UNIVERSITY OF RAJSHAHI

Faculty of Engineering

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Syllabus for B.Sc. Engineering
Session: 2013–2014

(North Block, 4th Science Building)

Tel: 0721-711103

Fax: 0721-750064

E-mail: cse@ru.ac.bd

Web Site: http://www.ru.ac.bd/cse

Syllabus for B.Sc. Engineering
Session: 2013-2014

Distribution of Courses: According to the Academic Ordinance

Course type	Marks	% of Marks	Credits
Mathematics and Basic Sciences with Lab	600-900	15-22.5	24-36
Humanities	100-300	2.5-7.5	4-12
Basic and Major Engineering	2800-3200	70-80	112-128
(i) Basic Engineering with Lab.	100-300	2.5-7.5	4-12
(ii) Major Engineering			
(a) Theoretical	1500-2400	37.5-60	60-96
(b) Laboratory	700-1200	17.5-30	28-48
(c) Board viva-voce	50-200	1.25-5	2-8
Total	4000	100%	160

Distribution of Courses

Course type	Marks	% of Marks	Credits
Mathematics and Basic Sciences	**625**	**15.63**	**25**
(a) Mathematics	375	9.38	15
(b) Statistics	100	2.50	4
(c) Physics	75	1.88	3
(d) Chemistry	75	1.88	3
Humanities	**200**	**5.00**	**8**
(a) Economics	50	1.25	2
(b) Accounting	50	1.25	2
(c) English	50	1.25	2
(d) Law	50	1.25	2
Basic and Major Engineering	**3125**	**78.13**	**125**
(i) Basic Engineering with Lab	100	2.50	4
(ii) Major Engineering	3025	75.63	121
(a) Theoretical	2175	54.38	87
(b) Laboratory	850	21.25	34
(c) Board viva-voce	**50**	**1.25**	**2**
Total	**4000**	**100.00**	**160**

Part-I, Odd Semester

Code	Course Title	Marks	Credit
ENG1111	Technical and Communicative English	50	2
MATH1111	Algebra, Trigonometry and Vector	75	3
CHEM1111	Physical and Inorganic Chemistry	75	3
APEE1131	Electrical Circuit and Electronics	75	3
APEE1132	Electrical Circuit and Electronics Lab	25	1
CSE1111	Computer Fundamentals	75	3
CSE1112	Computer Maintenance and Engineering Drawings Lab	25	1
CSE1121	Computer Programming with C	75	3
CSE1122	Computer Programming with C Lab	50	2
Total		**525**	**21**

Part-I, Even Semester

Code	Course Title	Marks	Credit
ECON1211	Economics	50	2
STAT1211	Statistics for Engineers	50	2
MATH1211	Differential and Integral Calculus	75	3
PHY1221	Applied Electricity and Magnetism	75	3
CSE1211	Introduction to Digital Electronics	75	3
CSE1212	Introduction to Digital Electronics Lab	25	1
CSE1221	Object Oriented Programming with C++	75	3
CSE1222	Object Oriented Programming with C++ Lab	50	2
Total		**475**	**19**

Part-II, Odd Semester

Code	Course Title	Marks	Credit
ACCO2111	Industrial Management and Accountancy	50	2
STAT2111	Theory of Statistics	50	2
MATH2111	Matrices and Differential Equations	75	3
CSE2111	Digital System Design	75	3
CSE2112	Digital System Design Lab	25	1
CSE2121	Data Structure	75	3
CSE2122	Data Structure Lab	25	1
CSE2131	Discrete Mathematics	75	3
CSE2142	Software Development Lab I	25	1
	Total	**475**	**19**

Part-II, Even Semester

Code	Course Title	Marks	Credit
LAW2211	Cyber and Intellectual Property Law	50	2
MATH2231	Numerical Methods	50	2
MATH2232	Numerical Methods Lab	25	1
MATH2241	Linear Algebra	75	3
CSE2211	Object Oriented Programming and Design Methods	75	3
CSE2212	Object Oriented Programming and Design Methods with Java Lab	25	1
CSE2221	Design and Analysis of Algorithms	75	3
CSE2222	Design and Analysis of Algorithms Lab	25	1
CSE2231	Computer Architecture and Organization	75	3
CSE2232	Computer Architecture and Organization Lab	25	1
CSE2242	Software Development Lab II	25	1
	Total	**525**	**21**

Part-III, Odd Semester

Code	Course Title	Marks	Credit
CSE3111	Software Engineering	75	3
CSE3112	Software Engineering Lab	25	1
CSE3121	Database Management Systems	75	3
CSE3122	Database Management Systems Lab	25	1
CSE3131	Digital Signal Processing	75	3
CSE3132	Digital Signal Processing Lab	25	1
CSE3141	Compiler Design	75	3
CSE3142	Compiler Design Lab	25	1
CSE3151	Computer Networks	75	3
CSE3152	Computer Networks Lab	25	1
CSE3162	Software Development Lab III	25	1
	Total	**425**	**21**

Part-III, Even Semester

Code	Course Title	Marks	Credit
CSE3211	System Analysis and Design	75	3
CSE3221	Computer Graphics	75	3
CSE3222	Computer Graphics Lab	25	1
CSE3231	Microprocessor and Assembly Language	75	3
CSE3232	Microprocessor and Assembly Language Lab	25	1
CSE3241	Operating System and System Programming	75	3
CSE3242	Operating System and System Programming Lab	25	1
ICE3261	Communication Engineering	75	3
ICE3262	Communication Engineering Lab	25	1
	Total	**475**	**19**

Part-IV, Odd Semester

Code	Course Title	Marks	Credit
CSE4111	Parallel Processing and Distributed System	75	3
CSE4112	Parallel Processing and Distributed System Lab	25	1
CSE4121	Theory of Computation	75	3
CSE4131	Computer Simulation and Modeling	75	3
CSE4132	Computer Simulation and Modeling Lab	25	1
CSE4141	Computer Peripherals and Interfacing	75	3
CSE4142	Computer Peripherals and Interfacing Lab	25	1
Option I (T)	Theory: Should be selected from Table-I	75	3
Option I (L)	Lab course based on Option-I (T)	25	1
CSE4192	Project (Part-I)	25	1
	Total	**500**	**20**

Part-IV, Even Semester

Code	Course Title	Marks	Credit
CSE4211	Artificial Intelligence	75	3
CSE4212	Artificial Intelligence Lab	25	1
CSE4221	E-Commerce	75	3
CSE4222	E-Commerce Lab	25	1
CSE4231	Cryptography and Network Security	75	3
CSE4232	Cryptography and Network Security Lab	25	1
Option II (T)	Theory: Should be selected from Table-II	75	3
Option II (L)	Lab course based on Option-II (T)	25	1
CSE4292	Project (Part-II)	50	2
CSE4280	Board viva-voce	50	2
	Total	**500**	**20**

Table-I: Option I

Code	Course Title	Marks	Credit
CSE4151	Design of VLSI Circuits and Systems	75	3
CSE4152	Design of VLSI Circuits and Systems Lab	25	1
CSE4161	Management Information System	75	3
CSE4162	Management Information System Lab	25	1
CSE4171	Computational Geometry	75	3
CSE4172	Computational Geometry Lab	25	1
CSE4181	Digital Image Processing	75	3
CSE4182	Digital Image Processing Lab	25	1

Table-II: Option II

Code	Course Title	Marks	Credit
CSE4241	Wireless Communication	75	3
CSE4242	Wireless Communication Lab	25	1
CSE4251	Multimedia System	75	3
CSE4252	Multimedia System Lab	25	1
CSE4261	Distributed Database Management System	75	3
CSE4262	Distributed Database Management System Lab	25	1

DETAIL DESCRIPTION OF THE COURSES

ENG1111: Technical and Communicative English

50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Grammar: Grammatical principles, modals, phrases & idioms, prefixes & suffixes, sentence structures, WH & yes/ no questions, conditional sentences.
Vocabulary: Technical & scientific vocabulary, defining terms.
Spoken English: Introduction to phonetic symbols, dialogue, responding to particular situations, extempore speech.
Reading: Comprehension of technical & non-technical materials-skimming, scanning, inferring & responding to context.
Technical Writing: Paragraph & composition writing on scientific & other themes, report writing, research paper writing, library references.
Professional communication: Business letter, job application, memos, quotations, tender notice.

Books Recommended:

1. John M. Lannon : **Technical Writing**, *Scott Foresman & Co.*
2. A. J. Thomson & A. V. Martinet : **A Practical English Grammar**, *Oxford University Press*
3. A. Ashley : **Oxford Handbook of Commercial Correspondence**, *Oxford University Press*
4. John Swales : **Writing Scientific English**, *Cengage Learning Australia*
5. Robert J. Dixson : **Complete Course in English**, *Prentice Hall*
6. Rajendra Pal & J. S. Korlahalli : **Essentials of Business Communications**, *Sultan Chand & Sons*

MATH1111: Algebra, Trigonometry and Vector

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Algebra of sets, De Morgan's rule, relation & function. Determinants: Properties and Cramer's rule.
Theory of Equations: Theorem, and relation between roots and coefficients. Solution of cubic equations.
De Moiver' theorem. Deduction from De Moiver's theorem.
Functions of complex arguments. Gregory's series. Summation of series, Difference equation, inequality, Hyperbolic functions.
Vector Addition, Multiplication & Differentiation.
Definitions of line: surface and volume integral. Gradient of scalar function, Divergence and curl of vector function. Physical significance of gradient, divergence and curl, Integral forms of gradient, divergence and curl, Divergence Theorem, Stoke's theorem, Green's theorem and Gauss's theorem.

Books Recommended:

1. H. S. Hall and S. R. Knight : **Higher Algebra**, *MacMillan Publications, Arihant Publishers*
2. B. C. Das and B. N. Mukherjee : **Higher Trigonometry**, *U. N. Dhur and Sons*
3. M. R. Spiegel, S. Lipschutz, and D. Spellman : **Vector Analysis and An Introduction to Tensor Analysis**, *McGraw-Hill*
4. W. S. Burnside and A. W. Panton : **Theory of Equations,** *Nabu Press*
5. Samuel Barnard and James M. Child : **Higher Algebra**, *MacMillan Publications*

CHEM1111: Physical and Inorganic Chemistry

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Electrochemistry: Conductors, Electrolytes and Electrolysis; Faradays Laws of Electrolysis and their significance. Ohm's law and electrolytic conductances; Theories for electrolytic conductance (Arrhenius & Debye-Hükel). Ionic mobility, Kohlrausch's law, Tranference Number and its determination; Activities, activity coefficient and Debye-Hükel limiting law.Electrochemical cells(Electrolytic and Galvanic/Voltaic):Electrode reaction and potentials. Reference electrodes; Reversible and concentration cells,Storage Batteries(or accumulators).

Chemical Equilibrium and Kinetics: Equilibrium and Equilibrium constants, Kc, Kp, Kx. Rate of reaction and rate constants; Le Chatelier principle and its application. Order and molecularity of a reaction; integrated rate expressions & half- lives of zeroeth, first and second order reactions. Determination of order & temperature dependence of a reaction; energy of activation and Arrhenius equation. Transition-state theory of reaction rates. Characteristics of catalysis, promoters and inhibitors.

Surface Chemistry and Colloids: Adsorption and sorption; Characteristics of physical and chemical adsorptions. Fruendlich, Langmuir and Gibb's Adsorption isotherms; The BET equation. Crystalloids, Colloids and their classification, preparation, properties (kinetic, colligative, optical & electrical) and importance,=. Original pf charge and stability of colloids (sols), Gold number; colloidal electrolytes. Elementary idea about emulsions and gels.

Atomic structure and Periodic Table: Modern concept of atomic structure and Periodic Table; related principles and Laws. Constitution and Periodic properties of elements (ionization potential, electronigativety, electron affinity, atomic and ionic radii). Grouping of elements, their properties and uses. Isotopes and radioactivity.

Electronic Theory of Valency and Chemical Bonding: Different types of bonds (ionic, covalent, co-ordinate, hydrogen and metallic) Classification of solids on the basis of bonding and their properties. Atomic orbitals and their hybridization; valency bond and Molecular orbital theories.

Chemistry of Transition Elements, Lanthanides and Actinides: Definitions, electronic configurations, preparations (nuclear transformations), general properties and uses.

Books Recommended:

1.	R. D. Madan	:	**Modern Inorganic Chemistry,** *S. Chand Publishers*
2.	M. M. Haque and M. A. Nawab	:	**Principles of Physical Chemistry**, *Nawab Publications*
3.	Esmarch S. Gilreath	:	**Fundamental Concepts in Inorganic Chemistry**, *McGraw-Hill*
4.	G. M. Barrow	:	**Physical Chemistry**, *McGraw-Hill*
5.	W. J. Moore	:	**Physical Chemistry**, *Orient Blackswan Pvt Ltd.*
6.	Keith J. Laidler, John H. Meiser	:	**Physical Chemistry**, *Houghton Mifflin Company*.
7.	S. R. Palit	:	**Elementary Physical Chemistry,** *Book Syndicate Pvt. Ltd.*
8.	S. Z. Haider	:	**Modern Inorganic Chemistry,** *Friends International.*
9.	Audrey L. Companion	:	**Chemical Bonding**, *McGraw-Hill*
10.	F. Albert Cotton, Geoffrey Wilkinson, Paul L. Gaus	:	**Basic Inorganic Chemistry**, *Wiley*
11.	Donald K. Sebera	:	**Electronic Structure and Chemical Bonding**, *Wiley*

APEE1131: Electrical Circuit and Electronics

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Networks Analysis: Kirchhoff's laws; Wheatstone bridge, Superposition theorem; Millman's theorem; Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Mesh and Node circuit analysis, Reduction of complicated networks, T and p-section network.

Filters: Properties of symmetrical networks, Characteristics impedance, Filter fundamentals, Different types of filters, high pass, low pass, band pass and band elimination filter, Active Filters.

Semiconductor Diodes: Semiconductor, n-and p-type semiconductors, p-n junction as a diodes and their V-I characteristics, Zener diode, half-and full wave rectifiers, voltage regulation using Zener diodes.

Transistor: Transistor action, transistor biasing, DC characteristics of CE, CB and CC configurations.

Transistor Amplifiers and Oscillators: CE, CB and CC amplifiers, current, voltage and power gains, frequency responses, principles of feedback, positive and negative feedback, oscillators and masturbators, astable and monostable multivibrator.

Operational Amplifier: Difference amplifier, CMRR, Ideal operational amplifier, Inverting amplifier, Non-inverting amplifier, General purpose IC operational amplifier, Integrator, Differentiator, Linear and non-linear applications of operational amplifier, Comparator and Converter.

Optoelectronic Devices: PN photodiode, Phototransistor, Solar cell, Photoconductive cell, Photovoltaic, Sensors, LED, LCD, Alphanumeric display, Photo couplers, Photodiode, LDR.

Instrumentation: Avometer, signal generator, oscilloscope.

Books Recommended:

1.	Jacob Millman and Christos C. Halkias	:	**Electronic Devices and Circuits,** *McGraw-Hill Inc*.
2.	Albert D. Helfrick and William David Cooper	:	**Modern Electronics Instrumentation and Measurement Techniques,** *Prentice Hall*
3.	A.K. Sowhney	:	**A Course in Electrical and Electronic Measurements and Instrumentation** , *Dhanpat Rai and Co.*
4.	Albert Paul Malvino	:	**Electronic Principles,** *Career Education*
5.	John D. Ryder	:	**Networks, Lines and Fields**, *Prentice Hall.*

APEE1132: Electrical Circuit and Electronics Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **APEE1131**

CSE1111: Computer Fundamentals

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam.Time: 3 hours

Computer Basics: Introduction to Studying Computers, History and development of Computers, Generation of Computers, Types of Computers.

Computer Hardware and Peripherals: Basic Units of Computer Hardware, Keyboard, Mouse, Internal structure of CPU, Functions of RAM, ROM and Cache memory, Basic functional mechanism of HDD and CD-ROM, Different types of Monitors, Impact and Non-impact Printers, Scanner, Plotter, Typical Computer specifications.

Software: Classifications, System software, Operating system concepts and importance, components and basic functions of DOS, Windows operating system, Application software's and Utility programs, Computer Virus.

Data Processing: Concepts of Data, Information, and Database, Traditional File Processing, and DBMS.

Computer Networks: Computer networks and its goals, Basic concepts on LAN, MAN, WAN and Internet systems, Internet services, Functions of Modem in Internet.

Books Recommended:

1. Peter Norton : **Introduction to Computer**, *McGraw-hill Publishers*
2. J. Stanley Warford : **Computer Systems**, *Jones & Bartlett Publishers*
3. P. Norton : **Inside the PC**, *Sam Publishers*
4. L. Rosch : **Hardware Bible**, *Braddy Publishing, Indianapolis*
5. Subramanian : **Introduction to Computers**, *Mcgraw-hill Inc.*
6. V. K. Jain : **Switching Theory and Digital Electronics**, *Khanna Publishers*

CSE1112: Computer Maintenance and Engineering Drawing Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE1111**

CSE1121: Computer Programming with C

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: Programming languages, basic concepts of compiler, interpreter, algorithm and flowchart.

Simple C: Program structure in C, Program creating, compiling, debugging and running, Basic I/O functions, Identifiers and keywords, Simple data types, variables, constants, operators, Bitwise operators, comments, Decision making statements with if and switch, Looping structures with for, while, do-while.

More Data Types: Array, Structures, Union, Pointes, Strings, Dynamic allocation, Static, global, external and registrar, User defined data types

Functions: C Functions and user defined function, Function types, parameters, prototypes, Recursive function.

File Handling: Concepts, Character and File I/O, Basics of simple File I/O, ANSI Standard Libraries.

Others: Pre-processor with define, include, macro, ifdef, Uses of graphics functions.

Books Recommended:

1. Kernighan and Ritchie : **The C Programming Language**, *Prentice Hall*
2. Gotfreid : **Programming with C**, **Schaum's Outline Series**, *Tata McGraw Hill*
3. D.E. Knuth : **The Art of Computer Programming**, *Addison-Wesley Professional*
4. E. Balagurusamy : **Programming with ANSI C**, *Tata McGraw Hill*
5. H. Schildt : **Teach yourself C**, *McGraw-Hill Publishers*

CSE1122: Computer Programming with C Lab

50 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
2 Credit, 26 Contact hours

Laboratory works based on **CSE1121**

ECON1211: Economics

50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Basic Concepts of Economics: Definition and subject matter of Economics; Microeconomics vs macroeconomics; Law of Economics; Central economic problems of every society; Different economic systems; Economics and Engineering.

Theory of Demand, Supply and Consumer Behavior: Law of Demand; Demand schedule and demand curve; Supply law, Supply schedule and supply curve; Shift in demand and supply; Equilibrium in the market; Elasticity of demand and supply

Production and Costs and Theory of the Firm: Meaning of production; Factors of production; Concepts of total, average and marginal costs, fixed and variable costs.

Theory of the Firm: Perfect competition and monopoly; Total, average and marginal revenue of a firm; Average and marginal revenue under perfect competition and monopoly; Firm's Equilibrium; Equilibrium of firm under perfect competition and monopoly.

The Input-Output Analysis: Meaning of input-output analysis; Input-output analysis model; balance equation; coefficient matrix; Determination of final demand vector.

Basic Concepts of Macroeconomics: Growth; Unemployment; Inflation; Philips Curve, Business cycle; Circular flow of economics; Two, three and four sector economics.

National Income accounting and determination: Concepts of GNP, GDP and national income; Methods of national income accounting; Problems of national income accounting; Keynesian model of national income determination; The multiplier; Effect of fiscal policy in the Keynesian model.

Budgets of Bangladesh: The revenue at the capital budget; Income, expenditure of the government; direct and indirect taxes.

Development Planning in Bangladesh: Need for planning in Bangladesh; Various five year plans in Bangladesh; Development strategies in the five year plans of Bangladesh.

Books Recommended:

1. K. K. Dewett : **Modern Economic Theory,** *S. Chand Publishers*
2. H.L Ahuja : **Advanced Economic Theory,** *S. Chand Publishers*
3. A. Asimakopulos : **An Introduction To Economic Theory: Microeconomics,** *Oxford University Press*
4. A. Koutsoyiannis : **Modern Microeconomics**, *Palgrave Macmillan*

STAT1211: Statistics for Engineers

50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Analysis of statistical data: Dispersion and their measures. Skewness, Kurtosis and their measures. Moment and Cumulants and Practical examples.

Probability: Concept of probability. Sample Space, Events union and Intersection of Events. Probability of events. Laws of probability, Conditional probabilities, Bayes' Theorem, Chebyshev's Inequality and Practical examples.

Random variables and probability Distribution: Basic concepts, Discrete and continuous random variables, Density and distributional functions, Mathematical expectation and variance, Joint marginal and conditional density functions, Conditional Expectation and conditional variance, Moments and Cumulant generating functions. Characteristic function. Study of Binomial, Poisson, Normal and Bivariate Normal distribution and Practical examples.

Linear Regression and Correlation: Correlation, Rank correlation, Partial and Multiple correlations. Linear Regression for two variables. Principle of Least Squares Method. Lines of best fit Residual Analysis and examples.

Test of Significance: Basic ideas of Null hypothesis. Alternative hypothesis. Type-I error, Type-II error, level of significance, Degree of freedom, Rejection region and Acceptance region. Test of Single mean, Single variance, Two sample means and variances. Test for 2x2 contingency tables. Independence test and practical examples.

Books Recommended:

1. A. J. B. Anderson : **Interpreting Data.** *Chapman and Hall, London*
2. H. Cramer : **The Elements of Probability Theory.** *Wiley, N. Y*
3. P. Hoel, : **Introductory Statistics**, *Wiley and Sons, N. Y.*
4. D. V. Lindley : **Introduction to Probability and Statistics.** Vol-1 *C. U. P. London*
5. S. Lipschutz : **Probability,** *McGraw-Hill, N. Y.*
6. Mosteller, Rourke and Thomas : **Probability With Statistical Applications**, *Addison- Wesley*
7. F. L. Wolf : **Elements of Probability and Statistics,**

McGraw-Hill, N. Y.

8. T. H. Wonnacot and R. J.   :   **Introductory Statistics**, *Wiley and Sons. N. Y.*
    Wonnacot
9. G. U. Yule, and M. G.   :   **An Introduction to the Theory of Statistics,**
    Kendall   *Charles Griffin, London*

MATH1211: Differential and Integral Calculus

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Functions: Domain, Range, Inverse function and graphs of functions, Composition of function, Limits, Continuity, Indeterminate form.

Ordinary Differentiation: Differentiability, Differentiation, Successive differentiation and Leibnitz theorem.

Expansions of functions: Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's formulae.

Maximum and minimum of functions of one variable.

Partial Differentiation: Euler's theorem, Tangents and normal.

Application of derivatives.

Indefinite Integrals: Method of substitution, Integration by parts, Special trigonometric functions and rational fractions.

Definite Integrals: Fundamental theorem, General properties, Evaluations of definite integrals and reduction formulas.

Multiple Integrals: Determination of lengths, Areas and Volumes.

Books Recommended:

1. B. C. Das and   :   **Differential Calculus,** *U. N. Dhur & Sons*
    B.N.Mukherjee
2. B. C. Das and   :   **Integral Calculus,** *U. N. Dhur & Sons*
    B.N.Mukherjee
3. F. Ayres and Elliot   :   **Calculas (Schaum's Outline Series)**,
    Mendelson   *McGraw-Hill*
4. Joseph Edwards   :   **Differential Calculas,** *Kessinger Publishing*
5. Md. Abdul Latif and S. :   **Differential Calculus,** *Chandaapure, Chittagong*
    Bhattacharjee

6. Md. Abdul Latif and S.   :   **Differential Calculus,** *Chandaapure, Chittagong*
    Bhattacharjee

PHY1221: Applied Electricity and Magnetism

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Electrostatics: Electric dipole; electric field due to a dipole; dipole on external electric field; Gauss's Law and its applications.
Capacitors: Parallel plate capacitors with dielectric; dielectrics and Gauss's Law; susceptibility, permeability, and dielectric constant; energy stored in an electric field.
Electric Current: Electron theory of conductivity; conductor, semiconductors and insulators; superconductors, current and current density; Kirchhoffs Law and its applications.
Electomagnetic Induction: Faraday's experiment; Faraday's law; Ampere's law, motional e.m.f.; self and mutual inductance galvanometers-moving coil, ballistic and deadbeat types.
Thermoelectricity: Thermal e.m.f; Seebeck, Peltier and Thomson Effects; laws of addition of thermal e.m.f., thermoelectric power.
DC and AC Circuits: D.C. circuits with LR, RC, and LCR in series; A.C. circuits with LR, RC, LC, and LCR in series.

Books Recommended:

1. Leigh Page and   :   **Principles of Electricity,** *D Van Nosrand Co.*
    Norman   Ilsley
    Adams
2. David   Halliday, :   **Physics (Part-I & II),** *Wiley*
    Robert Resnick and
    Kenneth S. Krane
3. Arthur Frederic Kip :   **Fundamentals of Electricity and Magnetism**,
                              McGraw-Hill Inc.
4. M. S. Huq   :   **Concepts of Electricity and Magnetism,** *Students'*
                              Publications

CSE1211: Introduction to Digital Electronics
50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Fundamentals of Digital Logic System: Number Systems, weighted and non-weighted codes, error detection code, Binary addition and subtraction, 2's compliment methods.

Logic Gates and Boolean Algebra, Logic Circuit Design, Adder, Substractor, Minimization Techniques: Algebraic Simplification, Karnaugh Map Method, Quine-McCluskey method, Consensus method.

Switching Devices, switching characteristics of diodes, transistor and FETs. Integrated Circuit Logic Families: DTL & TTL logic family, standard TTL series characteristics, other TTL series, TTL loading rules, TTL open-collector outputs, tristate TTL. The ECL family. Digital MOSFET circuits, characteristics, CMOS circuits, CMOS tristate logic, TTL driving CMOS, CMOS driving TTL.

Flip-Flops (FF) and related devices: Transistor Latch, NAND gate latch, NOR gate latch, D latch. Clock signals and Clocked FFs: Clocked SR, JK and D Flip-Flops, Master/Slave JK FF, timing diagram of different FFs, Edge-triggered and level-triggered timing diagrams.

555 Timer: Architecture of 555 Timer, different application of 555 timer, 555 as monostable, bistable and astable Multivibrators

A/D And D/A Converters: Sample and hold circuit, weighted resistor and R - 2 R ladder D/A Converters, specifications for D/A converters. A/D converters : Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

Books Recommended:

1. Ronald J. Tocci : **Digital Systems: Principles and Applications**, *Prentice Hall*
2. V. K. Jain : **An Introduction to Switching Theory and Digital Electronics**, *Khanna Publishers, New Delhi*
3. M. Morris Mano : **Digital Logic and Computer Design**, *Prentice Hall*
4. William H. Gothmann : **Digital Electronics,** *Prentice Hall*
5. A. Mottershead : **Electronic Devices and Circuits**: An Introduction**,** *Goodyear Pub*
6. Mehta, Rohit, V K Mehta : **Principles of Electronics**, *S. Chand Group*

CSE1212: Introduction to Digital Electronics Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]

1 Credit, 26 Contact hours

Laboratory works based on **CSE1211**

CSE1221: Object Oriented Programming with C++

**75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours**

Introduction: Object oriented programming and procedural oriented programming, encapsulation, inheritance, polymorphism, data abstraction, data binding, static and dynamic binding, message passing.

C++ as an object oriented language: Declaration and constants, expression and statements, data types, operator, Functions.

Classes: structure of classless. public, private and protected members, array of object, argumented member function, and non-augmented objects, nested member class and their object, pointer objects and pointer members, object a argument of function, static class member and static class. Friend function, friend class,.

Inheritance: mode of inheritance, classifications of inheritance, virtual inheritance.

Array of objects of derived class.

Constructor and destructors: default constructor, argumented constructor, copy constructor, dynamic constructor, constructor function for derived class and their order of execution, destructor.

Operator and function overloading, unary and binary operator overloading, run-time and compile time polymorphism, object pointer and pointer to an object, virtual function, dynamic binding.

C++ data file: C++ file stream classes, input and output file, mode of files, file pointer, random file accessing,

Template and Exception handling: function template and class template, Exception Handling

Books Recommended:

1. H. Schidt : **C++: A Beginner's Guide,** *McGraw Hill*

1. H. Schidt : **C++: The Complete Reference**, *McGraw Hill*
2. N. Barkakati : **Object Oriented Programming with C++,** *Prentice Hall India*
3. B. Stroustrap : **The C++ Programming Language,** Addison-Wesley Pub Co.

CSE1222: Object Oriented Programming with C++ Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE1221**

ACCO2111: Industrial Management and Accountancy

50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Section-A: Industrial Management

Business and Industry: Basic concept of business and Industry, objectives of business, types of Business, types of industry, business and society, business environment, and ethical issues of business.

Management and Organization of Industrial Establishment: Concept of management, management principles and functions: planning, organizing, leading, and controlling, levels of management, manager and roles of management, scientific management and core management skills, corporate activities, corporate social responsibility, concept of business management, organizational structure of industrial organization.

Management and Marketing Strategy : Concept of strategy, strategy formulation, SWOT analysis, PPM, competitive superiority, customer satisfaction, alliance, merger and acquisition, integration, concept of market and marketing, market research, sales/product planning, sales promotion, customer satisfaction survey, business strategy and goal evaluation, business

management system, strategy formulation in IT industry, strategy IT industry, technological development strategy, and planning

Human Resource Management and Industrial Relations: Concept of HRM, HRM functions and model, recruitment, selection, industrial relations and disputes. grievance, handling of grievances, labor welfare, workers' participation in management, motivation employees in the industry , leadership, payment of industrial workers, job satisfaction and job enrichment, training, and trade union, and collective bargaining.

Health, Safety, and Industrial Environment: Classification of accidents, causes of accidents, effects of accidents, safety consciousness & publicity, safety procedures, safety measures, basics of environmental pollution, various management techniques for control of environmental pollution, various control acts for air, water, solid waste and noise.

Managing Industrial Project: Concept of project and project management, project life cycle, project scope management, project proposal, scheduling and budgeting, procurement, project monitoring and evaluation

Service Management: Concept of service and service management, service management in IT industry, ITIL system diagram, ITIL framework, service support, service delivery, facility management, system audit and internal control

Materials Management: Material in industry, inventory control model, ABC analysis, safety stock, reorder, level, economic ordering quantity, stores equipment, stores records, purchasing procedures, purchase records, bin card, cardex, material handling, manual lifting, hoist, cranes, conveyors, trucks, fork trucks.

Operations research and Industrial Engineering: Concept of operation research, charts and diagram of understanding operations, methods of job analysis and operational planning, methods of decision making, problem solving methods, concept of standardization, standardization organizations and specifications, examples of standardization.

Section-B: Accountancy

Accountings: History, scope and nature of accounting, purpose of accounting, accounting equation, meaning and classification of account,

double entry system, rules for determining debit and credit, accounting cycle journal, ledger and trial balance

Cost Concepts and Cost-Volume-Profit Relationship: Meaning of cost, different types of costs, contribution margin and ratio analysis, break-even analysis, CVP relationship in Graphical Form and target net profit analysis

Recommended Books:

- **VK Sharma:** OP Harkut.:Industrial Management
- **M. C. Shukla**: *Business Organization and Management.*
- **Samuel C. Certo**: Modern *Management.*
- **Krajewski and Ritzman**: *Operation Management.*
- **David A. Decenzo and Stephen P. Robbins**: *Human Resource Management.*
- **Hermanson Etar:** *Accounting Principles.*
- **Ray H. Garrison**: *Managerial Accounting.*
- **Sharma BR:** Environmental and Pollution Awareness

STAT2111: Theory of Statistics

50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Sampling Distributing: Fisher's Lemma. Study of χ^2 Distribution, T-Distribution and F-Distribution, Properties, uses & Applications. Distribution of sample correlation coefficient in the null case. Sampling Distribution of the Medians and Range.

Elements of Point Estimations: Basic Concepts. consistent estimates. Unbiased estimates. Mean and variance of estimates. Ideas of Efficiency. Principle of Maximum Likelihood. Illustration from Binomial, poission & Normal Distributions.

Test of Significance: Basic ideas of Null hypothesis. Alternative hypothesis. Type-I error, Type-II error, level of significance, Degree of freedom,

Rejection region and Acceptance region. Test of Single mean, Single variance, Two sample means and variances. Test for 2x2 contingency tables. Independence test and practical examples.

Decision Rules: Statistical decisions; Statistical hypothesis; Critical region, Best critical region; Two types of errors; procedure of Test of hypothesis; Most powerful test, standard Errors.

Test of Significance: Test of single mean & single variance. Comparison of two sample Means, proportions and Variances. Bartlett's test for homogeniety of variances. Test for correlation and Regression coefficients. Exact test for 2*2 tables. Test for r*c tables. Three-Way contingency tables. Large Sample Test of Significance. Non-parametric Test, One Sample and two Sample Sign Test. Run Test and Rank Sum Test.

Recommended Books:

1.	R. L. Anderson, T. A. Bancroft	: **Statistical Theory in Research,** *McGraw-Hill N. Y. Banctoft, T.*
2.	G. Beaumont	: **Intermediate Mathematical Statistics,** *Chapman and Hill, London*
3.	Gutman, Wilks and Hunter	: **Introductory Engineering Statistics**, *John Wiley and Sons.*
4.	P. G. Hoel	: **Introduction to Mathematical Statistics,** *John Wiley and Sons, N. Y.*
5.	R. V. Hogg. and A. T. Graig	: **Introduction to Mathematical Statistics,** *Collier Macmilan, N. LY.*
6.	M. G. Kendall and A. Stuart A.	: **The Advanced Theory of Statistics** Vol. 1, *Charles Griffin and Co. London.*
7.	B. W. Lindgren	: **Statistical Theory,** *Collier-Macmillan Co; N. Y.*
8.	Mood, Graybill and Boes	: **Introduction to the Theory of Statistics**, *McGraw-Hill, N. Y.*
9.	G. B. Weatheril	: **Intermediate Statistics Methods,** *Chapman and Hall, London*

MATH2111: Matrices and Differential Equations

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Algebra of Matrices: Adjoint, Inverse and rank of matrix-definition, Properties and evaluation, Determinant Property and Crammer's Rule.

Elementary Transformations: Echelon: Canonical and normal forms, Solution of system of linear equations, Consistency and solution of homogeneous and nonhomogeneous systems by matrix method, and reduction to equivalent system.

Characteristic Equation: Eigenvalues, Eigenvectors and Caley-Hamilton theorem, Similar matrices and diagonalization.

Solutions of first order and first degree and first-order and higher degree equations with variable coefficients.

Solution of Higher-Order linear differential equations.

Differential Equations: Series solution of linear differential equation, Series solution of second order equation with variable coefficients, Solutions of partial differential equation, Laplace's equation and transformation, Poisson's equation, Helmholtz's equation, Diffusion equation, Green's function solution, Integral equation.

Books Recommended:

1.	M. L. Khanna	:	**Matrices,** *Jai Prakash Nath and Co.*
2.	Shepley L. Ross	:	**Introduction to Ordinary Differential Equations**, *Wiley.*
3.	Jr. Frank Ayres	:	**Theory and Problems of Matrices**, **Schaum's Outline Series,** *McGraw-Hill*
4.	Frank Ayres	:	**Differential Equations,** *McGraw-Hill*
5.	B. D. Sharma	:	**Differential Equations**, *Kedar Nath Ram Nath.*
6.	Louis Albert Pipes	:	**Applied Mathematics for Engineers and Physicist,** *McGraw-Hill*
7.	Ivar Stephen Sokolnikoff and Raymond M. Redheffer	:	**Mathematics of Physics and Modern Engineering**, *McGraw-Hill.*

CSE2111: Digital System Design

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Combinational Logic: Code converters, advanced arithmetic circuits, carry-look-ahead adder, binary parallel adder, BCD adder. magnitude comparator.

MSI logic circuits: Encoders, decoders, multiplexers, demultiplexers, application od decoder and multiplexer: realizing for min-terms and max-terms, Binary Multiplier Parity generator and checker.

Sequential Circuits: Latches, flip flops (FF), analysis of clocked sequential circuits, state reduction and assignments.

Registers and Counters: Registers, shift registers, parallel loading of shift register, counters, synchronous and asynchronous counter, up and down counter, ripple counter, counters using SR and JK FF, design of sequential counter, application of counter: parallel to serial communication, other types of counters.

Memory and Programmable Logic: Random access memory (RAM), memory addressing, Programmable Array Logic (PAL), Programmable Logic Array (PLA), Introduction to CPLDs, FPGAs

Introduction to hardware description language (HDL), Verilog HDL/VHDL, Syntax and program structure of HDL (Verilog HDL/VHDL).

Application of HDL: Description and simulation of common combinational circuits using HDL: Adder, decoder, multiplexer etc. Description and simulation of sequential circuits, registers, counters.

Books Recommended:

.	Ronald J. Tocci	:	**Digital Systems: Principles and Applications**, *Prentice Hall*
2.	V. K. Jain	:	**An Introduction to Switching Theory and Digital Electronics**, *Khanna Publishers, New Delhi*
3.	M. Morris Mano	:	**Digital Logic and Computer Design**, *Prentice Hall*
4.	William H. Gothmann	:	**Digital Electronics**, *Prentice Hall*
5.	A. Mottershead	:	**Electronic Devices and Circuits: An Introduction,** *Goodyear Pub*
6.	Mehta, Rohit, V K Mehta	:	**Principles of Electronics**, *S. Chand Group*

CSE2112: Digital System Design Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE2111**

CSE2121: Data Structure

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Arrays: Maximization, ordered lists, sparse matrices, representation of arrays.

Stacks, Queues and Recursion: Different types of stacks and queues: Circular, dequeues, etc; evaluation of expressions, multiple stacks and queues;

Recursion: Direct and indirect recursion, depth of recursion; Simulation of Recursion, Removal of recursion; Towers of Hanoi.

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

Trees: Basic terminology, binary trees, binary tree representations, binary tree traversal; Extended binary trees: 2-trees, internal and external path lengths, Huffman codes/algorithms; threaded binary trees, binary tree representation of trees; Application of Trees: Set representation, decision trees, games trees: Counting binary trees.

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

Symbol Tables: static tree tables, dynamic tree tables; Hash Tables: Hashing functions overflow handling, theoretical evaluation of overflow techniques.

Files: file, queries and sequential organizations: Indexing Techniques: Cylinder-surface indexing hashed indexes, tree indexing-B-trees; Tree indexing.

Books Recommended:

1.	E. Horowitz and S. Sahni	:	**Fundamentals of Data Structures,** *Galgotia.*
2.	Edward M. Reingold &Wilfred J. Hansen	:	**Data Structures,** *Addison Wesley Publishers*
3.	Niklaus Wirth	:	**Algorithms + Data Structures = Programs**, *Prentice Hall*
4.	Robert L. Kruse	:	**Data Structures and Program Design**, *Prentice Hall*
5.	Seymour Lipshultz	:	**Data Structures (Schaum's Outline Series),** *Tata McGraw-Hill*
6.	E. Horowitz and S. Sahni	:	**Computer Algorithms**, *Galgotia.*
7.	Seymour E. Goodman & S. T. Hedetniemi	:	**Introduction to Design and Analysis of Algorithms**, *McGraw-Hill.*

CSE2122: Data Structure Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE2121**

CSE2131: Discrete Mathematics

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Mathematical Logic: Connectives, Normal Forms, theory of inference for proposition calculus, predicate calculus, inference theory of predicate calculus, method of proof, mathematical induction.

Counting: Basic principles, sequences, Fibonacci, Eullerian, Bernoulli numbers, permutation, and Pascal's triangle.

Relation and ordering: Relations, properties of Binary relation in a set, composition of binary relation, relation matrix and graph of a relation, partial ordering, path in relation and di-graph.

Ordered relation and structure: Partially ordered set, external element of P.O. set, Lattice, finite Boolean algebra, function on Boolean algebra, Boolean function as Boolean polynomial.

Graph: Introduction to graph, graph terminology, representing graph and graph isomorphism, paths, reachability, connectivity, Euler and Hamilton path, shortest path problems, graph colouring, matrix representation of graph.

Trees: Introduction of trees, application of trees, tree traversal, labeling trees, trees and sorting, spanning trees, minimal spanning tree, and undirected trees.

Algebraic structure: Algebraic system, general properties, some simple algebraic system, ring, semiring, module, semi-module, Homomorphism of semigroups and monoid, Grammars and languages, Formal definition of a language, Definition and examples, homomorphism, product and quotients of group.

Books Recommended:

1.	Kenneth H. Rosen	:	**Discrete Mathematics and Its Applications**, *McGraw-Hill*.
2.	J. P. Tremblay and R. Manohar	:	**Discrete Mathematics structures with applications to Computer Science**, *Mc-Graw Hill*
3.	C.L. Liu	:	**Elements of Discrete Mathematics**, *McGraw-Hill*.
4.	Seymour Lipschutz	:	**Theory and Problems of Discrete Mathematics, Schaum's Outline Series**, *McGraw-Hill*
5	Bernard Kolman, Robert Busby, Sharon C. Ross		**Discrete Mathematical Structures**, *Prentice Hall*

CSE2142: Software Development Lab I

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

LAW 2211: Cyber and Intellectual Property Law

50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Cyber Law

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;

Legal Affairs: Laws on security, Laws on labor and transaction, Engineering ethics, Standardization.

The Information and Communication Technology Act, 2006 and 2013- Objectives, Strengths & Weaknesses of the ICT Law, Regulation of Cryptography;

International Cyber Law- India, Sri Lanka, Japan, Malaysia, Australia and the USA, International Conventions on Cyber Law & Crime

Electronic Commerce- Electronic Money, Online Credit card Payments and Electronic Bills of Lading, UNCITRAL Model Law on Electronic Commerce.

Intellectual Property Law

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.

Books Recommended:

1.	Vivck Sood	:	**Cyber Law Simplified,** *Tata McGraw Hill Publications.*
2.	V. D. Dudej	:	**Information Technology & Cyber Laws**, *Commonwealth Publishers.*
3.	Arpad Bogsch	:	**Universal Copyright Convention: An Analysis and Commentary,** *Bowker*
4.	Alan Daubeny Russell Clarke	:	**Copyright in Industrial Designs,** *Sweet and M.*

MATH2231: Numerical Methods

50 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
2 Credits, 26 Contact hours, Exam. Time: 2 hours

Floating-point arithmetic: Floating-point representations, General properties, IEEE-754, 32-bit and 64-bit formats, Denormalized numbers, NaNs and other special values, Floating-point exception handling, CRAY, Rounding methods, Floating-point operations (+, -, X, /), Catastrophic cancellation due to subtraction; introduction to the concept of condition number

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 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.

Finite-difference methods for ordinary differential equations: Solution of linear, homogeneous difference equations with constant coefficients, Survey of methods for deriving finite-difference algorithms, Stability analysis of finite-difference methods: Euler, backward Euler, Midpoint, Trapezoidal, Midpoint-trapezoidal predictor-corrector, Runge-Kutta methods, Adams-Moulton methods, Adams-Bashforth methods. Methods for stiff equations: Backward Euler, Gear's methods. Methods for linear systems of ODEs in which the coefficient matrix has purely imaginary eigenvalues, Finite-difference methods as digital filters: Transfer-function analysis, Boundary-value problems for ODEs

Numerical Solutions of Ordinary Differential Equations: Euler's Method, Modifications and Improvements of Euler's Methods, Runge-Kutta Methods, Adaptive Runge-Kutta Methods.

Pseudorandom-number generators, the FFT.

Recommended Books:

1.	Steven C. Chapra Raymond P. Canale	:	**Numerical Methods for Engineers,** *McGraw-Hill*
2.	S. S. Kuo	:	**Computer Applications of Numerical Methods**, *Addison-Wesley*
3.	S. S. Sastry	:	**Introductory Methods of Numerical Analysis**, *Prentice-Hall of India Pvt. Ltd.*
4.	Cantrell		**Modern Mathematical Methods for Physicists and Engineers**, *Cambridge University Press.*
5.	Press, Teukolsky Vetterling and		*Numerical Recipes* **in C: The Art of Scientific Computing,** *Cambridge University Press.*

MATH2232: Numerical Methods Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE2231**

MATH2241: Linear Algebra

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Vector space: subspace, sum and direct sum, inner product space, Hilbert space, normed space, Banach space.

Linear dependence and independence basis and dimension.

Linear transformation: range, kernel, nullity, rank, singular and non-singular transformations.

Matrices and linear operators: Matrix representation of a linear operator. Change of basis, similarity, Matrices and linear mapping.

Characteristic roots and vectors of linear transformations, theorems and problems; characteristic and minimum polynomials of square matrices.

Linear functionals and dual vector spaces, Annihilators.

Norms and inner products, Orthogonal complements, orthonormals sets, Gram-schmidt orthogonalization process.

Recommended Books:

1. Seymour Lipschutz, : **Linear Algebra, Schaum's Outline Series**, Marc Lipson *McGraw-Hill*
2. I. N. Herstein : **Topics in Algebra**, *Wiley*

CSE2211: Object Oriented Programming and Design Methods

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: Object Oriented Programming Concepts and features, Java as OOP language, Comparison between Java and C++ as OOP, Typical Java Development Environment.

Basics: Java's Primitive Data Types, Operator (arithmetic and logical) and Control Structures.

Introduction to Classes and Objects: Java Classes, Objects, Methods and instance variables, Program Modules in Java, static Methods, static Fields, Methods with Multiple Parameters, Java API Packages.

Arrays: Arrays, Enhanced for Statement, Passing Arrays to Methods, Variable-Length Argument Lists, Using Command-Line Arguments.

Classes and Objects: A Deeper Look: Encapsulation and data hiding, the notions of data abstraction and abstract data types (ADTs), Use of keyword this, use of static variables and methods, to import static members of a class, Controlling Access to Members, Inheritance, Polymorphism, Packages

Exception Handling: How exception and error handling works, to use try, throw and catch to detect, indicate and handle exceptions respectively, to use the finally block to release resources, to declare new exception classes.

Files and Streams: To create, read, write and update files, to retrieve information about files and directories, Java input/output stream class hierarchy, differences between text files and binary files, Sequential-access and random-access file processing.

GUI Programming: The design principles of graphical user interfaces (GUIs), to build GUIs and handle events generated by user interactions with GUIs, to handle mouse events and keyboard events, to use layout managers to arrange GUI components.

Networking: Understanding and implementing Java networking applications with sockets and datagrams, to understand how to implement Java clients and servers that communicate with one another, to understand how to implement network-based collaborative applications.

Books Recommended:

1.	Deitel & Deitel	:	**Java: How To Program**, Prentice Hall
2.	Cay Horstmann and Gary Cornell	:	**Core Java Vol. 1 & 2**, Prentice Hall.
3.	Ivor Horton	:	**The Sun Microsystems Press Java Series**, Prentice Hall.
4.	H. Schildt	:	**Beginning Java 2: JDK**, John Wiley & Sons.

CSE2212: Object Oriented Programming and Design Methods with Java Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE2211**

CSE2221: Design and Analysis of Algorithms

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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 queens problem, Sum of subsets, Graph coloring problem, Hamilton cycles.

Branch and bound: Lest cost search, 15-puzzle problem, Knapsack problem, Traveling salesman problem.

NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-complete problems.

Recommended Books:

1.	Thomas H. Kormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	:	**Introduction to Algorithms**, *The MIT Press*
2.	D. E. Knuth	:	**The Art of Computer Programming,** Vol. 1, 2, 3, *Addison-Wesley.*
5.	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran	:	**Fundamentals of Computer Algorithms**, *Galgotia Publications*

CSE2222: Design and Analysis of Algorithms Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE2221**

CSE2231: Computer Architecture and Organization

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Concepts and Terminology: Digital computer components Hardware & Software and their dual nature, recent development, Role of Operating Systems (OS).

Processor Design: Introduction: Processor organization, information representation, number formats; Fixed Point Arithmetic: Addition, subtraction, multiplication, division; ALU Design: Basic ALU organization, floating point arithmetic.

Control Design: Hardwired control: Design methods, multiplier control unit, CPU control unit; Basic concept of Micro programmed Control, Control memory optimization.

Memory Devices and its Organization: Different types of semiconductor memory, magnetic memory, optical memory, virtual memory, memory hierarchies; High-speed Memories: Interleaved memories, caches, associative memories.

System Organization: Communications: Introduction, bus control; IO Systems: Programmed IO, DMA and interrupts, IO processors.

Application HDL for microcomputer design: Description of Adder, ALU by using HDL, implementation of a simple microcomputer system using HDL.

Books Recommended:

1.	John P. Hayes	:	**Computer Architecture and Organization,** *McGraw-Hill.*
2.	Carl Hamacher, Zvonko Vranesic and Safwat Zaky	:	**Computer Organization**, *McGraw-Hill.*
3.	Kai Hwang and Faye A. Briggs	:	**Computer Architecture and Parallel Processing**, *McGraw-Hill.*
4.	William Stallings	:	**Computer Organization and Architecture: Designing for Performance**, *Prentice Hall.*

CSE2232: Computer Architecture and Organization Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE2231**

CSE2242: Software Development Lab II

50 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
2 credits, 52 Contact hours

Students will develop software with proper documentation as assigned by Lab teachers based on **CSE2211**.

CSE3111: System Analysis and Design

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: Introduction to information systems, general design consideration of information systems.

Overview: system concepts and the information systems environment, information needs, the concepts of MIS, the system development life cycle, the role of the systems analysis.

Systems Analysis: Systems planning and the initial investigation, information gathering, the tools of structured analysis, feasibility study, cost benefit analysis.

Systems Design: The process and stages of systems design, input/output and forms design, file organization and data base design.

System Implementation: system testing and quality assurance, implementation and software maintenance, hardware/software selection, project scheduling and software, Security, disaster/recovery, and ethics in system development.

Case study: Case studies of various information systems such as: Library management system, inventory system, voter identity management system, payroll system, etc.

Books Recommended:

1. E.M. Awad : **System Analysis and Design**, *Galgotia Publication Ltd*
2. P. Edwards : **System Analysis & Design,** *McGraw-Hill*
3. J.G. Burch Jr., F.R. Strater and G. Grundnitski : **Information Systems: Theory and Practice,** *John Wiley & Sons.*
4. G. Scott. : **Principles of Management Information Systems**, *McGraw-Hill*
5. A. Daniels and D. Yeates : **Basic System Analysis**, *Galgottia*

CSE3121: Database Management Systems

**75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours**

Introduction to database system: Overview, File system VS database system, Advantage of a DBMS, Describing and storing in a DBMS, Queries in a DBMS, Transaction management, Structure of a DBMS, Applications.

The Entity-Relationship model: Basic concept, Design issue, Mapping constraints, Keys, E-R diagram, Weak entity sets, Extended E-R features, Design of an E-R database schema, Reduction of a E-R schema to tables.

Relational model: Structure of relational databases, The relational algebra, The tuple relational calculus, the domain relational calculus, relational algebra operations, modification of the database, introduction to views.

Structured Query Language: The form of a basic SQL query, UNION, INTERSECTION and EXCEPT, nested queries, aggregate operations, null values, embedded SQL, cursors, dynamic SQL, ODBC and JDBC, triggers and active database.

Relational database design: Pitfalls in relational database design, Decomposition, normalization using functional dependencies, normalization using multivalued dependencies, normalization using join dependencies, domain-key normal form.

Object oriented and object relational databases: The object oriented data model, nested relations, complex types and object orientation, querying with complex types, creation of complex values and objects.

Storage and file structure: File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree .

Query processing: Catalog information for cost estimation, measuring of query cost, different operations, evaluation of expressions, and choice of evaluation plans.

Concurrency control: Lock based protocols, timestamp based protocols, validation based protocols, multiple granularity, multiversion schemes, deadlock handling, insert and delete operations.

Recovery system: Failure classification, storage structure, recovery and atomicity, log-based recovery, shadow paging, recovery with concurrent transactions, buffer management, advanced recovery techniques.

Database system architecture: Centralized systems, client-server systems, parallel systems, distributed systems, network types

An introduction to parallel and distributed database: Oracle: introduction to SQL plus, PL/SQL, triggers, forms, reports, query, procedures, and project builder.

Books Recommended:

1. A. Silberschatz : **Database System Concepts,** *Mcgraw-Hill.*
2. Raghu Ramakrishnan, Johannes Gehrke : **Database Management System,** *McGraw-Hill Higher Education*
3. James Martin : **Principles of Database Management**, *Prentice-hall Of India Pvt Ltd*
4. Ullman : **Database Management systems**, *Prentice-Hall Publication.*
5. Abey : **Oracle 8i a Beginners Guide**, *McGraw Hill.*

CSE3122: Database Management Systems Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE3121**

CSE3131: Digital Signal Processing

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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.

Books Recommended:

1. J. G. Prokis : **Digital Signal Processing**, *Prentice-hall Of India*
2. Defatta : **Digital Signal Processing,** *Wiley India Pvt Ltd*
3. R. G. Lyon : **Understanding Digital Signal Processing,** *Orling Kindersley India*
4. P. R. Babu. : **Digital Signal Processing**, *Scitech Publication..*

CSE3132: Digital Signal Processing Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE3131**

CSE3141: Compiler Design

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: Introduction to compiler, compiler and translator, the structure of a compiler.

Grammars: Notation and concepts for languages and Grammars, sets and string, Discussion and classification of Grammars, Scanner regular expression, regular definition, finite automata, LL and LR Grammars, ambiguous grammar.

Parsing: Basic parsing technique, parsers, shift reduce parsing, operator-procedure parsing, top-down parsing, bottom up parsing, predictive parsing.

Syntax: Syntax directed translation, intermediate code generation, polish notation, parse tree and syntax trees, quadruples, triples, Boolean expression.

Symbol Table: Perspective and motivation of symbol table. Symbol table content, operation on symbol table, organization of symbol table.

Code Optimization: Code optimization, sources of optimization, basic blocks, folding, loop optimization, flowgraph, induction variable elimination, reduction in strength, code motion.

Error Handling: Compile time error handling, error detection, error recovery, error repair.

Coding: Code generation, object programs, problems in code generation, a machine model, a simple code generator, register allocation and assignment peephole optimization.

Books Recommended:

1.	Alfred V. Aho and Jeffrey D. Ullman	:	**Principles of Compiler Design**, *Addison-Wesley Publication*.
2.	A.J. Holub	:	**Compiler design in C**, *Prentice-Hall of India*
3.	Trembly and Sorensen	:	**Theory and Practices of Compiler Writing,** *McGraw-Hill computer science series.*
4.	Hopcroft and Ulman	:	**Introduction to Automata Theory, Languages and Computation**, *University of Toronto*
5.	Adamek	:	**Automata and Algebra**, *Kluwer Academic* Publishers *Norwell, MA, USA.*

CSE3142: Compiler Design Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE3141**

CSE3151: Computer Networks

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam.Time: 3 hours

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.

Networking in Practice: Designing LAN, Cabling, Establishing Client-Server network, Configuring: Directory Server, Proxy server, FTP server, E-mail server, web server, DB server, Firewall, Network troubleshooting, network maintenance, network monitoring, Network programming.

Books Recommended:

1.	Behrouz A. Forouzan	:	**TCP/IP Protocol Suite**, *McGraw-Hill*
2.	Andrew S. Tanenbaum	:	**Computer Networks**, *Prentice Hall*
3.	William Stallings	:	**Data and Computer Communications**, *Prentice Hall*
4.	Behrouz A. Forouzan	:	**Data Communications and Networking**, *McGraw-Hill*

CSE3152: Computer Networks Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE3151**

CSE3162: Software Development Lab III

50 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
2 credits, 52 Contact hours

Students will develop software with proper documentation as assigned by Lab teachers based on **CSE2231**.

CSE3211: Software Engineering

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: Introduction to software engineering, Importance of software, The Software evolution, Software characteristics, Software components, Software applications, Crisis-Problem and causes.

Software development life-cycle: Requirement analysis, software design, coding, testing and maintenance etc.

Software requirement Specification: Water fall model, prototyping interactive enhancement, spiral model role of management in software development, role of matrices and measurement, Problem analysis, requirement specification, validation, matrices, monitoring and control.

System Design: Problem partitioning, abstraction, top down and bottom up – design, structured approach, functional versus object oriented approach, design specification and verification matrices, monitoring and control, Cohesiveness, coupling, 4 GL. Visio, DFD, Rational Rose, Visio, VS architectural design.

Coding: TOP-DOWN and BOTTOM-UP structure programming, information hiding, programming style, and internal documentation,

verification, metrics, monitoring and control, Subversion, Team System, Source Safe

Testing: levels of testing, functional testing, structural testing, test plane, test class specification, reliability assessment, Software testing strategies, Verification and validation, Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta testing, System testing and debugging. NUnit for unit testing, Selenium, WebLoad

Software project Management: Cost estimation, project scheduling, staffing, software configuration management, structured Vs unstructured maintenance, quality assurance, project monitoring, risk management. Agile-XP, scrum, Rally, Version One, Bugzilla, Visual Studio Team System, Agile project management, comparison with traditional process, Next generation software engineering

Function oriented and object oriented Software design: Overview of SA/SD Methodology, structured analysis, data flow diagrams, extending DFD to real time systems, Object oriented design, Graphical representation of OOD, Generic OO development paradigm.

Software Reliability and Quality Assurance: Reliability issues, Reliability metrics, reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM, NANT, CruiseControl.Net for automated build.

Books Recommended:

1. Roger S. Pressman : **Software Engineering, A practitioner's Approach,** *McGraw-Hill*
2. Ian Sommerville : **Software Engineering**, *Pearson Education.*
3. Richard Fairley : **Software Engineering Concepts**, *McGraw-Hill.*
4. Robert N. Charette : **Software Engineering Environments,** *McGraw-Hill.*
5. S. L. Pfleeger and J.M. Atlee : **Software Engineering Theory and Practice**, *Pearson Education.*

CSE3212: Software Engineering Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE3211**

CSE3221: Computer Graphics
75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction to Computer Graphics and Graphics systems: Overview of computer graphics, representing pictures, preparing, presenting and interacting with pictures for presentations; Visualization and image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active and Passive graphics devices; Computer graphics software.

Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

2D transformation and viewing: Basic transformations: translation, rotation, scaling; Matrix representations and homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse.

3D transformation and viewing: 3D transformations: translation, rotation, scaling and other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.

Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic Bspline curves, rational B-spline curves.

Hidden surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry.

Color and shading models: Light & color model; interpolative shading model; Texture;

Books Recommended:

1. Donald Hearn and M. Pauline Baker : **Computer Graphics**, *Prentice Hall*
2. Steven Harrington : **Computer Graphics: A Programming Approach**, *McGraw-Hill College*.
3. F. S. Hill : **Fundamentals of Computer Graphics**, *Prentice Hall*
4. Plastock and Kalley : **Computer Graphics**, *Mcgraw-hill*.
5. Zhigang Xiang & Roy Plastock : **Computer Graphics**, *Mcgraw-hill*.

CSE3222: Computer Graphics Lab
25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours
Laboratory works based on **CSE3221**

CSE3231: Microprocessor and Assembly Language
75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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 IMB 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.

Books Recommended:

1. Ytha Yu and Charlers Marut : **Assembly Language Programming and Organization of the IBM PC,** *McGraw-Hill*
2. Rafiquzzaman : **Microprocessor and Microcomputer based System Design**, *Crc Press Publication*
3. D. V. Hall : **Microprocessors and Interfacing**, *McGraw-Hill*
4. Y. Liu and G. A. Gibson : **Microcomputer Systems: 8086/8088 Family,** *Prentice-Hall*
5. Artwick : **Microcomputer Interfacing**, *Prentice-Hall series.*
6. Ramesh Goanker : **Microcomputer Interfacing**, *McGraw-Hill*

CSE3232: Microprocessor and Assembly Language Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE3231**

CSE3241: Operating System and System Programming

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]

3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed,time-sharing, real-time, distributed, parallel.

System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Process Management: Processes: Concept of processes, process scheduling, operations on processes, co-operating processes, interprocess communication.

Threads: overview, benefits of threads, user and kernel threads.

CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management: Memory Management: Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Disk Management: Disk reliability, disk formatting, boot block, bad blocks.

Protection & Security: Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Books Recommended:
1.	Abraham Silberschatz and Peter Baer Galvin	:	**Operating Systems Concepts**, *Wiley Publisher.*
2.	Tanenbaum	:	**Operating Systems**, *Prentice-Hall*
3.	Madnick and J. Donovon	:	**Operating systems**, *McGraw-Hill*
4.	B. Hausen	:	**Operating System Principles**, *Prentice-Hall of India*
5.	Donovan	:	**Systems Programming,** *McGraw-Hill.*
6.	Maurice. J. Bach	:	**The design of the Unix operating system**, *Prentice-Hall.*
7.	M. MilenKovic	:	**Operating System Concept and Design**, *Tata McGraw Hill.*
8.	Terrence	:	**Unix System Programming in C++,** *Prentice Hall* Publication

CSE3242: Operating System and System Programming Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours
Laboratory works based on **CSE3241**

ICE3261: Communication Engineering

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Fundamentals: Communication Engineering Fundamentals, Waveforms Spectra, Periodic waveforms and its properties, Fourier series, Noise and its different types.

Amplitude Modulation: Amplitude modulation, Amplitude modulation index, Frequency spectrum for sinusoidal AM, AM broadcast Transmitter.

Frequency Modulation: Frequency Modulation, Sinusoidal FM, Frequency spectrum for Sinusoidal FM, FM transmitter. FM receiver, Phase Modulation.

Pulse modulation, Pulse Codes Modulation (PCM), Quantization, Compression, PCM Receiver, Differential PCM, Delta Modulation, Sigma-Delta A/D conversion, Pulse Frequency Modulation (PFM), Pulse Time Modulation (PTM), Pulse Position Modulation (PPM).

Digital Communication: Digital Communication, Basic Digital Communication System, Synchronization, Asynchronous Transmission, Probability of Bit Error in Base band Transmission, Matched Filter, Eye Diagrams, Digital Carrier Systems, Amplitude Shift keying, Frequency Shift Keying, Phase Shift Keying, Carrier Recovery Circuits, Differential Phase Shift Keying, Error Control Coding, Block Control, Repetition Encoding, Parity Encoding, Convolution Encoding.

Propagation: Radio Wave Propagation, Mode of Propagation, Microwave Systems, Tropospheric Propagation, VHF/UHF Radio Systems.

Satellite Communication: Satellite Communication, Kepler's First and Second Law, Orbits, Geostationary Orbits, Power System.

Fiber Optic Communication: Fiber Optic Communication, Propagation within a Fiber, Modes of Propagation, Losses in Fibers, Light sources for Fiber optics, Photo detectors.

Books Recommended:
1.	Behrouz A. Forouzan	:	**Data Communications and Networking,** *Tata McGraw-Hill Edition*
2.	William Stallings	:	**Data and Computer Communications**, *Prentice Hall International, Inc.*
3.	John M. Senior	:	**Optical Fiber Communications** , *Prentice-Hall of India Pvt Ltd*
4.	F. Halsall	:	**Data Communication, Computer Network and open systems,** *Addison Wesly*
5.	Andrew S. Tanenbaum	:	**Computer Networks**, *Prentice Hall of India Pvt. Ltd*

ICE3262: Communication Engineering Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **ICE3261**

CSE4111: Parallel Processing and Distributed System

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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 Non linear 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 Multicomputers.

Distributed System: Introduction, Distributed System Architectures, Communication in Distributed Systems, Distributed Middleware, Client/Server Design Issues, Inter-process communication, RPC , Distributed Objects and Remote Invocation , Virtualization & Code

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Migration, Naming, Distributed Synchronization & Coordination, Consistency & Replication in Distributed Systems, Fault Tolerance, Distributed Transactions , Security, P2P Systems, Cloud Computing, Grid Computing.

Distributed System Programming : Java RMI, CORBA, P2P, COM, DCOM, Multi Agent System, SOAP, Web Service.

Books Recommended:

1.	Kai Hwang (Senior Consulting Edition)	:	**Advanced Computer Architecture Parallelism, Scalability, Programmability**, *McGraw Hill.*
2.	Kai Hwang, Faye A. Briggs	:	**Computer Architecture and Parallel Processing**, *McGraw Hill*
3.	R. J. Cypser	:	**Communication Architecture for distributed system**, *Addison-Wesley.*
4.	James Martin	:	**Design and Strategy for distributed data processing**, *Prentice Hall.*
5.	Tanenbaum and Van Steen.	:	**Distributed Systems: Principles and Paradigms.** *Prentice Hall.*
6.	George Coulouris, Jean Dollimore, and Tim Kindberg,		**Distributed Systems: Concepts and Design,** *Addison-Wesley.*

CSE4112: Parallel Processing and Distributed System Lab
25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours
Laboratory works based on **CSE4111**

CSE4121: Theory of Computation
75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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Introduction: Logic and Proofs, Mathematical Inductions, Sets, Equivalence relations, Language and recursive definitions.

Languages and Grammars: Finitte Automata - accepting languages, strings, string search algorithm, distinguishing strings, integers, lexical analysis, decision problems and languages, minimizing finite automata.

Regular languages and expression: Non-deterministic finite automata, Kleene's theorem. Contex-free languages, regular languages and grammars. Simplified forms and normal forms. Push-Down Automata- deterministic PDA and non-deterministic PDA, top-down and bottom-up PDA, Parsing - top down and bottom-up parsers. Decision problems and CFL.

Computational Models: Computational tasks - search and decision problems, General model of computation, Turing Machines - definition of Turing machine, Turing machine and regular languages, computing partial functions with Turing machine, composite and multi-tape Turing machines, non-deterministic Turing machines, universal Turing machine. Boolean circuits. Parallel random access machines.

Decision problems: Undecidable problems, reduction and halting problem, undecidable problems and context-free languages. Decision trees. Satisfiability problem.

Computational complexity: Introduction to complexity theory, Time complexity of a Turing machine, Polynomial-time reductions and NP completeness, NP-hard and NP-complete languages, the Cook-Levin theorem. Space complexity - time vs. space, logarithmic space, non-deterministic space complexity. Communication complexity.

Books Recommended:

1. John C. Martin : Introduction to Languages and The Theory of Computation. McGraw Hill 2011.
2. Sanjeev Arora and Boaz Barak : Computational Complexity: A Modern Approach
3. Oded Goldreich : Complexity of Algorithms - A Conceptual Perspective
4. Peter Gacs and Laszlo Lovasz : Complexity Algorithms

CSE4131: Computer Simulation and Modeling

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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.

Books Recommended:

1. J. A. Spriet : **Computer Aided Modelling & Simulation,** *Academic Press, Inc. Orlando, FL, USA.*
2. Richard Lehman : **Computer Simulation and Modeling,** *Lawrence Erlbaum Associates Publishers.*
3. G. Cordon : **System Simulation,** *Prentice Hall*
4. James D. Foley Andries van Dam : **Computer Graphics,** *Addison-Wesley.*

CSE4132: Computer Simulation and Modeling Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4131**

CSE4141: Computer Peripherals and Interfacing

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Basic concepts of microprocessor interfacing: reviews of address decoding concepts, Input and Output port design, decoder, encoder, mutliplexer, demultiplexer.

Interfacing peripherals: Peripheral I/O and memory mapped I/O, Interfacing with external memory, microprocessor controlled data transfer and peripheral controlled data transfer, Peripheral I/O instruction for Intel 8085 Microprocessor and its timing diagram. Interfacing with LED, seven segment display, Push-button keys, Matrix keyboard, AD and DA converter.

Programmable Interface device: 8212, Programmable devices with Handshake signals, 6155/8156 multipurpose programmable devices, Interfacing seven segment LED using 8155, 8155 timer, 8155 I/O ports in Handshake modes and its interfacing example, Interfacing 8355/8755 Programmable I/O ports, 8279 programmable keyboard/display interface and its interfacing example, 8255 Programmable peripheral interface, Block diagram of 8255, its different mode of operation, Interfacing A/D converter using 8255, Application of 8255 in Handshake mode, 8253 Programmable interval timer, programming 8263, 8253 as counter, 8259 programmable interrupt controller and its priority mode and other features, programming the 8259, 8257 DMA controller and its block diagram, example of application of 8257 DMA controller.

Serial I/O and data communication: Synchronous and asynchronous transmission, Parity check, BAUD, RS 232 standard, Software versus programmable hardware approach, software controlled asynchronous serial I/O, 8085 serial I/O SOD and SID, Hardware controlled serial I/O using programmable chips, 8251 programmable communication interface and its block diagram, interfacing RS 232 Terminal using the 8251A.

Books Recommended:

1. Rafiquzzaman : **Microprocessor and Microcomputer based System Design,** *CRC-Press*
2. D. V. Hall : **Microprocessors and Interfacing**, *McGraw-Hill*
3. Y. Liu and G. A. Gibson : **Microcomputer Systems: 8086/8088 Family**, *Prentice-Hall*
4. Artwick : **Microcomputer Interfacing**, *Prentice Hall.*
5. James E. Powell : **Designing User Interfaces**, *Microtrend Books San Marcos, CA, USA*

CSE4142: Computer Peripherals and Interfacing Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4141**

Option I Should be Selected from the Following Courses.
CSE4151-CSE4152, CSE4161–4162, CSE4171-4172, CSE4181-CSE4182

CSE4151: Design of VLSI Circuits and Systems

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam Time: 3 hours

VLSI design methodology: top-down design approach, technology trends.

MOS technology: Introduction to MOS technology, operation of MOS transistor as a switch and amplifier, MOS, NMOS, CMOS inverters, pass transistor and pass gates, DC and transient characteristics.

Overview of fabrication process: NMOS, CMOS, Bi-CMOS process.

NMOS and CMOS layout: Stick diagram, and design rules.

CMOS circuit characteristics: Resistance and capacitance, rise and fall time, power estimation.

Introduction to Bi-CMOS circuits: Shifter, adder, counter, multipliers. Data Path and memory structures, Buffer circuit design.

Design style: FPGA and PLDs.

Books Recommended:

1. K. Eshraghian & D. A. Pucknell : **Basic VLSI design: System & Circuit**, *Prentice-Hall*
2. R. K. Brayton : **Logic Minimization Algorithms for VLSI Synthesis**, *Kluwer Academic Publishers Norwell, MA, USA.*
3. F. Lombardi and M. G. Sami : **Testing and Diagnosable Design of VLSI and ULSI,** *Springer.*
4. C. A. Mead and L. A. : **Introduction to VLSI Systems**, *Addison-*

Conway   *Wesley.*

CSE4152: Design of VLSI Circuits and Systems Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4151**

CSE4161: Management Information System

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction to Management Information System (MIS). Role and Importance of Management. Process of Management. Organization Structure and Theory.

Basis of Management Information System, Decision Making, Information, Systems, System Analysis and Design, Development of MIS.

Application of Management Information System, Application in Manufacturing Sectors, Decision Support System, Enterprise Management System,

Electronic Commerce (e-commerce), Fundamentals of e-commerce, Models of e-commerce, Retailing in e-commerce, Models of Business to Business e-commerce.

Technology in Management Information System, Busyness Process Re-engineering.

Books Recommended:
1. W.S. Jawadekar   : **Management Information Systems**, *Tata McGraw-Hill*
2. Efraim Turban, Jae Kuy Lee, Jae Kyu Lee, Michael Chung : **Electronic Commerce: A Managerial Perspective,** *Prentice Hall*
3. James A. O'Brien, George M. Marakas : **Management Information Systems**, *McGraw-Hill*

CSE4162: Management Information System Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4161**

CSE4171: Computational Geometry

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: historical perspective, geometric preliminaries. Convex hulls algorithms in 2d and 3d, lower bounds.

Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs;

Voronoi diagrams: construction and applications, variants;

Delayney triangulations: divideand- conquer, flip and incremental algorithms, duality of Voronoi diagrams, min-max angle properties;

Geometric searching: pointlocation, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees;

Visibility: algorithms for weak and strong visibility, visibility with reflections, art-gallery problems;

Arrangements of lines: arrangements of hyperplanes, zone theorems, many-faces complexity and algorithms;

Combinatorial geometry: Ham-sandwich cuts, Helly's theorems, k-sets, polytopes and hierarchies, polytopes and linear progamming in d-dimensions, complexity of the union of convex sets, simply connected sets and visible regions;

Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements;

Randomization in computational geometry: algorithms, techniques for counting; Robust geometric computing; Applications of computational geometry.

Books Recommended:

1. M. d. Berg, O. Schwarzkopf, M. v. Kreveld and M. Overmars : **Computational Geometry: Algorithms and Applications**, *Springer.*
2. F. P. Preparata and M. I. Shamos : **Computational Geometry: An Introduction**, *Springer.*
3. J. O. Rourke : **Computational Geometry in C**, *Cambridge University Press.*

CSE4172: Computational Geometry Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4171**

CSE4181: Digital Image Processing

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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.

Books Recommended:

1. Rafeal C. Gonzalez & Richard E. Woods : **Digital Image Processing,** *Prentice-Hall Publication*
2. A. K. Jain : **Fundamentals of Digital Image Processing,** *Academic Press.*
3. Mark S. Nixon & Albert S. Aguado : **Feature Extraction and Image Processing**, *Academic Press*
4. William K. Pratt : **Digital Image Processing**, *Wiley-Interscience,*

CSE4182: Digital Image Processing Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours
Laboratory works based on **CSE4181**

CSE4192: Project (Part-I)

25 Marks [70% Presentation, 20% Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Each student has to complete one project in the combined duration of two semesters of Part-IV. In odd semester course CSE 4192 (Part-I), a student has to make a proposal defence at the end of the semester. The defenced project has to be completed in the continuation course CSE 4292 (Part-II) in even semester of Part-IV.

CSE4211: Artificial Intelligence

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction: History of AI - Intelligent agents – Structure of agents and its functions - Problem spaces and search - Heuristic Search techniques – Best-first search - Problem reduction - Constraint satisfaction - Means Ends Analysis.

Knowledge Representation: Approaches and issues in knowledge representation- Knowledge - Based Agent- Propositional Logic – Predicate logic – Unification – Resolution - Weak slot - filler structure – Strong slot - filler structure.

Reasoning under uncertainty: Logics of non-monotonic reasoning - Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems-Bayesian networks – Dempster - Shafer Theory - Fuzzy Logic.

Planning and Learning: Planning with state space search - conditional planning-continuous planning - Multi-Agent planning. Forms of learning - inductive learning - Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning

AI programming languages: Introduction to PROLOG, knowledge representation, domain, predicate, clauses, database, back tracking, unification, list, and compound object using prolog.

Introduction to selected topics in AI: Neural Networks, Expert system, Robotics and Fuzzy logic

Books Recommended:

1. Elaine Rich, Kevin Knight and Shivashankar B.Nair : **Artificial Intelligence,** *Tata McGraw-Hill*
2. Staurt J. Russel and Peter Norvig : **Artificial Intelligence: A modern Approach**, *Pearson Education Asia*
3. D. W. Patterson : **Introduction to Artificial Intelligence and Expert System,** *Prentice-Hall of India*
4. Patrick Henry Winston : **Artificial intelligence**, *Pearson Education Inc.*
5. N. P. Padhy : **Artificial Intelligence and Intelligent System**, *Oxford University Press*
6. Carl Townsend : **Introduction to Turbo Prolog,** *Sybex Inc.*
7. Bratko, I : **Prolog Programming for Artificial Intelligence,** *Addison Wesley*.
8. Clocksin, W.F. and Mellish, C.S. : **Programming in Prolog: Using the ISO Standard**, *Springer*.

CSE4212: Artificial Intelligence Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4211**

CSE4221: E-Commerce

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

E-Commerce Basics: E-Commerce Definition, Internet History and E-Commerce Development, Business-to-Business E-Commerce, Business-to-Consumer E-Commerce, E-Commerce Stages and Processes, E-Commerce Challenges, E-Commerce Opportunities.

E-Commerce Options: Internet Access Requirements, Web Hosting Requirements, Entry-Level Options, Storefront and Template Services, E-

Commerce Software Packages, E-Commerce Developers, E-Business Solutions.

Marketing Issues: Online and Offline Market Research, Data Collection, Domain Names, Advertising Options, E-Mail Marketing, Search Engines, Web Site Monitoring, Incentives.

Planning and Development: Web Site Goals, International Issues, Planning Stages, Resource Allocation, Content Development, Site Map Development, Web Site Design Principles, Web Site Design Tools, Web Page Programming Tools, Data-Processing Tools. E-Commerce Components: Navigation Aids, Web Site Search Tools, Databases, Forms, Shopping Carts, Checkout Procedures, Shipping Options. .

Payment Processing: Electronic Payment Issues, E-Cash, Credit Card Issues, Merchant Accounts, Online Payment Services, Transaction Processing

Mobile Commerce: Over view of M-Commerce, advantages and limitations, WML,

Security Issues: Security Issues and Threats, Security Procedures, Encryption, Digital Certificates, SSL and SET Technologies, Authentication and Identification, Security Providers, Privacy Policies.

E-Core values: Ethical, legal, taxation and International issues

Customer Service: Customer Service Issues, E-Mail Support , Telephone Support , Live Help Services, Customer Discussion Forums, Value-Added Options.

The WWW: HTTP protocol, HTML, XHTML, XML, Javascript, CSS, DOM

Books Recommended:

1.	Elias M. Awad	:	**Electronic Commerce: From Vision to Fulfillment**, *Prentice-Hall Inc.*
2.	Jeffrey F., Rayport, Bernard J. Jaworsk	:	**E-Commerce,** *McGraw-Hill*
3.	David Kosiur	:	**Understanding Electronic Commerce**, *Microsoft Press.*
4.	Jeffrey F. Rayport, et al.	:	**Introduction to E-Commerce**, *McGraw-Hill.*
5.	Debra Cameron	:	**E-Commerce Security Strategies: Protection the Enterprise**, *Computer Technology Research Corp*
6.	Charles Trepper	:	**E-Commerce Strategies**, *Phi Learning Pvt. Ltd*
7.	Dave W. Mercer, Allan Kent, Steven D. Nowicki, David Mercer, Dan Squier and Wankyu Choi	:	**Beginning PHP 5**, *Wrox publication*.

CSE4222: E-Commerce Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4221**

CSE4231: Cryptography and Network Security

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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.

Number theory: Fields, algebraic closures, Integers - divisibility, primes, testing primes, factorization, Euclidean algorithm

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.

Information Security: Information Security, Information Security Management, Security Technology Evaluation, Information Security Measures, Security Implementation Technology.

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

Books Recommended:

1.	W. Stallings	:	**Cryptography and Network Security Principles and Practice**, *Prentice Hall.*
2	Behrouz Forouzan		**Cryptography and Network Security**, *McGraw-Hill*
3.	Bruce Schneier	:	**Applied Cryptography**, *John Wiley & Sons.*
4.	Dieter Gollmann	:	**Computer Security**, *John Wiley and Son.*
5.	Edward Amoroso	:	**Fundamentals of Computer Security Technology**, *Prentice Hall*.
6.	E. Biham and A. Shamir	:	**Differential Crypt Analysis of the Data Encryption Standard,** *Springer Verlag.*
7.	D. Denning	:	**Cryptography and Data Security,** *Addison Wesley.*
8.	N. Kobliz	:	**A Course on Number Theory and Cryptography,** *Springer Verlag*.

CSE4232: Cryptography and Network Security Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4231**

CSE4241: Wireless Communication

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

Introduction To Wireless Communication Systems: Evolution of mobile radio communications, examples of wireless comm. 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.

Wireless Networking: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks. Wireless LAN Technogy - IEEE 802.11 Wireless LAN Standard - Bluetooth.

Intelligent Cell Concept And Application: Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

Books Recommended:

1.	William Stallings	:	**Wireless Communications and Networks**, *Prentice Hall*
2.	Theodore S. Rappaport	:	**Wireless Communications**, *Pearson Education*
3.	John G. Proakis	:	**Digital Communications**, *McGraw-Hill International*
4.	W.C.Y.Lee;	:	**Mobile Cellular Telecommunication,** *McGraw Hill*
5.	Jochen Schille	:	**Mobile Communications,** *Pearson*

CSE4242: Wireless Communication Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4241**

CSE4251: Multimedia System

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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 water-marking, 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.

Books Recommended:

1.	Ze-Nian Li and Mark S. Drew	:	**Fundamentals of Multimedia**, *Pearson*
2.	John Villamil-Casanova and Louis Molina	:	**Multimedia: An Introduction**, *Prentice Hall India.*
3.	Tay Vaughan	:	**Multimedia: Making It Work**, *McGraw-Hill*
4.	John Villamil-Casanova and Leony Fernandez-Elias	:	**Multimedia: Graphics,** *Prentice Hall India.*
5.	Jose Lozano**,** Louis Molina and John Willif	:	**Multimedia Sound and Video**, *Prentice Hall India.*

CSE4252: Multimedia System Lab

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4251**

CSE4261: Distributed Database Management System

75 Marks [70% Exam, 20% Quizzes/Class Tests, 10% Attendance]
3 Credits, 39 Contact hours, Exam. Time: 3 hours

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,

Books Recommended:

1.	M.T. Ozsu and P. Valduriez	:	**Principles of Distributed Database Systems,** *Pearson.*
2.	S. Ceri and G. Pelagatti	:	**Distributed Databases principles and systems,** *Tata McGraw Hill*
3.	Andrew S. Tanenbaum	:	**Distributed Database,** *Pearson.*

CSE4262: Distributed Database Management System

25 Marks [60% Practical, 30% Quizzes/Viva-voce, 10% Attendance]
1 Credit, 26 Contact hours

Laboratory works based on **CSE4261**

CSE4292: Project (Part-II)

50 Marks [70% Project defence, 30% Internal Examiner]

2 Credits, 52 Contact hours

This course is a continuation of the course CSE 4192 (Part-I) from the odd semester Part-IV. A student has to complete the defenced project proposal, submit it by the end of the semester and make an oral defence of the project.

CSE4280: Board viva-voce

50 Marks [100% Viva-voce]
2 Credits

Board viva-voce will be conducted by Examination Committee.