Contact

The Head
Department of Computer Science and Engineering
Jatiya Kabi Kazi Nazrul Islam University
Thishal, Mymensingh-2220, Bangladesh
Phone: 880903256215
E-mail: cse@jkkniu.edu.bd
Web: www.jkkniu.edu.bd/cse

Published by

Department of Computer Science and Engineering
Jatiya Kabi Kazi Nazrul Islam University
Trishal, Mymensingh-2220, Bangladesh

Editorial Committee

Cover Page

Designed by: Khandaker Mehedi Sharif, Dept. of CSE

Printed by:

Lima Printers
38, Chotobazar, Mymensingh
Phone: 01710-856451

Committee of Courses of Computer Science and Engineering:

1.	Engr. A. H. M. Kamal Head, Dept. of CSE, JKKNIU	Chairman
2.	Dr. Md. Mijanur Rahman Associate Professor, Dept. of CSE, JKKNIU	Member
3.	Mr. Md. Sujan Ali Associate Professor, Dept. of CSE, JKKNIU	Member
4.	Mst. Jannatul Ferdous Associate Professor, Dept. of CSE, JKKNIU	Member
5.	Mrs. Indrani Mandal Assistant Professor, Dept. of CSE, JKKNIU	Member
6.	Mr. Pronab Kumar Mondal Assistant Professor, Dept. of CSE, JKKNIU	Member
7.	Mr. Subrata Kumar Das Assistant Professor, Dept. of CSE, JKKNIU	Member
8.	Mrs. Poly Rani Ghosh Assistant Professor, Dept. of CSE, JKKNIU	Member
9.	Mrs. Habiba Sultana Lecturer, Dept. of CSE, JKKNIU	Member
10.	Mrs. Rubya Shaharin Lecturer, Dept. of CSE, JKKNIU	Member
11.	Mr. Kazi Mahmudul Hassan Lecturer, Dept. of CSE, JKKNIU	Member
12.	Mrs. Mahbubun Nahar Lecturer, Dept. of CSE, JKKNIU	Member
13.	Professor Dr. Md. Haider Ali Professor, Dept. of CSE, DU	Member
14.	Professor Dr. Abdul Muttalib Professor, Dept. of CIT, IUT	Member
15.	Dr. Md. Mahfuzul Islam Professor, Dept. of CSE, BUET	Member
16.	Dr. Md. Ahasan-Ul-Ambia Professor, Dept. of CSE, IU,Kushtia	Member

PREFACE

Jatiya Kazi Kazi Nazrul Islam University was established by the Government of Bangladesh on 01 March 2005. The academic program of this university was stated on 03 June 2007 with four Departments under two Faculties. The Dept. of Computer Science and Engineering is one of them. The Development of the present state of the society greatly depends on technological improvement. In this modern world to compete with the modern countries we need to be habituated ourselves with the use of technological equipments. So opening such a department (CSE) was obviously a notable decision. The department of Computer Science and Engineering is therefore aware of proving quality education. The department provides an excellent and bright young brand of teachers who are deeply committed to the university to bring out best graduates in academic disciplines. This endeavor has already brought our graduates in forth to serve the nation with reputation. Currently we're providing BSc (Engg) and MS degree. However we dream to commence the PhD program as well.

This booklet provides general information about course system, such as rules and regulations relating to admission, grading system, performance evaluation, requirement for degrees. It describes the course requirements, detailed course outline and courses offered in different semesters. Some of the information recorded in this booklet is likely to be modified from time to time. It is hoped that this booklet will be of much use to everybody concerned.

Trishal, Mymensingh, Bangladesh.

Engr. A.H.M. Kamal
Head of the Department

CONTENTS

Jatiya Kabi Kazi Nazrul Islam University
Dept. of Computer Science &Engineering
Syllabus for the Bachelor Degree of Science and Engineering: 2016-17 and 2017-18

1. Program Structure & Duration

The Academic program of Bachelor Degree of Science and Engineering will be of 4 (four) years duration divided into 8 (eight) semesters, each of the 19 (nineteen) weeks duration and a total of 162 (One hundred and sixty two) credit hours. Each student requires to complete this program not more than 06 (six) long consecutive academic years. The course curricula consist of the theoretical classes, laboratory sessions and project/thesis works. There would be one University Course, Nazrul Studies and weighted 3 (three) credits must be completed within Credit Courses by the students of Bachelor Degree of Science and Engineering.

1.1 Duration of Semester

The duration of each semester will be 19 weeks whose breakdown is as follows:

Class	14 weeks
Recess before Semester Final Examination	2 weeks
Semester Final Examination	3 weeks
Total	**19 weeks**

1.2 Assignment of Credits

The assignment of credits to a theoretical course follows a different rule from that of practical courses.

(i) For theoretical courses one lecture of 1 hour duration per week per semester is equivalent to one credit (14 lecture hours).

(ii) For practical courses one lab of 2 hour duration per week per semester is equivalent to one credit (28 lab hour sessions).

(iii) Credits are also assigned to thesis/project work taken by students in the 7th & 8th semesters.

2. Medium of Instruction and Answer

The medium of instruction and answer in the examination script shall be English. For University Course, the medium of instruction shall be Bengali.

3. Course Coding System

Each course is designed by a three to four letter code identifying the department offering the code followed by a three-digit number having the following interpretation:

1 The last three digits represent the course number.
2. The last two zeros (00) of a course code represents Project/Thesis works.
3. The last digit is an odd number for theoretical courses and an even number for laboratory courses.
4. The letter code CSE stands for departmental courses, EEE represents Electronics/Electrical courses, PHY stands for Physics courses, MATH stands for mathematical courses, and GED identifies general educational courses.

4. Evaluation System

The marking and student evaluation system will be as follows:

4.1 Distribution of Marks for Theoretical Part

1.	Class participation		10%
2.	Mid Term:		30%
	a. Mid Semester Exam-1	10%	
	b. Mid Semester Exam-2	10%	
	c. Mid Semester Exam-3 (Quiz/Assignment)	10%	
3.	Semester Final Exam		60%
	Total		**100%**

4.2. Distribution of Marks for Laboratory Session

1. Lab attendance	10%
2. Lab report	10%
3. Lab final test and test report	50%
4. Lab viva voce	30%
Total	**100%**

4.3 Class Attendance

The distribution of marks for class attendance (theoretical and practical) will be as follows:

Attendance	Marks
90% and above	10
85% to 89%	09
80% to 84 %	08
75% to 79 %	07
70% to 74%	06
65% to 69%	05
60 % to 64%	04
55% to 59 %	03
50% to 54%	02
Less than 50%	00

A student shall have to attend at least 75% of theoretical and practical classes held in a course. In case of shortage of attendance (not bellow 60%), student will be allowed to sit for examination after paying of taka 500/- as irregular fee for each course in university account.

4.4 The Grading System

The total performance of a student in given course is based on a scheme of continuous assessment. For theory courses this continuous assessment is made through a set of quizzes, class evaluation, class participation, homework assignment and a semester final examination. The assessment in laboratory/practical courses is made through observation of the student at work during the class, viva-voce, laboratory hours and quizzes.

Each course has a certain number of credits, which describes its corresponding weights. A letter grade with a specification number of grade points is awarded to each course for which a student is registered. A student's performance is measured both by the number of credits completed satisfactorily and by the weighted average of the grade point earned. A minimum grade point average (GPA) is essential for

satisfactory progress. A minimum number of earned credits also have to be acquired in order to qualify for the degree.

Letter grades and corresponding grade points will be awarded in accordance with the provisions shown below:

Numerical Grade	Letter grade	Grade Point	Interpretation
80% and above	A+	4.00	Outstanding
75% to less than 80%	A	3.75	Excellent
70% to less than 75%	A-	3.50	Very Good
65% to less than 70%	B+	3.25	Good
60% to less than 65%	B	3.00	Satisfactory
55% to less than 60	B-	2.75	Nearly Satisfactory
50% to less than 55%	C+	2.50	Average
45% to less than 50%	C	2.25	Nearly Average
40% to less than 45%	D	2.00	Poor
Less than 40%	F	0	Fail

N.B. A student securing less than Letter Grade C+ (GP 2.5) in practical examination shall have no credit i.e., this mark will not be counted while determining his/her results.

5. Computation of Grade Point Average (GPA)

Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student. For example, if a student passes/completes n courses in a semester having credits of C_1, C_2,....., C_n and his/her earned grade points in these courses are G_1, G_2.....G_n respectively, then.

$$GPA = \frac{\sum_{i=1}^{n} C_i * G_i}{\sum_{i=1}^{n} C_i}$$

The Cumulative Grade Point average (CGPA) is the weight average of the GPA obtained in all the semester passed/completed by a student. For example, if a student passes/completes n semesters having total credits of TC_1, TC_2, ... TC_n, and his/her GPA in these semesters are GPA_1, GPA_2.....GPA_n respectively, then.

$$CGPA = \frac{\sum_{i=1}^{n} TC_i * GPA_i}{\sum_{i=1}^{n} TC_i}$$

5.1 Numerical Examples of Computing GPA and CGPA

5.1.2. Example for Computing GPA

Say a student completed eight courses in a semester and obtained the following grade:

Course	Credits (Ci)	Grade	Grade Points (Gi)	Ci × Gi
CSE 111	2.00	A+	4.00	8.000
CSE 112	3.00	A+	4.00	12.000
CSE 113	1.50	A	3.75	5.625
CSE 114	3.00	B	3.00	9.000
CSE 115	1.50	A-	3.50	5.250
CSE 116	3.00	A+	4.00	12.000
CSE 117	4.00	A	3.75	15.000
CSE 118	1.50	A-	3.50	5.250
Total	**19.50**			**72.125**

Then, the Grade point Average (GPA) is calculated as follows:

GPA= 72.125/19.50=3.7

5.1.3. Example for Computing CGPA

Say, a student completed four semesters and obtained the following

Year	Semester	Total Credit TC_i	GPA Earned, GPA_i	$TC_i \times GPA_i$
1	I	19.50	3.70	72.150
1	II	20.50	3.93	80.565
2	I	21.25	3.96	84.150
2	II	20.25	4.00	81.000
Total		**81.50**		**317.865**

Then, the Cumulative Grade Point Average (CGPA) is calculated as follows:

$$CGPA=317.865/81.50=3.90$$

6. Promotion

6.1. From First Year to Second Year

For promotion from 1st Year to 2nd Year a student will be required to earn CGPA of 2.00 (except viva-voce grade).

6.2. From Second Year to Third Year

For promotion from 2nd Year to 3rd Year a student will be required to earn CGPA of 2.25 (except viva-voce grade) taking into consideration all the grade points earned in a total number of courses of 1st Year and 2nd Year & the improved grade, if any.

6.3. From Third Year to Fourth Year

For promotion to 3rd Year to 4th Year, a student will be required to earn CGPA of 2.5 (except viva-voce grade) taking into consideration all the grade points earned in all courses of 1st, 2nd & 3rd year including the improved grade, if any.

6.4. A student failing to clear up the university/departmental dues of the year of study shall not be promoted to the next year.

6.5. Dean's List

As a recognition of excellent performance, the names of students obtaining an average GPA of 3.80 or above in two regular Semester in each academic year may be published in Dean's list in each faculty. Students having GPA of 3.80 or more but received an 'F' Grade in any of the courses will not be considered for Dean's list for that year.

7. Improvement of Grades

7.1. Student obtaining the grade C and below (less than 2.25) in any year (1st semester to 8th semester) shall be allowed to improve the Grade only after the results of 8th semester final examination. After the publication of grade improvement examination result if the student fails to improve his/her 'F' grade shall be given only one opportunity to improve the 'F' grade. The examination shall be called F grade improvement examination.

7.2. To improve the grade and to appear in the examination the student shall have to pay the examination fee for each course as determined by the University from time to time.

7.3. A students willing to appear improvement Examination shall have to apply to the Controller of Examination through the Chairman of the Department concerned in the prescribed form within 30 days of the publications of the final result of BSE program. If a student fails to improve his/her CGPA, then previous CGPA will remain valid.

7.4. No improvement shall be allowed in internal evaluation (in-course/assignment/tutorial/mid term), Project or thesis and viva-voce examination.

7.5. The relevant 4th year examination committee will conduct and complete the grade-improve examination within 4 (four) months and 'F grade improvement examination' within 2 (two) months after the publication of result.

8. Award of the Bachelor of Engineering Degree.

8.1. Bachelor of Engineering degree shall be awarded to a student on completion of minimum 160 credits and on securing CGPA of 2.5 or above.

8.2. A student for four years degree shall be awarded the degree with distinction if his/her CGPA is 3.80 and above and he/she does not have any F grade in the total program.

9. Re-admission:

9.1. A student failing to get the requisite grade points for promotion from a year to the next year may seek re-admission with the following batches. For re-admission a student shall have to apply for this within one month after announcement of the result of the concerned year.

9.2. On re-admission, grades earlier earned by a student in the class year of re-admission shall cease to exist and the student shall have to retake all the course works and examinations.

9.3. A student can take readmission in a class year shall be allowed only once and a student will not get chance for readmission more than twice during the entire program. A re-admitted student must complete the Bachelor of Science and Engineering program within a maximum period of six consecutive years from the programs admission year.

10. Drop Out

10.1. A student failing to earn the yearly GPA for promotion for one year to next year taking readmission in any year shall be dropped out of the program.

10.2. For a student fails to earn the CGPA of 2.5 or complete 160 credits including grade improvements examination/ F grade improvement shall be dropped out from the B.S.E program.

11. Adoption of Unfair Means

11.1. Students adopting unfair means shall be treated according to university rules.

11.2. No credit transfer from any other program/university/institution is allowed for Bachelor of Science and Engineering.

12. Semester-wise Distribution of Courses & Credit

Overview of the Semester-wise Distribution of Courses & Credit in Tabular Form:

First Year First Semester

Course Code	Course Name	No. of credits
CSE 101	Computer Fundamentals and Programming Basics	3.0
CSE 102	Computer Fundamentals and Programming Basics Lab	1.5
CSE 103	Discrete Mathematics	3.0
EEE 161	Basic Electrical Engineering	3.0
EEE 162	Basic Electrical Engineering Lab	1.5
GED 163	Accounting	3.0
GED 165	English	3.0
MATH 167	Calculus and Differential Equation	3.0
	Total	**21.0**

First Year Second Semester

Course Code	Course Name	No. of credits
CSE 121	Structured Programming	3.0
CSE 122	Structured Programming Lab	1.5
CSE 127	Numerical Methods	3.0
MATH 171	Matrix and Vector Analysis	3.0
EEE 175	Electronics	3.0
EEE 176	Electronics Lab	1.5
PHY 177	Physics	3.0
GED 179	Nazrul Studies	3.0
CSE 100	Software Development Project-I	1.5
	Total	**22.5**

Second Year First Semester

Course Code	Course Name	No. of credits
CSE 201	Object Oriented Programming	3.0
CSE 202	Object Oriented Programming Lab	1.5
CSE 203	Data Structures	3.0
CSE 204	Data Structures Lab	1.5
CSE 205	Digital Logic Design	3.0
CSE 206	Digital Logic Design Lab	1.5
MATH 261	Coordinate Geometry	3.0
MATH 273	Statistics and Probability Theory	3.0
	Total	**19.5**

Second Year Second Semester

Course Code	Course Name	No. of credits
CSE 221	Algorithms	3.0
CSE 222	Algorithms Lab	1.5
CSE 223	Database Management System	3.0
CSE 224	Database Management System Lab	1.5
CSE 225	Computer Architecture and Organization	3.0
CSE 227	Digital Electronics and Pulse Technique	3.0
CSE 228	Digital Electronics and Pulse Technique Lab	1.5
GED 272	Technical Writing and Presentation	1.5
MATH 275	Complex variable, Laplace transformation and Fourier Analysis	3.0
CSE 200	Software Development Project-II	1.5
	Total	**22.5**

Third Year First Semester

Course Code	Course Name	No. of credits
CSE 301	Microprocessors	3.0
CSE 302	Microprocessors and Assembly Language Lab	1.5
CSE 303	Operating Systems	3.0
CSE 304	Operating Systems Lab	1.5
CSE 305	Theory of Computation	3.0
CSE 307	Internet and Web Programming	3.0
CSE 308	Internet and Web Programming Lab	1.5
CSE 309	Data Communication	3.0
	Total	**19.5**

Third Year Second Semester

Course Code	Course Name	No. of credits
CSE 321	Computer Networks	3.0
CSE 322	Computer Networks Lab	1.5
CSE 323	Compiler Design	3.0
CSE 324	Compiler Design Lab	1.5
CSE 325	Computer Peripherals and Interfacing	3.0
CSE 326	Computer Peripherals and Interfacing Lab	1.5
CSE 327	System Analysis and Design	3.0
GED 371	Economics	1.5
GED 374	Developing English Skill Lab	1.5
CSE 300	Software Development Project	1.5
	Total	**21.0**

Fourth Year First Semester

(A student must register, at the beginning of this semester, for the 12-month duration thesis/project to be completed by the end of the fourth year second semester. Also In this Semester, the students are to undertake 1 (One) optional course from **Optional – I**)

Course Code	Course Name	No. of credits
CSE 401	Software Engineering	3.0
CSE 402	Software Engineering Lab	1.5
CSE 403	Computer Graphics	3.0
CSE 404	Computer Graphics Lab	1.5
CSE 407	Communication Engineering	3.0
CSE 409	Digital Signal Processing	3.0
CSE 410	Digital Signal Processing Lab	1.5
	Optional-I	4.5
CSE400(A)	Thesis / Project	1.5
	Total	**22.5**

Optional – I

Course Code	Course Name	No. of credits
CSE 431	Digital Speech Processing	3.0
CSE 432	Digital Speech Processing Lab	1.5
CSE 433	Robotics Technology	3.0
CSE 434	Robotics Technology Lab	1.5
CSE 435	Network Security	3.0
CSE 436	Network Security Lab	1.5
CSE 437	Parallel and Distributed Processing	3.0
CSE 438	Parallel and Distributed Processing Lab	1.5
CSE 443	Natural Language Processing	3.0
CSE 444	Natural Language Processing Lab	1.5
CSE 445	Basic Graph Theory	3.0
CSE 446	Basic Graph Theory Lab	1.5

Fourth Year Second Semester

(In this Semester, the students are to undertake 1 (One) optional course from **Optional – II**)

Course Code	Course Name	No. of credits
CSE 421	Artificial Intelligence	3.0
CSE 422	Artificial Intelligence Lab	1.5
CSE 423	IT Organization and Management	3.0
	Optional - II	4.5
CSE 400 (B)	Thesis / Project	3.0
	Total	**15.0**

Optional – II

Course Code	Course Name	No. of credits
CSE 451	VLSI Design	3.0
CSE 452	VLSI Design lab	1.5
CSE 453	Pattern Recognition	3.0
CSE 454	Pattern Recognition lab	1.5
CSE 457	Multimedia Technology	3.0
CSE 458	Multimedia Technology lab	1.5
CSE 459	Wireless Communication	3.0
CSE 460	Wireless Communication Lab	1.5

13. Detail Outline of Courses

First Year First Semester

CSE 101	**Computer Fundamentals and Programming Basics**	**3.0**

Introduction: Brief history, Generation of computers, Classification of Computer, Working features of computer system, Application.

Hardware: Organization and architecture of a computer, CPU, Memory units**,** I/O Devices, peripheral devices, BIOS, Bus Architecture, Storage devices.

Software: Classifications, System software, Operating system concepts, Basic DOS commands, Concept of Windows and UNIX operating systems, Application software: word-word processing, spreadsheet database and presentation software.

Number System Conversion: Decimal, Binary, Octal and Hexadecimal Number systems and their conversion, Number Operations.

Logic gates and Boolean algebra: Basic and Compound Logic gates, Basic rules of Boolean algebra, De-Morgan Theorems.

Computer Networks and Internet: Basic concepts of LAN, MAM, WAN, and Internet systems, Internet Services, on-Line and off-line Processing, E-mail, E-commerce, E-governance and WWW.

Maintenance of PC: Computer viruses and virus protection, software and hardware troubleshooting and maintenance.

Programming Basics: Overview of C language, C program structure, Compiler, Interpreter, Application, C Tokens, Keywords, Identifiers, Data types, Constants, Operators, Statements, Conditional Statements, if and Loops: for, while and do-while.

CSE 102	**Computer Fundamentals and Programming Basics Lab**	**1.5**

Laboratory works based on Course CSE 101

CSE 103	**Discrete Mathematics**	**3.0**

Sets: Introduction, Sets and elements, Universal and empty sets, Subsets, Venn diagrams, Operations on sets, Algebra of sets, Finite sets and Counting principle, , Power set and Partitions.

Relations: Introduction, Composition of relation, Types of relations, Closure properties, Equivalence relation, Partial ordering relations, n-ary relation.

Functions: One-to-one, onto and invertible functions, Composition of function, Recursive functions, Cardinality.

Logic and Propositions: Propositions, compound propositions, Truth tables, Basic logical operations, Tautologies and contradictions, Logical equivalence, Algebra of Propositions.

Sets with binary operations: Binary operations, Semigroups, Monoids, Groups, Subgroups, Homomorphisms, Congruence relations, Cycle and Rings.

Counting: Basic counting principle; Factorial, Permutations, and Combinations; Pigeonhole principle, Generating function, Binomial coefficients and theorem.

Graphs: Introduction, Multigraph, Connectivity, Planar graph, Graph colorings and Representing graphs in memory.

Tree: Introduction, Binary trees, Completed and extended binary trees, Traversing, Binary search trees and Representing binary trees in memory.

EEE 161	Basic Electrical Engineering	3.0

Fundamental electrical concepts and measuring units; Direct current: voltage, current, resistance and power; Laws of electrical circuits and methods of network analysis; Introduction to magnetic circuits; D.C. Transients; 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.

EEE 162	Basic Electrical Engineering Lab	1.5

Laboratory works based on Course EEE 161

GED 163	Accounting	3.0

The accounting profession, accounting concept, introduction to book keeping, rules of double entry, preparing balance sheets and profit and loss statement, balance-day adjustments, closing accounts, computerized accounting systems, accounting for companies, analysis of financial reports, product costing, cost planning and control, time value of money.

GED 165	English	3.0

1. English phonetics:

The places of articulation and the manners of articulation of the English Sounds.

2. English grammar:

Rules of Syntax: Grammatical principles and structures, construction of Sentences, Right form of verbs.

3. Developing Vocabulary:

Correction of Sentences, Transformation of Sentences, Phrases and Idioms, Prefixes and Suffixes, Changing words into different forms. Synonym and Antonym, Preposition, Framing Questions.

4. Writing Skill:

Comprehension, Paragraph writing, Precis writing, Amplification, Memo and Report writing, Letter writing.

MATH 167	Calculus and Differential Equation	3.0

Differential Calculus: Limits, continuity, and differentiation of real-valued functions. Successive differentiation. Expansion of functions. Maxima and Minima. Partial differentiation. Tangent and Normal.

Integral Calculus: Methods of substitution. Integration by parts. Integration of special trigonometric and rational functions. Fundamental Theorem of Calculus. General properties of definite integrals. Simple definite integrals and reduction formula. Beta & Gamma Function. Length and areas of plane curves. Volumes and surface-areas of solids of revolution.

Ordinary Differential Equation: Degree and order of ordinary differential equations. Formation of differential equations. Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher orders with constant coefficients, Solution of homogeneous linear equations. Solution of differential equations of the higher order when the dependent or independent variables are absent. Solution of differential equation by the method based on the factorization of the operators.

First Year Second Semester

CSE 121	Structured Programming	3.0

Introduction: Procedural and non-procedural Programming Languages, Structured Language, Problem solving techniques, algorithm specification and development. Programming style, Debugging, Program documentation. Program design methodologies, Structured and modular program design.

Introduction to C Programming: C programming environment, simple C programs, variables, arithmetic in C, and operators in C.

Structured Programming Approach: Algorithm, pseudo code, control structures: (sequential, selection, repetition), if selection, if-else selection, while repetition, counter controlled repetitions, assignment, increment/decrement operators.

Program Control: Essentials of repetitions (loop); for, while and do-while loops; switch multiple selection structure, break and continue statements.

Functions: Program modules in C, user-defined and library functions, header files, parameter passing, storage classes, scope rules, recursion.

Arrays and Pointers: Array: declaring arrays, types of arrays with examples, passing arrays to functions, sorting and searching arrays; Pointers: pointer arithmetic, pointers and functions, pointers and arrays, pointers to pointers.

Structures and Unions: Basics of structures, initialization, structures and functions, structures and arrays, pointers to structures, structures within structures and unions.

Dynamic Memory Management: Malloc, Calloc, Free, and sizeof functions.

File Management: Low Level and high level file access. Sequential and random access files, error handling.

Preprocessor: macro substitution, header file inclusion, study of standard libraries like studio. H, ctype.h, string.h, math.h, stdlib.h, dos.h

CSE 122	Structured Programming Lab	1.5

Laboratory works based on Course CSE 121

CSE 127	Numerical Methods	3.0

Numbers and errors: Significant figures. Absolute and relative error. Rounding. Error in functional evaluation. Propagation of error in arithmetic process. Single non-linear equ: Picard iteration. Neuton Raphson method Convergence.Interpolation: Difference tables. Newton forward and backward interpolation formulae with error. Divided difference and central difference formulae. Lagranges Interpolation formula. Numerical differentiation. Numerical integration by Trapezoidal rule. Simpson's rule. Rhomberg rule with error. Curve fitting by least squares. Cubic spline. che byshev polynomials. Minmax properties.

Differential equations: Modified Euler method . Runge –Kutta method. Predictor corrector method, Linear algebraic systems, Direct and iterative methods, Matrix inversion.

Solution of partial differential equation: Introduction to partial differential equation. Geometric interpretation. Definition of elliptic , parabolic and hyperbolic partial differential equation .

Eigen Values and Eigen Vectors: Introduction and concept of eigen value and eigen vector. Solution of homogeneous linear system. Estimation of the size of Eigen values.

MATH 171	Matrix and Vector Analysis	3.0

Matrices: Definition and Algebra of matrices; Special types of matrices. Determinant of a square matrix: Properties; Crammer's rule; Rank of a matrix; elementary transformation and normal form. The adjoint and inverse of a square matrix. Matrix inversion by partitioning; Solution of system of linear equations: Gauss-Jordan method.

Vector Algebra : Concept of vector and scalar quantities and variables, addition and subtraction vectors, Multiplication of vector by a scalar and vector products; Vector triple products, Some of vector algebra in Computer Science (such as in Computer Graphics)

Vector calculus : Differentiation of vector function, Difference derivative- gradient, divergence and curl, Green, Gauss and Stoke's theorem.

EEE 175	Electronics	3.0

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, V-I 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 Transistor (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): liner applications of OPAMPs, gain, input and output impedance, 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.

EEE 176	Electronics Lab	1.5

Laboratory works based on Course EEE 175

PHY 177	Physics	3.0

Heat and Thermodynamics : Kinetic theory of gases: Maxwell's distribution of molecular speeds, mean free path, equipartition of energy, thermodynamics and its applications, Carnot cycle; Maxwall relations.

Structure of Matter : Crystalline and non-crystalline solids, single crystal and polycrystal solids, unit cell, crystal systems, co-ordinations number, crystal planes and directions.

Waves and Oscillations: Differential equation of a simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, Lissajous' figures, spring-mass system, calculation of time period of torsional pendulum, damped oscillation. determination of damping co-efficient, forced oscillation, resonance, two-body oscillations, Reduced mass, differential equation of a progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity, architectural acoustics, reverberation and Sabine's formula.

Sound and Acoustics: Perception of sound, Longitudinal and transverse waves, Sound wave properties and characteristics, Speed of sound, Acoustics and noise, Sound pressure level

Light and Optics: Polarization, diffraction, interference, Inverse square law, reflection, refraction, optics system, optics of the human eye

GED 179	Nazrul Studies	3.0

bRiæj-cvV

1.1 bRiæ‡ji Rxeb I `k©b

1.2 Kve¨MÖš' : AwMœ-exYv

1.3 Dcb¨vm : g„Zz¨-ÿzav

1.4 Mí : K. *e¨_vi `vb* MíMÖš' ‡_‡K : Ôe¨_vi `vbÕ, Ô‡nbvÕ, ev`j-ewil‡YÕ|
L. *wi‡³i †e`b* MíMÖš' †_‡K : ÔevD‡ji AvZœKvwnbxÕ, Ôwi‡³i †e`bÕ, Ôivÿzmx Õ
M. *wkDwj-gvjv* MíMÖš' †_‡K : ÔcÙ-‡MvLivÕ, ÔAwMœ-wMwiÕ, ÔwkDwj-gvjvÕ|

1.5 MxwZ :
1. AÄwj jn †gvi m½x‡Z
2. GwK Aci*f*c i*f*‡c gv †Zvgvi †nwiby cjøx Rbbx
3. I fvB LuvwU ‡mvbvi †P‡q LuvwU
4. ‡LwjQ G wek^ j‡q
5. Pj Pj Pj
6. Zzwg wK Avwm‡e bv
7. cÙvi †XD‡i
8. jvBjx ‡Zvgvi G‡m‡Q wdwiqv
9. kvIb iv‡Z hw` ¯§i‡Y Av‡m †gv‡i
10. ïK‡bv cvZvi b~cyi cv‡q

1.6 cÖeÜ :

1. Ô‡hŠe‡bi MvbÕ, 2. ÔeZ©gvb wek^mvwnZ¨Õ, 3. ÔivRe›`xi Revbe›`xÕ, 4. ÔAvgvi ^KwdqZÕ, 5. Ôgw›`i I gmwR`Õ, 6. Ôwn›`y-gymjgvbÕ, 7. ÔWvqv‡ii ¯§„wZ¯Í¤¢Õ, 8. ÔKvjv Av`gx‡K ¸wj K‡i gvivÕ, 9. ÔmZ¨ wkÿvÕ, 10. ÔRvZxq wkÿvÕ, 11. ÔRvZxq wek^we`¨vjqÕ, 12. ÔevOjv mvwn‡Z¨ gymjgvbÕ|

1.7 bvUK :

1. ÔcyZz‡ji we‡qÕ, 2. ÔwSwjwgwjÕ|

1.8 cÎvewj :

1. wcÖwÝcvj Beªvwng Luv wjwLZ ÔwPwVi DË‡iÕ|
2. †eMg kvgmybœvnvi gvngy`‡K wjwLZ cÎ|

CSE 100	Software Development Project-I	1.5

Development of software within this semester under the guidance of departmental teachers.

Second Year First Semester

CSE 201	Object Oriented Programming	3.0

Introduction: Concepts of Object Oriented Programming (OOP); Advantages of OOP; Applications of OOP; Encapsulation, classes, objects and methods, access specifies, static and non-static members; Overview of C++ and Java languages; Constants, variables, data types, operators and expression; Branching and looping statements; Functions, constructors and destructors; Arrays, strings and pointers.
Inheritance: single and multiple inheritance, interfaces.
Polymorphism: overloading, abstract classes, virtual functions and overriding; Errors and exceptions; Packages; Applet and graphics programming; Multi-threaded Programming; and Input/output files .
Reference languages: C++ and Java.

CSE 202	Object Oriented Programming Lab	1.5

Laboratory works based on CSE 201

CSE 203	Data Structures	3.0

Introduction: Basic Terminology; Elementary Data Organization; Data Structures; Data structure Operations; Control Structures; Algorithms: Complexity, Time-Space Tradeoff, Mathematical Notation and function, String Processing : String Operations, Word Processing, and pattern Matching Algorithms.

Arrays, Records and pointers: Linear Arrays; Representation of linear array in memory; Traversing linear arrays. Inserting and Deleting;

Sorting; (Bubble sort), Searching (linear, binary), Multidimensional Arrays; Pointer Arrays; Record Structures; Matrices.

Linked lists: Representation of linked lists in memory, Traversing a linked list, Searching a linked list, insertion, deletion; Header and tow-way lists.

Stacks, Queues, Recursion: Array Representation of Stacks, Polish Notation; Quick sort, Recursive definition; Towers of Hanoi, Implementation of Recursive procedures, Queue Dequeue, Priority Queues.

Trees: Binary Trees; Representing Binary Trees in memory, traversing binary tree, Header Nodes; Threads, binary search trees, Heap tree, Heap sort, Huffman's Algorithm.

Graphs: Sequential Representation of Graph; Adjacency Matrix; Path Matrix; Warshall's Algorithm; Linked representation of Graphs.

CSE 204	**Data Structures Lab**	**1.5**

Laboratory works based on Course CSE 203

CSE 205	**Digital Logic Design**	**3.0**

Digital logic: Boolean algebra, De Morgan's Theorems, logic gates and their trust tables, canonical forms, combination logic circuits, minimization techniques; Arithmetic and data handling logic circuits, decoders and encoders, multiplexers 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 minimizations and assignments; Pulse mode logic; Fundamental mode design.

CSE 206	**Digital Logic Design Lab**	**1.5**

Laboratory works based on CSE 205

MATH 261	**Co-ordinate Geometry**	**3.0**

Co-ordinate Geometry of two dimensions: Change of axes, Transformation of co-ordinates, simplification of equations of curves; General equation of second degree. Pairs of Straight lines, Circle, System of Circle, Parabola, Ellipse, Hyperbola.

Co-ordinate Geometry of three dimensions: System of co-ordinates, distance of two points, Section formula, Projection, direction cosines, Equations of planes and lines. Sphere, Cone, Central conicoids.

MATH 273	Statistics and probability Theory	3.0

Element of Statistics: Nature and scope of statistics, nature and representation of statistical data, attributes and variables, discrete and continuous variables, methods of data collection.

Measures of Location: Characteristics of an ideal measure; arithmetic mean; geometric mean; harmonic mean; median; mode; quartiles; deciles; percentiles.

Measure of Dispersion: Characteristics of an ideal measure; absolute and relative measures; range; standard deviation; mean deviation; quartile deviation; coefficient of dispersion; coefficient of variation; skew ness and kurtoisis.

Elements of Probability : Meaning and definition of probability; a priori probability and a posteriori probability; basic terminology of probability; random variables; probability function; expectation of sum and products.

Regression and Correlation: Relationship between variables, fitting of regression lines, simple correlation, multiple correlation and regression.
Test of Significance: Tests of mean; variance,; correlation coefficient; and regression coefficient.
Probability Distribution: Concept of stochastic process; binomial, Poisson, Normal, and Exponential distributions; 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/G/1, M/D/1, G/M/1,

solution network queues; closed queuing models and approximate models.

Second Year Second Semester

CSE 221	Algorithms	3.0

Techniques for analysis of algorithms; Methods for the design of efficient algorithms: divide and conquer, greedy method, dynamic programming, back tracking, branch and bound; Basic search and traversal techniques; Topological sorting; Connected components, spanning trees, shortest paths; Flow algorithms; Approximation algorithms; Parallel algorithms; Algebraic simplification and transformations; Lower bound theory; NP-completeness, NP-hard and NP-complete problems.

CSE 222	Algorithms Lab	1.5

Laboratory works based on CSE 221

CSE 223	Database Management System	3.0

Introduction to Database: Database concepts, database management system, database applications, database languages, database design, data mining, database architecture, database users and administrators; Relational Database, relational model, relational-algebra operations, null values; Entity-Relationship (E-R) Model, E-R diagrams, E-R features, constraints, weak and strong entity sets; SQL, structure of SQL queries, operations, aggregate functions, subqueries; SQL data types and Integrity Constraints; Transaction Concept, transaction state, ACID properties, concurrent executions, serializability.

Database Programming: Programming concept, SQL Operators and Statements, SQL Data Types, SQL Functions, Creating a Database, Opening a Database, Modifying a Database, Modifying a Database Structure, Transaction control; PL/SQL, Procedures, Functions; Programming for Data Entries, Update, Report, and Menu; Projects on DBMS using ORACLE or other database packages instructed by the teachers.

CSE 224	Database Management System Lab	1.5

Laboratory works based on CSE 223

CSE 225	Computer Architecture and Organization	3.0

Fundamentals of Computer Design: Introduction, definition of performance, job of computer designer, historical perspectives.

Processor design: Introduction, Processor Organization, information representation, number formats; Instruction types; Fixed point Arithmetic: Addition, subtraction, multiplication, division; ALU design, Basic ALU Organization, floating point arithmetic, arithmetic processors; Stack processor.

Control design: Introduction, Instruction Sequence, instruction interpretation; Hardwired control: Design methods, multiplier control unit, CPU control unit; Micro-programmed control: Basic concepts, control memory optimization, multiplier control unit, Micro-programmed Computers: Conventional and nanno-programmed computers;

Memory Organization: Review of primary and secondary memories; memory hierarchies; High-speed memories, Interleaved memories, Caches, associative memories.

System Organization: Communications: Introduction, bus control; I/O systems: Programmed I/O, DMA and interrupts, I/O processors, Basic concepts of parallel processing.

RISC and CISC processors: Introduction, data dependency, addressing modes, condition code, register sets, brief study of standard RISC and CISC processors.

CSE 227	Digital Electronics and Pulse Technique	3.0

Diode logic gates, transistor switches, transistor gates, MOS gates; Logic Families: TTL, ECL, IIL and COMS 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, PLAs; A/D and 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 generation; monostable, bistable and astable multivibrators, Schmitt trigger, blocking oscillators and time-base circuit; Timing circuits; Simple voltage sweeps, linear current sweeps.

CSE 228	Digital Electronics and Pulse Technique Lab	1.5

Laboratory works based on CSE 227

GED 272	Technical Writing and Presentation	1.5

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: L_AT_EX; Diagram drawing software; presentation tools.

MATH 275	Complex variable, Laplace transformation and Fourier Analysis	3.0

Complex Variables: The Theory of Complex Variables, Introduction, Functions of a complex Variables, The Derivative and the Cauchy-Riemann Differential Equations. Analytic functions, Line Integrals of Complex Functions, Cauchy's Integral Theorem, Cauchy's Integral formula, Taylor's Series, Laurent's series , Cauchy's Residue Theorem , Singular points of an Analytic function, Evaluation of Residues, The Evaluation of Real Definite Integrals.

Fourier Series and Fourier Integrals: Introduction, Fourier Coefficients and Fourier series representation, complex Fourier series and the Dirac δ function, Fourier Integral and Transforms, Applications.

The Laplace Transforms: Theoretical preliminaries, The general method, The Transforms of Special Functions, Further General Theorems, The Heaviside Expansion Theorem, Transforms of Periodic Functions, Convolution and Duhamel Formulas.

CSE 200	Software Development Project-II	1.5

Development of software within this semester under the guidance of departmental teachers.

Third Year First Semester

CSE 301	Microprocessors	3.0

Introduction: Microprocessors and microcomputers; Evolution of microprocessors; microprocessor applications; Programming Languages; General architecture of microprocessor; The Memory; Input/Output; Co-processors.

Microprocessor Software Concepts: Instruction formats; Addressing Modes; Instruction Types; Introduction to Assembly Language Programming.

Intel 8085 microprocessor: Internal architecture; Register structure; Programming model; Addressing modes, Instruction set; Interrupts, Programming; Memory subsystem and Interfacing; Bus timing and standards.

Intel 8086/8088 microprocessors: Internal architecture; Register structure; Programming model; Addressing modes; Instruction set, Interrupts and Memory interfacing.

Overview of Other Processors: Intel 80186, 80286, 80386, 80486 & Pentium microprocessors and other advance processors; Motorola 68000.

Arithmetic co-processor; Microcontrollers; Integrating microprocessor with interfacing chips.

CSE 302	Microprocessor and Assembly Language lab	1.5

Laboratory works based on CSE 301

CSE 303	Operating Systems	3.0

Introduction: Evolution, Goals and Components of OS, Types of OS; **Process management:** Process states and state transition, Process Control Blocks, Job and Process scheduling.

CPU Scheduling: Scheduling levels, Objectives and criteria, CPU scheduling algorithms, Algorithm Evaluation.

Process Synchronization: Process co-ordination, Critical section problems, Semaphores, Monitors, Classical problems of process synchronization.

Deadlock: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, avoidance, and detection, Recovery form deadlock, Combined approach to deadlock handling.

Memory management: Logical versus Physical Address Space, Swapping, Memory allocation schemes, Paging and Segmentation, Segmentation with Paging.

Virtual memory: Demand paging, Performance of Demand Paging, Page replacement, Page replacement algorithms, Allocation of frames, Trashing, Other Considerations, Demand Segmentation.

Secondary storage management: Disk structure, Disk scheduling, Disk management, Swap-space management, Disk reliability, Stable storage implementation.

File-System: File and Directory concept, File system structure, Allocation method, Free space Management, Directory Implementation; Protection and Security.

CSE 304	Operating Systems Lab	1.5

Laboratory works based on CSE 303

CSE 305	Theory of Computation	3.0

Study Finite automata and regular expressions; properties of regular sets, pumping lemma, closure properties, decision algorithms and Myhill-Nerode theorem; context-free grammars; push down automata; context free languages; Turing machines, Chomsky hierarchy, Recursive, Valid and Invalid computation, Deterministic context- free languages.

CSE 307	Internet and Web Programming	3.0

The Internet: Evolution of the Internet, addressing and routing. Internet applications: FTP, Telnet, Email, Chat.
World Wide Web: HTTP protocol. Designing techniques of web pages: HTML, forms, CGI scripts and clickable maps. Perl, DHTML, XML. E-Commerce and security issues including symmetric and asymmetric key, encryption, digital signature and authentication. Emerging trends, Internet telephony, Intranet and extranet, firewall design issues. Web server, web dB
Client Side Scripting: VB script, Java script, JQuery, AJAX, PHP
Serve Side Scripting: ASP, JSP, PHP, Servlet, C#, ASP.net
Case Studies: Design and development of E-commerce based site.

CSE 308	Internet and Web Programming Lab	1.5

Laboratory works based on CSE 307

CSE 309	Data Communication	3.0

Introduction: Data communication networks, standards, communication architecture.
Data Transmission: Spectrum and bandwidth, Time and Frequency Domain, Analog and digital data transmission, Transmission impairments, Channel capacity, Transmission media.
Data Encoding: Digital data and digital signaling, Analog-to-Digital Conversion, Digital-to-Analog, Digital-to-Digital Conversion.
Multiplexing: FDM, WDM, TDM, STDM, Digital Subscriber Line.
Data Communication Interface: Parallel and Serial Transmission, Asynchronous and synchronous transmission, RS232C (or EIA 232D) standard, Different types of Modems.
Switching: Space division and time division switching, Two-dimensional switching, Circuit switching, Packet switching and hybrid switching, Timing, Network Synchronization, Routing and Traffic Control.
Digital Integrated Services Networks: X.25 standard, Frame Relay, ISDN, ATM, SONET/SDH.

Third Year Second Semester

CSE 321	Computer Networks	3.0

Introduction: Introduction to Computer Networks, Network Goals, Applications of Networks, Network Structure, Network Architectures, The OSI Reference Model, Data Transmission in the OSI Model, OSI Terminology, Connection-Oriented and Connectionless Services, Service Primitives, Public Networks, The ARPANET, SNA.

Local Area Network : LAN Technology - Architecture, Topology, Wireless LAN. LAN System - Ethernet and Fast-Ethernet, Token Ring and FDDI, ATM LANs. Bridges - Bridges operation, outing through the bridge, ATM LAN emulation.

Wide Area Network: Circuit switching and Packet Switching concept, Frame Relay - frame relay protocol architecture, frame relay call control, user data transfer, network function and congestion control.

The Data Link Layer: Services Provided to the Network Layer, Framing, Error Control, Flow Control, Error Detection and Correction, Error Correcting Codes, Error Detecting Codes, Stop-and-Wait Protocol, Sliding Window Protocol, Go Back n Protocol, Selective Repeat Protocol, Performance of Stop and Wait Protocol and Sliding Window Protocol, The Data Link Layer in Public Networks, The Data Link Layer in ARPANET.

Communication Architecture and Protocol: Protocols and Architecture - protocols , network reference model, TCP/IP protocol suite. Internetworking - principles of internetworking, connectionless internetworking, The Internet protocol, Routing Protocol, Ipv6 and ICMv6. Transport Protocol - Transport Services, Protocol mechanisms, TCP, UDP

CSE 322	Computer Networks Lab	1.5

Laboratory works based on Course CSE 321

CSE 323	Compiler Design	3.0

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, finite automata, from regular expression to NFA, from NFA to DFA, design of a lexical anlyzer 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, backpatching, procedure calls.

Code optimization: principle of source optimization, optimization of basic blocks, loop in flow graphs, global data flow analysis, iterative solution of data flow equations.

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 optimazations, generating code from dags.

CSE 324	Compiler Design Lab	1.5

Laboratory works based on Course CSE 323

CSE 325	Computer Peripherals and Interfacing	3.0

Basic I/O Interface: Introduction to I/O interface, I/O port address decoding, programmable peripheral interface (PPI), programming the 82C55, an LCD display interfaced to 82C55, a stepper motor interfaced to 82C55, the 8279 programmable keyboard/display interface, key matrix interface, 8254 programmable interval timer (PIT), de motor speed and direction control, 16550 programmable communication interface, analog-to-digital (ADC) and digital-to-analog (DAC)

converters, DAC0830, ADC080X, Hard disk, monitor, scanner, interfacing.

Memory interface: Introduction, memory devices, address decoding, 8088 and 80188 (8-bit) memory interface, 8086, 80186, 80286 and 80386SX (16-bit) memory interface, 80386DX and 80486 (32-bit) memory interface, Pentium and Pentium Pro (64-bit) memory interface, dynamic RAM, DMA controller.
Bus Interface: ISA bus EISA, Peripheral Component Interconnect (PCI) bus, Parallel Printer Interface (LPT), serial com port, Universal, Serial Bus (USB), Accelerated Graphics Port (AGP). PCI EX press (PEQ).

CSE 326	Computer Peripherals and Interfacing Lab	1.5

Laboratory works based on CSE 325

CSE 327	System Analysis and Design	3.0

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 analysis: 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, Object oriented analysis and design methodology, UML diagram, useer stories, use cases.
System Implementation: structured programming, Method for testing, Software maintenance.

GED 371	Economics	3.0

Nature of the economics theory, applicability of economic theories to the problem of developing countries. Some basic concepts - supply, demand and their elasticities. The relationship among average, margin and total and their derivation. Equilibrium - stable, straight and dynamic equilibrium. Consumer's equilibrium-indifference curve, producer's equilibrium-isoquant. Production-factors of production, production possibility curve-equilibrium of a firm, fixed cost and variable cost, the short run and the long run. The cost curves and supply curves, law of returns, internal and external economics and diseconomies. Economics of development and planning, basic concept-saving, investment, GNP, NNP, pereapita income, growth rate, policy instruments of development. Fiscal policy, monetary policy and trade policy, their relative applicability in Bangladesh, some planning tools-capital output ratio, input analysis, planning in Bangladesh -five year plans of Bangladesh, development problems related to agriculture, industry and population of Bangladesh.

GED 374	Developing English Skill Lab	1.5

Grammar: Tense, article, preposition, subject-verb agreement, clause, conditional and sentence structure.

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

Developing redings 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 from parapraphs, weiting paragraphs, essays, reports, formal and informal letters,

Listening skill and note taking: Listening to recorded texts and class lectures and learning to take notes based on listening.

Developing speaking Skill: Oral skills including communicative expressions for presonal identification, life at home, giving advice and opinion, instruction and directions, requests, complaints, apologies, describing people and places, narrating events.

CSE 300	Software Development Project-II	1.5

Development of software within this semester under the guidance of departmental teachers.

Fourth Year First Semester

CSE 401	Software Engineering	3.0

Software engineering principles; life cycle models; sizing, estimation, planning and control; requirements specification; functional specification and design using Z; integration and testing strategies; quality assurance; configuration management; software maintenance. Management of programming teams, Programming methodologies, debugging aids, documentation, evaluation and measurement of software, verification and testing techniques, and the problems of maintenance, modification and Portability. Software project planning.

CSE 402	Software Engineering Lab	1.5

Laboratory works based on CSE 401

CSE 403	Computer Graphics	3.0

Introduction to Computer Graphics: Introduction, Presentation graphics, Application Areas, GUI; Graphics Hardware: Display devices Architecture and Input Devices.

Graphic Primitives: Drawin Lines, Circles, Ellipse, Rectangles, Arcs; Polygons: Using scan conversion algorithm, inside-outside tests, polygon fill algorithms, Character generation.

Geometric Transformations: Basic transformations, Affine Transformations, Translations, Rotations, Scaling, reflection and Shearing, Composite transformations matrices, Transformation of 3D objects (4×4 matrices).

Viewing and Clipping: Viewing pipeline, different types of projections, projection matrices.

Curve and Surface design: Interpolation and approximation techniques, 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, BSP tree, Octree, 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.

Some Topics of Graphics: CAD, Introduction to OPEN GL, Virtual reality and Animation.

CSE 404	Computer Graphics Lab	1.5

Laboratory works based on Course CSE 403

CSE 407	Communication Engineering	3.0

Principles of communication system: Basic constituents of communication system. Need for using high carrier frequency. Classification of RF spectrum.

Noise: Classification of noise. Addition of noise due to several sources. Signal to noise ratio. Noise figure.

Modulation theory: Definition, types of modulation: AM, FM. Mathematical expressions of AM, FM and signals. Comparison of frequency modulation and Amplitude modulation. Pre-emphasis and de-emphasis. Wide band FM and narrow band FM. Stereophonic FM Multiplex system. SSB, DSBSC. Modulation/Demodulation methods**.**

Space Communication: Introduction, Types of satellite, Orbits, station keeping, satellite altitude, transmission path, path losses, satellite construction, VSAT.

Optical fiber Communication: Introduction, principle of light transmission in a fiber, light sources for fiber optics, modulation techniques, receiver design, fiber optic communication system.

Telecommunication: Introduction, simple telecommunication system. Basic of a switching system.

Telecommunication network: Major telecommunication network, Data transmission and data rates in PSTN. Switching techniques of PSTN, Public Telecommunication network.

ISDN: Motivation and protocol for ISDN, ISDN standard, Expert system in ISDN. ISDN channel and broadband ISDN. Transmission channel, Signaling, Numbering and addressing of ISDN.
Cellular Mobile Communication: Operation of Cellular mobile Systems, Planning, Analog and Digital Cellular System, AMPS, GSM, TDMA, CDMA, GPRS, EDGE, WAP.

CSE 409	Digital Signal Processing	3.0

Introduction to Signals: Concepts of signals, systems and signal processing; classification of signals; Digital signals and systems; Classification of discrete time signals; Sampling theorem; Fourier series and Fourier transform; Autocorrelation.

The Z-Transform: The Z-Transform and its properties; The inverse Z-Transform.

The Discrete Fourier Transform (DFT): The Discrete Fourier Transform (DFT), redundancy in the DFT; The Fast Fourier Transform (FFT); the FFT decimation in time & decimation in frequency; Interrelationship between the DFT & Z-transform; Convolution of sequences & sectioning.
Digital Filter: Digital Filter characterization; Digital filter structures; Design of Digital Filters; Recursive Filter design; Effects of finite word length; Simple models for quantization noise in recursive systems; Non-recursive filter design via the DFT computational techniques; Other radix formulations; Other radix formulations; Spectral analysis using the FFT; Speech processing algorithms.

CSE 410	Digital Signal Processing Lab	1.5

Laboratory works based on Course CSE 409

CSE 431	Digital speech processing	3.0

Introduction: Speech as Signal : Signal Processing : digital Signal Processing.

Fundamentals of Digital Speech Processing: Introduction; Discrete Time Signals and Systems; Transform Representation of Signals and Systems; Review of FIR and IIR Digital Filters; Review of sampling Theorem.

Digital Models of Speech Signal: Process of speech production ; Acoustic Theory of speech production; Lossless Tube Models; Digital Models of Speech Signals.

Time – Domain Models for Speech Processing: Time Dependent Processing of Speech : Short – Time Energy and Average Magnitude; Short – Time Average Zero – Crossing Rate; Speech Versus Silence Discrimination Using Energy and Zero-Crossings; Pitch Period Estimation Using a Parallel Processing Approach; Short-Time Auto – Correlation Function; Short Time Average Magnitude Difference Function; Pitch Period Estimation Using Auto-correlation Function; Median Smoothing and speech processing.

Digital Representations of speech Waveform: Sampling Speech; Review of Statistical Model of Speech ; Instantaneous Quantization; Adaptive Quantization; General Theory of Differential Quantization; Delta Modulation; Differential PCM; comparison of Systems; Direct Digital Conversion.

Short – Time Fourier Analysis: Definitions and properties; Design of Filter Banks; Implementation of filter Bank Summation method; Spectrographic Method Using FFT; pitch Detection; Analysis by Synthesis; Analysis – Synthesis Systems.

Homomorphic Speech Processing: Homomorphic Systems form Convolution; The Complex Cepstrum of Speech; Pitch Detection; Format Estimation; Homomorphic Vocoder.

Linear Predictive Coding of speech: Basic Principle of Linear Predicative Analysis; Computation of Gain for the Model; Solution of LPC Equations; Comparison Between the Models of Solution of LPC Analysis Equations; Prediction Error Signal; Frequency – Domain Interpretation of Linear Predictive Analysis; Relation of Linear Predicative Analysis to Lossless Tube Models; Relation Between Various Speech Parameters; Synthesis of Speech from Linear Predicative Parameters; Application of LPC Parameters.

Digital Speech Processing for man – machine Communication by Voice: Voice Response Systems; Speaker Recognition; Speech Recognition Systems.

CSE 432	Digital speech processing Lab	1.5

Laboratory works based on Course CSE 431

CSE 433	Robotics Technology	3.0

Introduction to Robotics, History Present Status and future Trends, Robot Kinematics, Robot Drives, Actuators and Control, Robot End-effectors, Sensors and Intelligent Robots, Robot Languages and Programming, Basic Electronics and Computer Interfacing, Flexible Automation Technology, Quantitative Techniques for Economic Performance, Applications of Robots.

CSE 434	Robotics Technology Lab	1.5

Laboratory works based on Course CSE 433

CSE 435	Network Security	3.0

Network Security Fundamentals: Network Security and open systems, typical security requirements and attacks; Security policy, threats and safeguards, security services, intrusion detection and security audit.

Security in Layered Protocol Architecture: Protocol Layering, the OSI layer structures, services, and protocols, TCP/IP protocol suite, architectural placement of security services, management of security services.

Authentication: General concepts, Message Authentication, passwords and other no-cryptographic mechanisms, cryptographic mechanisms, authentication protocol subtleties, data origin authentication.

Access Control: Policies and mechanisms, access control function distribution, management of access control information.

Confidentiality and Data Integrity: Confidentiality and Data Integrity mechanisms, combining congeniality and data integrity.

Security Protocols : General security architectural concepts, transport layer security protocol, network layer security protocol, IEEE LAN security protocol, OSI upper layers architectural overview, upper layers security model, security exchanges.

Electronic Mail and EDI Security: MHS (X.400) overview, security services, security protocol elements, security techniques, EDI security, Internet privacy enhanced mail.

Directory Systems Security: Directory (X.500) overview, security requirements, directory authentication framework (X.509), access control lists.

Classical cryptography: Introduction to simple cryptosystems, Shanon's Theory: Perfect Secrecy, Entropy, Perfect Cryptosystems.

The data Encryption Standard: Conventional encryption, Modes of operation, Differential Cryptanalysis; RSA System and Factoring: Introduction to Public-key cryptography, The RSA cryptosystem, Attacks on RSA, Factoring Algorithms. Other Public key cryptosystems:

The EiGamal cryptosystem and discrete Logs, The Merkle-Hellman Knansack System.

Signature Schemes: The ElGamal Signature Scheme, The Digital Signature Standard, Fail Stop Signature. Hash Functions: Signatures and Hash Functions, Collision – Free Hash Functions, The Birthday Arrack. Key Distribution & Key Agreement: Pre-distribution, Kerboros, DiffieHellman Key Key Exchange.

CSE 436	Network Security Lab	1.5

Laboratory works based on Course CSE 435

CSE 437	Parallel and Distributed Processing	3.0

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.

CSE 438	Parallel and Distributed Processing Lab	1.5

Laboratory works based on Course CSE 437

CSE 443	Natural Language Processing	3.0

Introduction to Linguistics: Knowledge in speech and language processing, ambiguity, models and algorithms, Language, thought and understanding, Historical Development of Computational Linguistics and Natural Language Processing.

Morphology: Structure of words, background concepts, complex words and morphemes, Inflectional versus derivational morphology, problematic aspects of morphological analysis, meaning of complex words, morphological anaphora.

Regular Expression and Automata: Regular expression, Finite state automata, Morphology, Finite state morphology, Morphological parsing, FST lexicon and rules, Morphological processing.

Phonetic and Phonemic Transcription: Background concepts, representation of speech sounds, phonemic transcription, vowel and consonant phonemes, phonetic variations of a phonemic theme, relationship between phonetic and phonemic representation.

Phonology: Introduction to phonology, Internal structure of speech sounds, external organization of speech sounds, computational phonology and phonological rules, Text-to- speech (TTS) processing, Prosody in TTS, Human processing of Phonology and Morphology; context-Free grammar: Context free tree and rules, grammar and human processing.

Syntax: Background concepts, informal theory of syntax, formal syntactic theory, tag sets, part-of speech tagging, rule-based part-0f-speech tagging, stochastic part-of-speech tagging, transformation-based tagging, multiple tags, class-based n-grams.

Semantics: Semantics as a part of grammar, meaning and denotation, Semantic theory, computational desiderata for representations, meaning structure of language, predicate argument structure, first order predicate calculus (FOPC), elements of FOPC, semantics of FOPC, variables and quantifiers, inference.

Semantic Analysis: Syntax-driven semantic analysis, attachments for fragments, integrating semantic analysis, idioms and compositionality, robust semantic analysis.

Bangla Language Processing: Computational analysis of Phonemes, Context free grammar representation and processing, TTS and morphological processing.

CSE 444	Natural Language Processing Lab	1.5

Laboratory works based on Course CSE 443

CSE 445	Basic Graph Theory	3.0

Simple graphs, digraphs, subgraphs, vertex-degrees, walks, paths and cycles; Tress, spanning trees in graphs, distance in graphs; Complementary graphs, cut-vertices, bridges and blocks, k-connected graphs; Euler tours, Hamiltonian cycles, Chinese Postman Problem, Traveling Salesman Problem; Chromatic number, chromatic polynomials, chromatic index, Vizing's theorem, planar graphs, perfect graphs.

CSE 446	Basic Graph Theory Lab	1.5

Laboratory works based on Course CSE 445

Fourth Year Second Semester

CSE 421	Artificial Intelligence	3.0

- Introduction**:** Introduction to AI and intelligent agents, General Concept of Knowledge.
- Problem solving by searching : formulating problems, uninformed and informed search strategies, local search, evaluation of behavior and estimated cost, applications
- Constraint satisfaction : formulating problems as CSP, backtracking and constraint propagation, applications
- Games and adversarial search : minimax algorithm and Alpha-Beta? pruning, applications
- Propositional logic : representing knowledge in PL, inference and reasoning, applications
- First-order logic : representing knowledge in FOL, inference and reasining, forward and backward chaining, rule-based systems, applications
- Planning : languages of planning problems, search methods, planing graphs, hierarchical planning, extensions, applications
- AI, philosophy and ethics : can machines act intelligently, can machines really think, ethics and risks of AI, future of AI

CSE 422	Artificial Intelligence Lab	1.5

Laboratory works based on CSE 421

CSE 423	IT Organization and Management	3.0

Management Fundamentals: Managers & Management, Managing in today's world.

Planning: Foundation of planning and decision making.

Organizing: Basic organization, staffing & human resource management, managing change & innovation.

Leading: Foundations of individual & group behavior, undertaking work teams, motivating & rewarding employees, leadership & trust, communication & inter-personnel skills.

Marketing Management: Concepts; Strategy; Sales promotion; Patent laws.

Controlling: Foundation of Control, Technology & Operations.

IT industry Scenario: Study on various types of IT organizations- Software development, Software Testing, Network, ISP, Web development etc. IT status in various countries, Organization of an Information Service Centre, organcgram, infrastructure, external communication, administration & management scenario of an IT organization.

IT Project Management

CSE 451	VLSI Design	3.0

VLSI Design methodology : Top-down design approach, technology trends and design automation algorithm ; 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 language, 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.

CSE 452	VLSI Design Lab	1.5

Laboratory works based on CSE 451

CSE 453	Pattern Recognition	3.0

Introduction to Pattern Recognition, statistical, syntactic and fuzzy theoretic approaches, feature extraction and selection; Parametric and non-parametric classification, clustering. Models of cognition, learning, computer vision and speech understanding systems, Pattern Recognition by Neural Network and hidden Markov models; Application to Hand written character, Speech Recognition, Remote Sensing & biomedical area.

Introduction to machine learning, supervised, unsupervised and reinforcement learning, Unsupervised learning algorithms, neural network based learning algorithms, genetic algorithms and genetic programming, reinforcement learning algorithms, computational learning theory.

CSE 454	Pattern Recognition Lab	1.5

Laboratory works based on CSE 453

CSE 457	Multimedia Technology	3.0

Introduction to Multimedia System: Architecture and components, Multimedia distributed processing model, Synchronization, Orchestration and Quality of service (QOS) architecture.
Audio and Speech: Data acquisition, Sampling and Quantization, Human speech production mechanism, Digital model of speech production, Analysis and synthesis, Psycho-acoustics, low bit rate speech compression, MPEG audio compression.
Images and Video: Image acquisition and representation, Composite video signal NTSC , PAL and SECAM video standards.
Bilevel Image Compression Standards: ITU (formerly CCITT) Group III and IV standards , JPEC image compression standards, MPEG vidio compression standards.
Multimedia Communication: Fundamentals of data communication and networking, Bandwidth requirements of different media.
Real Time Constraints: Audio latency, Video data rate, multimedia over LAN and WAN, Multimedia conferencing.
Hypermedia Presentation: Authoring and publishing, Linear and nonlinear presentation, Structuring Information, Different approaches of

authoring hypermedia documents, Hypermedia data models and standards.

Multimedia Information System: Operating system support for continuous media application: limitations is usual OS, New OS support , Media stream protocol, file system support for continuous media, data models for multimedia and hypermedia information, content based retrieval of unstructured data.

CSE 458	Multimedia Technology Lab	1.5

Laboratory works based on CSE 457

CSE 459	Wireless Communication	3.0

Cellular concepts : Frequency reuse, handoff strategies, interference and system capacity, grade of service, improving capacity and coverage, call blocking probability; Propagation effects: outdoor propagation models, indoor propagation models, power control, Doppler's effect, small and large scale fades, Wireless LAN Technology, IEEE 802.11: standard protocol architecture, physics layer and media access control; Mobile IP; Wireless Access; Brief review of 2nd and 3rd generation wireless: GSM, GPRS, CDMA, Cordless system: Wireless local loop: Bluetooth: overview and base band specifications.

CSE 460	Wireless Communication Lab	1.5

Laboratory works based on CSE 459