410	Design of VLSI Circuits and Systems Lab	1
2	CSE 411	Communication Engineering	3
	CSE 412	Communication Engineering Lab	1
3	CSE 413	Web Engineering	3
	CSE 414	Web Engineering Lab	1
4	CSE 415	Computational Geometry	1
	CSE 416	Computational Geometry Lab	3
5	CSE 417	Multimedia System and Virtual Environment	3
	CSE 418	Multimedia System and Virtual Environment	1
6	CSE 419	Mobile Applications Development	3
	CSE 420	Mobile Applications Development Lab	1

Fourth Year, Second Semester

Course Code	Course Title	Contact Hours	Credits
CSE 451	Machine Learning	39	3
CSE 452	Machine Learning Lab	26	1
CSE 453	Digital Image Processing	39	3
CSE 454	Digital Image Processing Lab	26	1
CSE 455	Computer Peripherals and Interfacing	39	3
CSE 456	Computer Peripherals and Interfacing Lab	26	1
CSE 457	Cryptography and Network Security	39	3
CSE 458	Cryptography and Network Security Lab	26	1
Option II	Theory: Should be selected from Table-II	39	3
Option II	Lab course based on Option-II	26	1
CSE 488	Project/Thesis	78	3
CSE 489	Viva Voce	26	1
	Total		24

Table-II: Option II

1	CSE 459	Distributed Database Management System	3
	CSE 460	Distributed Database Management System Lab	1
2	CSE 461	Pattern Recognition	3
	CSE 462	Pattern Recognition Lab	1
3	CSE 463	Wireless Communication	3
	CSE 464	Wireless Communication Lab	1
4	CSE 465	Robotics	3
	CSE 466	Robotics Lab	1
5	CSE 467	Parallel Processing and Distributed Systems	3
	CSE 468	Parallel Processing and Distributed Systems Lab	1

First Year First Semester B.Sc. Engineering Course Contents

CSE 101: Introduction to Computer Systems

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction to Computer fundamentals: Types and generation of computer, basic organization and functional units, input, output and memory devices, keyboard, mouse, OMR, OCR, MICR, CD ROM, Printers, CRT, microfilm, floppy disk, hard disk, magnetic tape etc. Information representation in digital computers, Software and application: Types of software, system software, application software, operating systems, operating systems commands, Text processing, Data communications. Basic of computer network and internet, Elements of computer structures and languages. Computer programming algorithms and flow chart.

CSE 102: Introduction to Computer Systems Lab

Credits: 3

Contact Hours: 39

Exam Hours: 3

Lab works based on CSE 100 and MS word, MS power point, MS excel, Photoshop, Elastrator.

CSE 103: Structured Programming Language

Credits: 3

Contact Hours: 39

Exam Hours: 3

Structured programming concepts. Programming Algorithms and flow chart, Writing, debugging and running programs, Header files, Preprocessor, data types, operators, expressions, Standard input and output, formatted input and output, control structures, arrays, Strings, Functions and structure: parameter passing conventions, scope rules and storage classes, recursion, Pointers, User defined data types: structures, unions, enumerations; file access, Variable length argument list, Command line parameters, Error Handling, Graphics, Linking, Library functions.

CSE 104: Structured Programming Language Lab

Credits: 3

Contact Hours: 78

Exam Hours: 3

Lab works based on CSE 103.

ENG 105: Technical English Language

Credits: 1

Contact Hours: 26

Exam Hours: 3

English phonetics: The places and manners of articulation of the English sounds.

Vocabulary building: Technical and scientific vocabulary, Correct and precise diction, affixes, level of appropriateness. Colloquial and standard, informal and formal.

English grammar: Construction of sentences, some grammatical problems, Comprehension, Paragraph writing, Report writing, Business communication and tenders.

Developing reading skill: Strategies of reading, skimming, scanning, predicting, inferring, analyzing and interpreting variety of texts, practicing comprehension from literary and nonliterary texts.

Developing writing skill: Sentences, sentence variety, generating sentences, clarity and correctness of sentences, linking sentences to form paragraphs, writing paragraphs, essays, reports, formal and informal letters.

ENG 106: Technical English Language Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on ENG 105.

MAT 105: Differential Calculus and Integral Calculus

Credits: 1

Contact Hours: 26

Exam Hours: 3

Differential Calculus: Limit, Continuity and differentiability, Differential co-efficient of explicit and implicit function, parametric equation, Significance of derivatives and differential, Successive differentiation use Leibnitz's theorem, Taylor's theorem, Mean value theorem and Rolle's theorem, Geometrical interpretation of the theorems.

Partial differentiation: Homogeneous function, Eulers theorem, Partial derivatives, Total derivatives and differential, Geometrical interpretation of Total and partial derivatives, Jacobian transformation. **Tangent and Normal:** Tangent and Normal in polar coordinates, Sub-tangent and subnormal in cartesian and polar coordinates. **Pedal equation:** Tangent at origin. **Maxima and Minima:** Determination of maximum and minimum value of the functions of more than one variables. **Indeterminate form:** L. Hospital method. **Curvature:** Curvature, radius, chord and centre of curvature, Envelope, Evolute and involute. **Integral Calculus:** Indefinite integral: Integration by various method, Integration by the method of successive reduction. Definite integral: Definite integral as the limit of a sum, properties of definite integral, walli's formula. More reduction of definite integral, Properties of definite integral, Gamma and Beta functions and its properties, Area of the region enclosed by the curves in cartesian and polar co-ordinates, Volume of solid revolution form by the curtesian and polar coordinates. Volume of the solid revolution using papus theorem.

EEE 105: Electrical Circuit Analysis

Credits: 2

Contact Hours: 26

Exam Hours: 3

Fundamental concepts, .Avometer, signal generator, oscilloscope, pH-meter, laws of electrical circuits and methods of network analysis, Principle of D.C., measuring apparatus, Laws of magnetic fields and methods of solving simple magnetic circuits. Alternating current-instantaneous and r.m.s Current, Voltage and Power, Analysis of various combinations of R,L,C circuits, Phasor representation of sinusoidal quantities, Signle and Polyphase A.C. circuit analysis, Resonance, Filter fundamentals, Different types of filters.

EEE 106: Electrical Circuit Analysis Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on EEE 105.

First Year Second Semester B.Sc. Engineering Course Contents

CSE 151: Object Oriented Programming

Credits: 3	Contact Hours: 39	Exam Hours: 3
Concepts of object oriented programming, Classes, Friend functions: Objects, isomorphism, polymorphism, inheritance, parameterized constructors, multiple inheritance, passing object to functions, arrays of objects, pointer to objects. Function and operator overloading, overloading constructor functions, references, virtual functions, Exception Handling, streams, Dynamic allocation, Static class members, Multi-threaded programming.		

CSE 152: Object Oriented Programming Lab

Credits: 3	Contact Hours: 78	Exam Hours: 3
Lab works based on CSE 151.		

CSE 153: Discrete Computational Theory

Credits: 3	Contact Hours: 39	Exam Hours: 3
Mathematical logic: Propositional Logic, Set theory, Sets, Relations, Partial Ordered sets, Functions, Generating functions, Mathematical reasoning and proof techniques, Prepositional calculus, Predicate calculus, Graph theory: Graphs, Paths, Trees. Algebraic Structures, Binary operations, Semigraphs, Groups, Permutation Groups, Rings and Fields, Lattices, Morphism of algebraic structures.		

CSE 156: Technical Writing and Presentation

Credits: 2	Contact Hours: 26	Exam Hours: 3
Issues of technical writing and effective oral presentation in Computer Science and Engineering; Writing styles of definitions, propositions, theorems and proofs; Preparation of reports, research papers, theses and books: abstract, preface, contents, bibliography and index; Writing of book reviews and referee reports; Writing tools: LATEX; Diagram drawing software; presentation tools.		

MAT 155: Co-ordinate Geometry & Ordinary Differential Equation**Credits: 3****Contact Hours: 39****Exam Hours: 3**

Co-ordinate Geometry: Two dimension: Transformation of coordinates, Pair of Straight lines, General equation of 2nd degree: (Reduced to standard form, properties of the equation parabola, ellipse, Hyperbola, Pair of tangents, Chord of contact, equation of chord in terms of middle point) Equation of the conic in polar form.

Three dimension: System of coordinates, distance between two points, section formula, direction cosines and ratio's, projection.

Plane: Equation of plane, angle between two planes, condition for perpendicularity and parallelism. **Straight lines:** Equation of straight lines, standard form, symmetric form, angle between two lines, condition for perpendicularity and parallelism, condition for co-planarity; Shortest distance between two straight lines, Equation of sphere, equation of tangent plane; condition for tangency.

Ordinary differential equation: Definition, classification, formation, degree, order of D.E. 1st order 1st degree differential equation: Solution of D.E. (Variable separable, Homogeneous, Reduced to homogeneous, Linear differential equations, Brnoulli's equation, Exact differential equation); Differential equation with constant coefficient: Solution of D.E. with constant co-efficient of 2nd and higher order. (Homogeneous, non-homogeneous); Cauchy's Euler's equation.; Solution of Linear differential equation by the method of variation of parameters, method based on factorization of operators; Application of D.E. (Growth, decay, chemical reactions, falling bodies and motion problems, mechanical vibrations, electric networks).

BST 155: Bangabandhu in Science and Technology

Credits: 2

Contact Hours: 26

Exam Hours: 3

Early life of Bangabandhu seikh Mujibur Rahman, Personal life ,family & relatives of Seikh Mujibur Rahman, Education of Bangabandhu Seikh Mujibar Rahman,Political activism in British India, Activity of bangabandhu in Bengali language Movement, 1954 Election (Juktofront Election), The founding of the Awamileague, Six Point Movement of Bangabandhu,1966 Movement of Bangabandhu,Agartala Conspiracy Case and Bangabandhu,1970 Election and civil disobedience,Contribution On Bangladesh Establishment, Ramna Raecourse (7th March Speech), Mujibnagar Government, Establishment of BAKSAL,Governning Period of Bangabandhu(1972-75), Economic policies & Foreign Policies of Bangabandhu, Bangabandhu at the UN, Assassination of Bangabandhu Seikh Mujibar Family, Analysis Of The Unfinished Memories.

EEE 155: Electronic Devices and Circuits

Credits: 2

Contact Hours: 39

Exam Hours: 3

Semiconductor Diodes: Energy bands in solids, Valence and conduction band, Classification of solids in terms of energy bands, Work function, Electron emission, Intrinsic and Extrinsic semiconductors, n-type and p-type semiconductors, P-N junction diodes and their V-I characteristics, Zener diode, Tunnel diode, Varactor diode, Thermistor, Photodiode and LDR, Transition and Diffusion capacity. **Diode Circuits:** Ideal rectifier concept, Half wave and Full wave rectifiers, High Precision rectifiers, Filters, Voltage regulators, Voltage doubler, Clippers, Clampers. **Bipolar Junction Transistors:** Working principle of PNP and NPN transistor, Transistor as an amplifier, Common-base, Common-emitter and Common Collector Configurations, Input and output characteristics of CB, CE, and CC transistor connections, Load line analysis, Operating point, Performance of transistor operation, Cutoff and Saturation points. **Field-Effect Transistors (FET):** Construction and classification, Principle of operation, Characteristic curves,

Channel ohmic and pinch-off region, Characteristic parameters of the FET, Effect of temperature on FET, MOSFET, Classification of MOSFET, CMOS. **Operational Amplifier:** Difference amplifier CMRR, Ideal operational amplifier, Inverting amplifier, Non-inverting amplifier, Summing Amplifier, Integrator, Differentiator, Linear and non-linear applications of operational amplifier, Comparator and Converter, monostable and bistable multivibrator. **Oscillators:** Positive feedback, Condition of oscillation, RC phase shift oscillator, Wein bridge oscillator, Resonant circuit oscillators, Crystal oscillator and Waveform generators.

CSE 178: Project

Credits: 1

Contact Hours: 26

Exam Hours: 3

Any project based on C language including implementation of Data Structure is acceptable. Gaming project using graphics library in C is preferable. Teachers must have to ensure every project is unique. Innovative project idea should get extra weight to prevent imitating old projects.

Second Year First Semester B.Sc. Engineering Course Contents

CSE 201 : Data Structure

Credits: 3

Contact Hours: 39

Exam Hours: 3

Internal data representation, Abstract data types, Elementary data structures: arrays, lists, stacks, queues, trees, graphs, Advanced data Structures: heaps, Fibonacci heaps, B-trees, Recursion, sorting, searching, hash techniques, Memory management.

CSE 202 : Data Structure Lab

Credits: 2

Contact Hours: 52

Exam Hours: 3

Lab works based on CSE 201.

CSE 203 : Digital Logic Design

Credits: 3

Contact Hours: 39

Exam Hours: 3

Number systems & codes, Digital logic: Boolean algebra, De- Morgan's Theorems, logic gates and their truth tables, canonical forms, combinational logic circuits, minimization technique, Arithmetic and data handling logic circuits, decoders and encoders, multiplexes and demultiplexers, Combinational circuit design, Flip-flops, race around problems, Counters: asynchronous counters, synchronous counters and their applications, PLA design, Synchronous and asynchronous logic design, State diagram, Mealy and Moore machines, State minimization's and assignments, Pulse mode logic, Fundamental mode design.

CSE 204 : Digital Logic Design Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 203.

CSE 205 : Java Technology

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction: The Java Programming Environment, Object and classes, Inheritance, Interfaces and Inner Classes, Controlling Program Flow, Initialization & Cleanup, Hiding the implementation, Polymorphism, Error handling with exceptions. **Graphics Programming:** User Interface Components with swing, AWT, GWT, Applets, Streams and Files. **Java I/O:** The Java I/O system, Run-time type Identification, Creating windows & Applets, Threads and Multi-threads, Distributed Computing, **Advance Java:** Java API Library, Enterprise Java framework, application model, multi-tier application, Java servlets, Java server pages(JSP), Java Beans, JDBC, Remote Method Invocation(RMI), Naming Service, Serialization, Internationalization, JSTL, Network Programming.

CSE 206 : Java Technology Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 205.

STA 205 : Applied Statistics and Queueing Theory

Credits: 3	Contact Hours: 39	Exam Hours: 3
Introduction, mean, standard deviation and measures of dispersion, Moments, Skewness and Kurtosis, Elementary probability theory, Characteristics of distributions, Elementary sampling theory, Estimation, Hypothesis testing and regression analysis, Probability distribution and expectations, discontinuous probability distribution, e.g. binomial, Poission and negative binomial, Continuous probability distributions, e.g. normal and exponential. Stochastic processes, Discrete time Markov Chain and continuous time Markov chain, birth death process in queuing, Queuing models: M/M/1, M/M/C, M/G/1, M/D/1, G/M/1 solution of network of queue-closed queuing models, approximate solution methods, Application of queuing models in Computer Science.		

MAT 205 : Vector, Matrix and Fourier Analysis

Credits: 3	Contact Hours: 39	Exam Hours: 3
Vector Analysis: Introduction to vectors, Linear dependence and independence of vectors, Differentiation and integration of vectors together with elementary application, Definitions of line, surface and volume integrals, Gradient of a scalar function, Divergence and curl of a vector function, Integral forms of gradient, divergence and curl, divergence theorem, Stoke's theorem, Green's theorem and Gauss's theorem. Matrix: Definition of Matrix, Matrix operations, Transpose of matrices and inverse of matrix, Rank of matrices. Fourier Analysis: Real and complex form, Finite transform, Fourier integral, Fourier transforms and their uses in solving boundary value problems, Application in engineering problems.		

Second Year Second Semester B.Sc. Engineering Course Contents

CSE 251 : Algorithms Design and Analysis

Credits: 3	Contact Hours: 39	Exam Hours: 3
Basics of Algorithm: Algorithms as a technology, Analyzing algorithms, Designing algorithms, Time and space analysis of algorithms, Average, best and worst case analysis, different notations.		

Sorting: Insertion sort, Heapsort, Quicksort, Counting sort, Radix sort, Bucket sort. **Dynamic programming:** Assembly-line scheduling, Matrix-chain multiplication, Longest common subsequence, Optimal binary search trees. **Greedy method:** An activity-selection problem, Elements of the greedy strategy, Huffman codes. **Graph algorithms:** Depth-first search, Breadth-first search, Topological sort, Minimum spanning tree, Kruskal's and Prim's algorithm, Bellman-Ford algorithm, Dijkstra's algorithm, Floyd-Warshall algorithm, Johnson's algorithm for sparse graphs, Ford-Fulkerson method. **Computational Geometry:** Line-segment properties, Determining whether any pair of segments intersects, Finding the convex hull, Finding the closest pair of points. **Backtracking:** 8 queen's problem, Sum of subsets, Graph coloring problem, Hamilton cycles. **Branch and bound:** Least cost search, 15-puzzle problem, Knapsack problem, Traveling salesman problem. **NP-Completeness:** Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-complete problems.

CSE 252 : Algorithms Design and Analysis Lab

Credits: 2	Contact Hours: 52	Exam Hours: 3
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Lab works based on CSE 251.

CSE 253 : Introduction to Digital Systems

Credits: 3	Contact Hours: 39	Exam Hours: 3
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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-flops, counters and register, memory systems, PLA's A/D and D/A converters with applications, Linear wave shaping: Diode wave shaping techniques, clipping and clamping circuits, monostable, bistable and astable multivibrations, Schmitt trigger.

CSE 254 : Introduction to Digital Systems Lab

Credits: 1	Contact Hours: 26	Exam Hours: 3
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Lab works based on CSE 253.

CSE 255 : Theory of Computing

Credits: 2

Contact Hours: 26

Exam Hours: 3

Finite automata: Deterministic finites automata, nondeterministic finite automata, equivalence and conversion of deterministic and nondeterminitic finite automata, pushdown automata, Context free languages, context free grammars, Turing Machines, basic machines, configuration, computing with turing machines, combining turing machines, Undecidaility.

CSE 258 : Engineering Drawing Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Photoshop, Illustrator, Auto CAD

MAT 255: Complex Variables and Laplace Transformation

Credits: 3

Contact Hours: 39

Exam Hours: 3

Complex Variables: Complex number system, General functions of a complex variable, Limits and continuity of a function of complex variable and related theorems, Complex differentiation and the Cauchy-Raiemann equations, Infinite scries, Convergence and uniform convergence, Line integral of a complex function, Cauchy integral formula, Liouville's theorem, Taylor's and Laurent's theorem, Singular points, Residue, Cauchy's residue theorem, Contour integration and conformal mapping, Application in engineering problems.

Laplace transforms: Definition, Laplace transforms of some elementary functions, Sufficient conditions for existence of Laplace transforms, Inverse Laplace transforms, Laplace transforms of derivatives, The unit step function, Periodic function, Some special theorems on Laplace transforms, Partial fraction, Solutions of differential equations by Laplace transforms, Evaluation of improper integrals, Application in engineering problems.

LAW 255 : Cyber and Intellectual Property Law

Credits: 2

Contact Hours: 26

Exam Hours: 3

Cyber Law: Definition Nature, Scope, Utility of Cyber Law, Origin and Development of Cyber Law and Internet ICT Policy in Bangladesh, Internet Service Providers (ISP)- Domain Name, Present Legal Basis of ISP in Bangladesh, e-Readiness in Bangladesh- e-Commerce in Bangladesh, e-Governance in Bangladesh, e-Learning/Education in Bangladesh, e-Journal in Bangladesh, e-Voting in Bangladesh, Electronic Evidence- Digital Signature, The Evidence Act of 1872 Vs. ICT Act-2006, Electronic Evidence in Bangladesh,

Legal Effects of Electronic Evidence, UNCITRAL Model Law on Electronic Evidence. **Cyber Crime:** Jurisdiction and Cyber Crime, Criminal Justice in Bangladesh and Implications on Cyber Crime, Cyber vandalism, Hacking, Malicious Spreading in Viruses, Password fraud, Cheating, Cyber Pornography, Child Pornography, Protection of Copyrights and Intellectual Property right, Invasion of Privacy, Constitutional basis of Privacy, Unsolicited e-Mail, Defamation, Harassment and e-Mail Abuse, Present Legal Protection, Human Rights Violation and Internet; The Information and Communication Technology Act, 2006- Objectives, Strengths & Weaknesses of the ICT Law, Regulation of Cryptography. **Intellectual Property Law:** Basic Concepts of IP Law, Nature of IPR, Computer-related intellectual property rights, Copyright- Original and development of copyright law, subject matter of copyright protection, Rights protected by copyright, Neighbouring rights, Limitations of Copyright protecting, Piracy and infringement, Remedies, Computer Program, New technology and copyright, Software Patents Vs. Copyright, International Convention on Copyright, Patent- Patents and technological development, Requirements for patentability and ownership of patents, Scope of exclusive rights and duration of protection, Patents infringement, defences and remedies, Legal arrangement for the transfer of technology, Types of intellectual Property licenses, Trademarks- Reasons for the protection of trademarks, Acquisition of trademark right, Registration procedure, Duration of protection and renewal, Termination, Trademarks in Cyberspace, Domain Name and Meta-tag Controversies.

AIS 255: Industrial Management and Accountancy

Credits: 1 **Contact Hours: 26** **Exam Hours: 3**

Industrial Management: Administration, Management and organization, Authority and responsibility, Management theories, Organization structure, organization chart, Span of control, Selection and recruitment of employees, wage system and incentive, Job evaluation and merit ratings, Plant layout of physical facilities, Transportation and storage, Material handling, Maintenance, maintenance policy, Production control in intermittent and continuous manufacturing industry, functions of production control, Purchasing procedures, Laws governing labor relation: CBA, Trade Union, Lay off, Lockout, Strike, Labor court, Marketing management

Inventory-need and methods of control, Factors affecting inventory building-up, Economic lot size and reorder point. **Accountancy:** Basic accounting principles, Cash book, Trial Balance, Balance Sheet, Bank Reconciliation statement, Cost Accounts and objective, Elements of costs, Direct cost, Overhead allocation, Preparation of a cost sheet, Computation of breakeven point, Standard costing, job order costing, Process costing, Cost Variance.

CSE 278: Project

Credits: 1

Contact Hours: 26

Exam Hours: 3

Project focusing on Object Oriented Programming approach and Internet programming and using standard algorithm is preferable. Every project should maintain a goal so that it can be used as a useful tool in the IT fields. Also innovative project ideas that require different types scripting/programming languages or programming tools can be accepted with respect to the consent of the corresponding project supervisor.

Third Year First Semester B.Sc. Engineering Course Contents

CSE 301 : System Analysis and Design

Credits: 3

Contact Hours: 39

Exam Hours: 3

Different types of information, Qualities of information, Analysis of information requirements for modern organizations, Role, Tasks and attributes of a systems analyst, Sources of information, Information gathering techniques, Editing, Handling of missing information, Requirements specifications, Steps of systems analysis, Concepts of feasibility analysis, Analysis of technical facilities, Cost-benefit analysis, Design of an information system, Network models for project time estimation, Estimation of confidence level, Simplex method for minimization of project time, Project effort analysis methods, Designing of inputs and outputs, Hardware and software analysis, Telecommunications requirements analysis, Project team organization, Database and files design, Project management and documentation, Analysis of system maintenance and upgrading Ethics and privacy, Control and security.

CSE 302 : Analytical Programming Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Student will solve at least 30 problems (ACM-ICPC, NCPC, ICFP, UVA like) using C, C++ or Java. Among them at least three problems should be submitted from Geometry, Mathematics, String Processing, Tree, Graph and Sorting Techniques.

CSE 303 : Operating System and System Programming

Credits: 3

Contact Hours: 39

Exam Hours: 3

Operating System: its role in computer systems; Operating system concepts; Operating system structure; Process: process model and implementation, Inter-Process Communication (IPC), classical IPC problems, process scheduling, multiprocessing and time-sharing; Memory management: swapping, paging, segmentation, virtual memory; Input/Output: hardware, software, disk, terminals, clocks; Deadlock: resource allocation and deadlock, deadlock detection, prevention and recovery; File Systems: files, directories, security, protection; Case study of some operating systems.

CSE 304 : Operating System and System Programming Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 303.

CSE 305 : Computer Architecture and Organization

Credits: 3

Contact Hours: 39

Exam Hours: 3

Information representation, Measuring performance; **Instructions and data access methods:** operations and operands of computer hardware, representing instruction, addressing styles, **Arithmetic Logic Unit (ALU) design:** arithmetic and logical operations, floating point operations, designing ALU; **Processor design:** datapaths-single cycle and multi-cycle implementations; Control Unit design-hardware and microprogrammed, Hazards; Exceptions, **Pipeline:** pipelined datapath and control, superscalar and dynamic pipelining, **Memory organization:** cache, virtual memory; channels; DMA and Interrupts, **Buses, Multiprocessors:** types of multiprocessors, performance, single bus multiprocessors, multiprocessors connected by network, clusters.

CSE 307 : Compiler Design

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction to compiling, Basic issues, Lexical analysis, Syntax analysis, Syntax-directed translation, Semantic analysis, type-checking, Run-time environments, Intermediate code generation, Code generation, Code optimization.

CSE 308 : Compiler Design Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 307.

CSE 309 : Database Management Systems

Credits: 3

Contact Hours: 39

Exam Hours: 3

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 and QBE, Relational algebra and Set operational, **Relational database design:** Relational design criteria, Losses decomposition, decomposition algorithms and synthesis algorithms.

Advance Database Concepts: Fourth and Fifth normal forms, **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, **The MAM technique:** Fact types, Uniqueness constraints, Arty Checking, General constraints, Conceptual schema transformations, Relational implementation, Distributed data base concurrency control, Security system, Recovery management, Quarry optimization, Data Base administration multimedia and Object oriented data base concepts.

CSE 310 : Database Management Systems Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 309.

CSE 311 : Industrial Attachment

Credits: 1

Contact Hours: 26

Exam Hours: 3

To gain the industry experience, students will be assigned with a well-known organization of Information Technology industry.

Third Year Second Semester B.Sc. Engineering Course Contents

CSE 351 : Computer Graphics

Credits: 3

Contact Hours: 39

Exam Hours: 3

Graphics hardware: display devices, input devices etc; Basic raster graphics algorithms for drawing 2D primitives; Two-dimensional and three-dimensional viewing, clipping and transformations; **Three-dimensional object representations:** polygon surface, B-Spline curves and surfaces, BSP trees, Octrees, Fractal-Geometry methods; **Visible surface detection methods:** Z-buffer method, BSP tree method, Ray casting method; Illumination models; **Surface rendering methods:** polygon rendering, ray tracing, terrain visualization with height mapping, modeling surface details with texture mapping; Color models; Computer animation.

CSE 352 : Computer Graphics Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 351.

CSE 353 : Computer Networks

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction: Computer Networks and Applications, OSI reference model, TCP/IP model and terminology, Connectionless and Connection Oriented services, Service primitives, The ARPANET

Physical Layer: Circuit switching and Packet switching, X-25 protocol, Frame relay and Cell relay, ATM reference model. **Medium Access Sublayer:** Pure and slotted ALOHA, Persistent and Non persistent CSMA, CSMA with collision detection and collision free protocols, IEEE standard 802.3 and Ethernet. **Data Link Layer:** Types of errors, framing, error detection & correction methods; Flow control, Stop & wait ARQ, Go-Back-N ARQ, Selective repeat ARQ, HDLC. **Network Layer:** Internet address, classful address, subnetting, static vs. dynamic routing, shortest path algorithm, flooding, distance vector routing, link state routing, ARP, RARP, IP, ICMP. **Transport Layer:** UDP, TCP, Connection management, Addressing, Establishing and Releasing Connection, Congestion control algorithm, Flow control and Buffering, Multiplexing. **Presentation Layer:** Data Compression techniques, Frequency Dependent Coding, Context Dependent Encoding. **Application Layer:** Internet and intranets, Internet services and goals, DNS, SMTP, FTP, Telnet, HTTP, World Wide Web (WWW), DHCP and BOOTP.

CSE 354 : Computer Networks Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 353.

CSE 355 : Numerical Methods for Engineers

Credits: 2

Contact Hours: 26

Exam Hours: 3

Approximations and Errors: Accuracy and Precision, Error Definitions, Round-Off Errors, Truncation Errors. **Roots of Equations:** Graphical Methods, The Bisection Method, The False-Position Method, Simple One-Point Iteration, The Newton-Raphson Method, The Secant Method.

Systems of linear algebraic equations: Gauss Elimination, Solving Small Numbers of Equations, Naive Gauss Elimination, Pitfalls of Elimination Methods, Matrix Inversion and Gauss –Seidel, The Matrix Inverse, Error Analysis and System Condition. **Curve Fitting:** Linear Regression, Polynomial Regression, Multiple Linear Regression, Newton's Forward and Backward Formula for Equal Interpolation Theorem, Gauss's Interpolation Formula, Newton's Divided Difference Interpolating Polynomials, Lagrange Interpolating Polynomials, Coefficients of an Interpolating Polynomials, Curve Fitting with Sinusoidal Functions. **Numerical Differentiation and Integration :** The Trapezoidal Rule, Simpson's Rules, Integration with Unequal Segments, Romberg Integration, Gauss Quadrature, High-Accuracy Differentiation Formulas, Richardson Extrapolation, Derivatives of Unequally Spaced Data. **Numerical Solutions of Ordinary Differential Equations:** Euler's Method, Modifications and Improvements of Euler's Methods, Runge-Kutta Methods, Adaptive Runge-Kutta Methods.

CSE 356 : Numerical Methods for Engineers Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 355.

CSE 357 : Microprocessor and Microcontroller

Credits: 3

Contact Hours: 39

Exam Hours: 3

Microprocessor Fundamentals: Architecture of a microprocessor, Data bus, address bus, control bus, I/O units and memory. **Architecture:** Architecture of Intel 8086 Microprocessor, its execution unit and bus-interface unit, its registers and flags.

Programming Model: Programming model of 8086 processor, segment-offset address and physical address calculations, even and odd addressing, introduction of different addressing modes, Operating systems and BIOS, Memory organization of PC. **Assembly Language:** Introduction to IBM PC Assembly Language, Assembly Language syntax, Program Data, Variables, Named constants, program structure, memory models, Input/Output instruction, Running program, Program Segment Prefix. **Status Register:** The processor status and the Flag register, Overflow condition, Debugging a program. **Flow control:** Flow control instructions, Conditional jumps, signed versus unsigned jumps, High-level language structures, branching and looping structures. **Logic Operation:** Logic, Shift and Rotate Instruction, some common applications of Shift and Rotate operations. **Data Structure:** The Stack and Introduction to Procedures, Basic stack operations, Procedures Declaration, Communication between procedures, calling a procedures. **Arithmetic Operation:** Multiplication and Division Instructions, signed versus unsigned multiplications, Divide overflow, Signed Extension of Dividend. **Arrays:** Arrays and related addressing modes, DUP operator, Register indirect modes, Based and Indexed addressing modes. **String Manipulation:** The string instructions, director flag, Moving a string, storing a string, Loading a string, scanning a string, comparing strings, substring operation. **Introduction to Microcontroller:** Microcontroller Architecture, Addressing mode and instruction sets, PIC and 8051 Family Microcontroller, Integrating microprocessor with interfacing chips.

CSE 358 : Microprocessor and Microcontroller Lab

Credits: 1	Contact Hours: 26	Exam Hours: 3
Lab works based on CSE 357.		

CSE 359 : Software Engineering

Credits: 3	Contact Hours: 39	Exam Hours: 3
Concepts of software engineering; Software engineering paradigms; Different phases of software; Synthesis vs. iterative design; Topdown and bottom-up design; Different design tools; Structured and non-Structured programming; Data-directed design techniques; Modular design; Design of automatic, redundant and defensive programs; Influences of languages in design process; Concepts of complexity measures; COCOMO model; Tree model; Zipf's laws and their application in computer languages;		

Halstead program length formula; Graphical analysis for complexity measures; Memory requirements analysis; Processing time analysis; Testing philosophy; Test methods; Debugging, Verification, Validation and Certification, Choice of test data; Simulator; Concepts of software reliability and availability; Software repair, downtime, error and faults, specification and correction; New error generation hypothesis, Estimating number of bugs in computer program; Reliability models, Availability models; Quality assurance; Quality measures; Different cost estimation models and their comparisons; Software maintenance; Maintenance-cost models; Growth dynamic models; Documentation; Software project organization; Management and communication skills.

CSE 360 : Software Engineering Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE359.

CSE 378 : Project

Credits: 2

Contact Hours: 52

Exam Hours: 3

Projects must possess innovative ideas which reflect contemporary IT trends. Supervisor have to ensure that every accepted project contain basic level of research work. Projects that meet the software/hardware requirements of national and international issues are highly preferable. Students have to give a presentation on their project works. Departments should take appropriate steps to archive all the projects and keep tracks to maintain the genuineness of the projects.

Fourth Year First Semester B.Sc. Engineering Course Contents

CSE 401 : Artificial Intelligence

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction, Knowledge representation, Prepositional and first order logic, inference in first order logic, frame problem, Search techniques in AI; Game playing, Planning; Probabilistic reasoning, Learning in symbolic and non-symbolic representation, Introduction to expert system, Natural language processing.

CSE 402 : Artificial Intelligence Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 401.

CSE 403 : Computer Simulation and Modeling

Credits: 3

Contact Hours: 39

Exam Hours: 3

Simulation methods: Introduction to Simulation, Random number generator, analogue simulation of continuous system, Discrete system simulation, Simulation of a pert network, Statistical analysis of result, Validation and verification techniques, Application of simulation to problems e.g. business, operation research, operating system, Computer design, Introduction to simulation packages, Computer animation.

Modelling: Introduction to modelling techniques, Problems, models and systems, Modelling concepts, Logic for (conceptual) modelling, Logic programming for conceptual modelling, Concepts of relational modelling and its practice. Some practical modelling e.g. Relational Database modelling, Different methods for Curves and surface modelling, Fractals, Polyhedral modelling with Euler's formula, Advanced modelling, Procedural models. Case Study: Simulation and Modelling software: SimScript.

CSE 404 : Computer Simulation and Modeling Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 403.

CSE 405 : Digital Signal Processing

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction: signals, systems and signal processing, classification of signals, the concept of frequency in continuous time and discrete time signals, analog to digital and digital to analog conversion, Sampling and quantization. **Discrete time signals and systems:** Discrete time signals, discrete time systems, analysis of discrete time linear time invariant systems. Discrete time systems described by difference equations, implementation of discrete time systems, correlation and convolution of discrete time signals.

The z-transform: Introduction, definition of the z-transform, z-transform and ROC of infinite duration sequence, properties of z-transform inversion of the z-transform, the one-sided z-transform. **Frequency analysis of signals and systems:** Frequency analysis of continuous time signals, Frequency analysis of discrete time signals, Properties of Fourier transform of discrete time signals, Frequency domain characteristics of linear time invariant system, linear time invariant systems as frequency selective filters, Inverse systems and deconvolution. **The Discrete Fourier Transform:** The DFT, Properties of the DFT, Filtering method based on the DFT, Frequency analysis of signals using the DFT. **Fast Fourier Transform Algorithms:** FFT algorithms, applications of FFT algorithm. **Digital Filters:** Design of FIR and IIR filters. **Adaptive filters:** Adaptive system, kalman filters, RLS adaptive filters, the steepest-descent method, the LMS filters. **Application of DSP:** Speech processing, analysis and coding, Matlab application to DSP.

CSE 406 : Digital Signal Processing Lab

Credits: 1 **Contact Hours: 26** **Exam Hours: 3**

Lab works based on CSE 405.

CSE 407 : Digital System Design

Credits: 3 **Contact Hours: 39** **Exam Hours: 3**

Design using MSI and LSI components; Design of memory subsystem using SRAM and DRAM; Design of various components of a computer: ALU, memory and control unit-hardwired and microprogrammed Microprocessor based designs. Computer bus stander is design using special purpose controllers.

CSE 408 : Digital System Design Lab

Credits: 1 **Contact Hours: 26** **Exam Hours: 3**

Lab works based on CSE 407.

Option I

CSE 409 : Design of VLSI Circuits and Systems

Credits: 3**Contact Hours: 39****Exam Hours: 3**

VLSI design methodology: top-down design approach, technology trends. NMOS, CMOS inverters, pass transistor and pass gates: dc and transient characteristics. Brief overview of fabrication process: NMOS, CMOS, Bi-CMOS process, NMOS and CMOS layout, stick diagram and design rules CMOS circuit characteristics and performance estimation: resistance and capacitance, rise and fall time, power estimation. Buffer circuit design, Introduction to Bi- CMOS circuits. Complex CMOS gates, CMOS building block: multiplexer, barrel shifter, adder, counter, multipliers: Data Path and memory structures, Design style: FPGA and PLDs. Introduction to HDL; basic digital design using VHDL.

CSE 410 : Design of VLSI Circuits and Systems Lab

Credits: 1**Contact Hours: 26****Exam Hours: 3**

Lab works based on CSE 409.

CSE 411: Communication Engineering

Credits: 3**Contact Hours: 39****Exam Hours: 3**

Synchronous and asynchronous communications; Hardware interfaces, multiplexers, concentrators and buffers; Communication mediums and their characteristics; Data communication services: SMDS and ATM; Error control codes: linear block codes, cyclic codes, MLDC codes, convolution codes, Trellis code modulation; Digital switching: space and time division switching; Radio system design; Fiber optics communication: transmitter, receivers, network components, WDM; Line coding, trunks, multiplexing, switching, ATM switches; Satellite communications: frequency bands and characteristics, types of satellites, multiple access techniques; Cellular communications: GSM, CDMA.

CSE 412 : Communication Engineering Lab

Credits: 1**Contact Hours: 26****Exam Hours: 3**

Lab works based on CSE 411.

CSE 413 : Web Engineering

Credits: 3

Contact Hours: 39

Exam Hours: 3

Principles and Techniques: Introduction and perspective: Evaluation of the web, Categories of web application, Evaluation of Web engineering, Web development process, Knowledge and skills for web development, Web engineering resources portal (WEP):A reference model. **Web Application Development Methodologies:** Web Applications, Web Application Components, Challenges of Web Application Development, Web Development Methodologies, the Advantages and Disadvantages. **Relationship Analysis:** A Technique to Enhance Systems Analysis for Web Development: Generic Relationship Taxonomy, Conducting a Relationship Analysis, Relationship Analysis Model: Theoretical Basis, Relationship Analysis Process, Web Maintenance and Evolution, Techniques and Methodologies. Internet and World Wide Web application, HTML, SGML, XML, DTD, PHP, Java Script, CGI Programming etc. **E-Commerce Basics:** E-Commerce Definition, Internet History and E-Commerce Development, Classification of E-Commerce, E-Commerce Challenges, E-Commerce Opportunities, Payment Processing- Electronic Payment Issues, E-Cash, Credit Card Issues, Merchant Accounts, Online Payment Services, Transaction Processing.

CSE 414 : Web Engineering Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 413.

CSE 415 : Computational Geometry

Credits: 3

Contact Hours: 39

Exam Hours: 3

Algorithm and complexity of fundamental geometric objects: polygon triangulations and art gallery theorem, polygon partitioning, convex hulls in 2-dimension, 3-dimension, **Proximity:** Voronoi diagrams and Delaunary triangulations. **Graph Drawing:** drawing styles and applications, drawing of rooted trees, straight line drawing of planar graphs.

CSE 416 : Computational Geometry Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 415.

CSE 417 : Multimedia System and Virtual Environment

Credits: 3

Contact Hours: 39

Exam Hours: 3

Multimedia systems: introduction; Coding and compression standards; Architecture issues in multimedia. **Operating systems issues in multimedia:** real-time OS issues, synchronization, interrupt handling. **Database issues in multimedia:** indexing and storing multimedia data, disk placement, disk scheduling, searching for a multimedia document. **Networking issues in multimedia:** Quality-of-service guarantees, resource reservation, traffic specification, haping and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions; **Security issues in multimedia:** digital watermarking, partial encryption schemes for video streams. **Multimedia applications:** audio and video conferencing, video on demand, voice over IP. **Networked virtual environment (NVE):** Networked virtual environment overview; forms of distributed interaction; example systems; NVE technologies and challenges; origins of NVE.

CSE 418 : Multimedia System and Virtual Environment Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 417.

CSE 419: Mobile Application Development

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction: Introduction to Mobile Computing, Development Environment, **Factors in Developing Mobile Applications:** Mobile Software Engineering, Frameworks and Tools, Generic UI Development, User concern, **More on UIs:** VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal UIs, Intents and Services, **Storing and Retrieving Data:** Synchronization and Replication of Mobile Data, Getting the Model Right, Storing and Retrieving Data, Working with a Content Provider, **Communications Via Network and the Web:** Correct Communications Model, Networking and Web, **Notifications and Alarms:** Notifications and Alarms, Performance, **Location:** Mobility and Location Based Services, Architecture, Design, Testing

CSE 420 : Mobile Application Development Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 419.

Exam Hours: 3

CSE 478 : Project

Credits: 1

Contact Hours: 26

Exam Hours: 3

Project/Thesis works based on Application level of CSE.

Exam Hours: 3

Fourth Year Second Semester B.Sc. Engineering Course Contents

CSE 451 : Machine Learning

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction to machine learning; Learning algorithms: supervised, unsupervised, reinforcement, attribute based, neural network based, relational supervised and negative correlation; Genetic algorithm, genetic programming and evolutionary programming; Practical application of machine learning.

CSE 452: Machine Learning Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 451.

CSE 453 : Digital Image Processing

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction and Fundamental to Digital Image Processing: What is Digital Image Processing, Origin of Digital Image Processing, Examples that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Digital Image Processing System, Image sensing and acquisition, Image sampling, quantization and representation, Basic relationship between pixels. **Image Enhancement in the Spatial Domain & Frequency domain:** Background, Basic gray level transformation, Histogram processing, Basics of spatial filtering, Smoothing and Sharpening Spatial filters, Introduction to Fourier Transform and the Frequency Domain, Discrete Fourier Transform. Smoothing and Sharpening Frequency-Domain filters. **Image Restoration:** Image Degradation/Restoration Process, Noise models. Restoration in presence of noise, Inverse Filtering, Minimum Mean Square Filtering, Geometric mean filter, Geometric transformations.

Color Image Processing: Color Fundamentals, Color models, Basis of full color image processing, Color transformations.

Image Compression: Fundamentals, Image compression models, Error free compression, Lossy compression. **Morphological image processing:** Preliminaries, Dilations and Erosion, opening and closing, Some basic morphological algorithms. **Image Segmentation:** Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation. **Representation, Description and Recognition:** Representation-chain codes, polygonal approximation and skeletons, Boundary descriptors-simple descriptors, shape numbers, Regional descriptors- simple, topological descriptors, Pattern and Pattern classes-Recognition based on matching techniques.

CSE 454 : Digital Image Processing Lab

Credits: 1 **Contact Hours: 26** **Exam Hours: 3**
Lab works based on CSE 453.

CSE 455: Computer Peripherals and Interfacing

Credits: 3 **Contact Hours: 39** **Exam Hours: 3**
I/O system; I/O devices, designing I/O systems; Programmable peripheral interface (interface to A/D and D/A converter); keyboard/display interface; Programmable timer; Programmable interrupt controller, DMA controller,; floppy and hard-disk controller, serial communication interface; Barcode reader; Sound card, MIDI interface; Printer interface; ISA, PCI, AGP, PS/2 and USB interfaces, Interfacing with power circuits, stepper motors, opto-isolation; controlling semiconductor power switches- MOSFET, BJT, SCR, Triac and Solinoids.

CSE 456 : Computer Peripherals and Interfacing Lab

Credits: 1 **Contact Hours: 26** **Exam Hours: 3**
Lab works based on CSE 455

CSE 457 : Cryptography and Network Security

Credits: 3

Contact Hours: 39

Exam Hours: 3

Cryptography:

Overview: Cryptography Overview and Terminologies. **Symmetric Ciphers:** Symmetric Cipher Model, Substitution Techniques,

Transposition Techniques, Steganography, Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Evaluation Criteria for AES, The AES Cipher, Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Block Ciphers, RC4 Stream Cipher, Placement of Encryption Function, Traffic Confidentiality, Key Distribution.

Public-Key Encryption: Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management.

Network Security:

Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, MD5 Message Digest Algorithm, Secure Hash Algorithm, Digital Signatures, Authentication Protocols. **Network Security Practice:** Kerberos, Pretty Good Privacy, S/Mime, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Web Security Considerations, Secure Socket Layer and Transport Layer Security.

System Security: Intruders, Intrusion Detection, Password Management, Viruses and Related Threats, Virus Countermeasures, Firewalls.

CSE 458 : Cryptography and Network Security Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 457.

Option II

CSE 459 : Distributed Database Management System

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction: Distributed Data processing, Distributed database system (DDBMSS), Promises of DDBMSs, Complicating factors and Problem areas in DDBMSs, Overview Of Relational DBMS Relational Database concepts, Normalization, Integrity rules, Relational Data Languages, Relational DBMS, **Distributed DBMS Architecture:** DBMS Standardization, Architectural models for Distributed DBMS, Distributed DBMS Architecture Distributed Database Design: Alternative design Strategies, Distribution design issues, Fragmentation, Allocation. Semantic Data Control: View Management, Data security, Semantic Integrity Control, **Overview Of Query Processing:** Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing, **Introduction to Transaction Management:** Definition of Transaction, Properties of transaction, types of transaction, **Distributed Concurrency Control:** Serializability theory, Taxonomy of concurrency control mechanisms, locking bases concurrency control algorithms. Parallel Database Systems: Database servers, Parallel architecture, Parallel DBMS techniques, Parallel execution problems, Parallel execution for hierarchical architecture, **Distributed Object Database Management systems:** Fundamental Object concepts and Object models, Object distribution design. Architectural issues, Object management, Distributed object storage, Object query processing. Transaction management. **Database Interoperability:** Database Integration, Query processing.

CSE 460 : Distributed Database Management System Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 459.

CSE 461 : Pattern Recognition

Credits: 3

Contact Hours: 39

Exam Hours: 3

Basics of pattern recognition: Introduction to pattern recognition, feature extraction, and classification. **Bayesian decision theory:** Classifiers, Discriminant functions, Decision surfaces, Normal density and discriminant functions, Discrete features.

Parameter estimation methods: Maximum-Likelihood estimation, Gaussian mixture models, Expectation-maximization method, Bayesian estimation. **Hidden Markov models for sequential pattern classification:** Discrete hidden Markov models, Continuous density hidden Markov models, Viterbi algorithm, Baum-Welch algorithm. **Dimension reduction methods:** Principal component, Fisher discriminant analysis. **Non-parametric techniques for density estimation:** Parzen-window method, K-Nearest Neighbors method. **Linear/non-linear discriminant function based classifiers:** Multi-layer Perceptrons, Support vector machines. **Non-metric methods for pattern classification:** Non-numeric data or nominal data, Decision trees. **Unsupervised learning and clustering:** Criterion functions for clustering, Algorithms for clustering: K-means, Hierarchical and other methods, Cluster validation.

CSE 462 : Pattern Recognition Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 461.

CSE 463 : Wireless Communication

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction: Evolution of mobile radio communications, examples of wireless communication systems, paging systems, Cordless telephone systems, comparison of various wireless systems. **Modern Wireless Communication Systems:** Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks. **Introduction to Cellular Mobile Systems:** Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems. **Cellular System Design Fundamentals:** Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity. **Multiple Access Techniques for Wireless Communication:** Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems. **Intelligent Cell Concept and Application:** Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks. **WiMax:** WiMAX, WiMAX Metrics,

WiMAX Family of Standard, Fixed WiMAX Standards, Mobile WiMAX Standards, WiMAX Protocol Layers, WiMAX Physical Layer Operation, WiMAX MAC Layer Operations, WiMAX RF Optimization, WiMAX Problems, Economics of WiMAX, WiMAX Regulatory Issues, WiMAX Competition, WiMAX Planning, Coverage and Capacity, WiMAX Future Trends. **WiFi:** Principles and Operation , Metropolitan WiFi Network Design and Deployment , Technology, Applications, Design, and Deployment , Wi-Fi Network Security , Wireless 802.xx Networks Overview, 802.11 Wireless LAN Trends and Technologies , Wireless LANs Security Fundamentals. **Wireless Sensor Network:** Wireless Sensor Network Overview, Application of WSN, Characteristics of WSN, Standard and Specification of WSN, Wireless HART, ISA100, IEEE 1451, ZigBee / 802.15.4, WSN Operating System(Overview only) eCos or uC/OS, Tiny OS, Lite OS, WSN Simulator (Overview only) QualNet, NetSim, NS2, Distributed sensor network, Limitation, Future Trend.

CSE 464 : Wireless Communication Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 463.

CSE 465:Robotics

Credits: 3

Contact Hours: 39

Exam Hours: 3

Robotics: Introduction to Robotics, Essential Components of a Robot & their Kinematics, Links, Frames, Spatial Motions, Programming Robots, Clocks, Sensors, Actuators and Drives, Control Components, Differential Motion, Statics, Energy Method, Hybrid Position-force Control, Non-holonomic Systems, Legged Robots, Multi-fingered Hands, Computer Vision, Tele-robotics and Virtual Reality.

CSE 466 : Robotics Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 465.

CSE 467: Parallel Processing and Distributed Systems

Credits: 3

Contact Hours: 39

Exam Hours: 3

Introduction: Trends towards parallel processing, Parallel processing mechanism, Multiprogramming and Time sharing, Parallel Computer Structures, Parallelism and Pipelining, Parallel processing applications, Speedup Performance Laws, Parallel Random Access Machines (PRAM) and VLSI model. **Hardware Technology:** Advanced processor Technology, Superscalar and Vector processor, Shared memory organization, Design of Linear and Nonlinear Pipeline processor, Multiprocessor System Interconnects. **Pipelining and Vector Processing:** Principles of Pipelining, Classification of pipelined processors, Instruction and Arithmetic pipeline design, Vector Processing principles, Vector processing requirements, Designing Pipelined processors, Compound Vector processing, Recent Vector processors, Vectorization and Optimization methods. **Parallel Programming:** Parallel Programming models, Parallel Languages and Compilers, Code Optimization and Scheduling, Loop Parallelization and Pipelining, Parallel Programming Environments, Shared-variable program structures, mapping programs onto Multicomputer. **Distributed Processing:** Introduction, Function distribution, Hierarchical and Horizontal distributed system, Strategies for distributed data processing, Data distribution, Conflict analysis, Distributed Database and applications. Transaction and distributed transaction, concurrency control, security in distributed system.

CSE 468 : Parallel Processing and Distributed Systems Lab

Credits: 1

Contact Hours: 26

Exam Hours: 3

Lab works based on CSE 467.

CSE 488 : Project

Credits: 3

Contact Hours: 78

Exam Hours: 3

CSE 489 : Viva Voce

Credits: 1

Contact Hours: 26

Exam Hours: 3

	Course type		Credits
1.	Non-Major Courses		30
	(i) Theory I (Mathematics and Basic Sciences)		
	(a) Mathematics	12	
	(b) Statistics	3	
	(c) Technical Writing	2	
	(d) Electrical and Electronics	4	
	Total (Math and Basic Sc.)	21	
	(ii) Theory II		
	(a) Bangabandhu	2	
	(b) Accounting	2	
	(c) English	1	
	(d) Law	2	
	Total (Humanities)	7	
	(iii) Laboratory (Mathematics and Basic Sciences, Humanities)		
	(a) Electrical and Electronics	1	
	(b) English	1	
	Total Laboratory (non-major)	2	
2.	Major Course		131
	(i) Major Engineering		
	(a) Theoretical	88	
	(b) Laboratory	34	
	(c) Project	4	
	(d) Project/Thesis	4	
	(e) Industrial Attachment	1	
	Total (major and non-major courses)		161