

## Revised Syllabus

### Gono Bishwabidyalay Department of Computer Science and Engineering (CSE) Syllabus for 4-Year B.Sc. (Hons.) Program

#### Year-1, Semester -1

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE111	Computer Fundamentals	54	3	100
CSE111L	Computer Fundamentals Lab	72	2	50
CSE112	Structured Programming Language	54	3	100
CSE112L	Structured Programming Language Lab	72	2	50
MAT113	Mathematics-I	36	2	50
ENV114	Environmental Science	54	3	100
LAN115	English-I	36	2	50
LAN116	Bengali	36	2	50
CSE117	Viva Voce	-	1	25
Total		414	20	575

#### Year-1, Semester -2

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE121	Object Oriented Programming Language	54	3	100
CSE121L	Object Oriented Programming Language Lab	72	2	50
CSE122	Digital Logic & System Design	54	3	100
CSE122L	Digital Logic & System Design Lab	72	2	50
MAT123	Mathematics-II	36	2	50
PHY124	Physics	54	3	100
LAN125	English-II	36	2	50
LAN126	Liberation War of Bangladesh	54	3	100
CSE127	Viva Voce	-	1	25
Total		432	21	625

**Year-2, Semester – 3**

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE231	Data Structures	54	3	100
CSE231L	Data Structures Lab	72	2	50
CSE232	Electronics & Electrical Circuits	54	3	100
CSE232L	Electronics & Electrical Circuits Lab	72	2	50
COM233	Management	36	2	50
STA234	Statistics & Probability	54	3	100
MAT235	Mathematics-III	36	2	50
ECO236	Economics	54	3	100
CSE237	Viva Voce	-	1	25
Total		432	21	625

**Year-2, Semester –4**

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE241	Algorithms	54	3	100
CSE241L	Algorithms Lab	72	2	50
CSE242	Digital Image Processing	54	3	100
CSE242L	Digital Image Processing Lab	72	2	50
CSE243L	Assembly Language Program. Lab	72	2	50
CSE244	Discrete Mathematics	54	3	100
MAT245	Mathematics-IV	36	2	50
COM246	Accounting	36	2	50
CSE247	Viva Voce	-	1	25
Total		450	20	575

**Year-3, Semester – 5**

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE351	Database Systems	54	3	100
CSE351L	Database Systems Lab	72	2	50
CSE352	Microprocessor	54	3	100
CSE352L	Microprocessor Lab	72	2	50
CSE353	Data Communication	54	3	100
CSE354	Automata Theory	36	2	50
CSE355L	Java Programming Lab	72	2	50
CSE356	Numerical Methods	36	2	50
CSE 357	Viva Voce	-	1	25
Total		450	20	575

**Year-3, Semester -6**

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE361	Operating System	54	3	100
CSE361L	Operating System Lab	72	2	50
CSE362	Web Engineering	54	3	100
CSE362L	Web Engineering Lab	72	2	50
CSE363	Computer Architecture	54	3	100
CSE364	Computer Peripherals and Interfacing	54	3	100
CSE365	Multimedia Systems	36	2	50
CSE366L	Mobile Application Lab	72	2	50
CSE367	Viva Voce	-	1	25
<b>Total</b>		<b>468</b>	<b>21</b>	<b>625</b>

**Year-4, Semester - 7**

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE471	Computer Networks	54	3	100
CSE471L	Computer Networks Lab	72	2	50
CSE472	Software Engineering	54	3	100
CSE472L	Software Engineering Lab	72	2	50
CSE473	Digital Signal Processing	54	3	100
CSE474	Compiler Design	36	2	50
CSE475	Simulation and Modeling	54	3	100
CSE476	Viva Voce	-	1	25
<b>Total</b>		<b>396</b>	<b>19</b>	<b>575</b>

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**Year-4, Semester – 8**

Course Code	Course Name	Contact Hours Theory / Lab	Credits	Marks
CSE481	Computer Graphics	54	3	100
CSE481L	Computer Graphics Lab	72	2	50
CSE482	Artificial Intelligence	54	3	100
CSE482L	Artificial Intelligence Lab	72	2	50
CSE483	Data Mining	54	3	100
CSE484	Project Work	140	4	100
CSE485	Viva Voce	-	1	25
<b>Total</b>		<b>446</b>	<b>18</b>	<b>525</b>

<b>Grand Total</b>	<b>2034/1508</b>	<b>160</b>	<b>4700</b>
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## **DETAILED OUTLINE OF UNDERGRADUATE CSE PROGRAM YEAR-1, SEMESTER-1**

### **CSE111: Computer Fundamentals**

Introduction, types and generation of computers, basic organization and functional units, hardware and software, system unit, mother board, system bus, Interface cards, etc. Number systems, BCD and ASCII code, binary arithmetic, logic functions. Key board, mouse, OCR, OMR, MICR, CD-ROM, printers, CRT's, Computer microfilm, hard disk, floppy disk, magnetic tape and other input and output devices. Examples of operating system software - DOS, Windows, UNIX and system utilities, classification of application software, package programs (Word processing, spreadsheet, database package, statistical package, graphic package etc.), High level language, mid-level language, interpreter, compiler and assembler.

#### **Books:**

1. Dr. M. Lutfar Rahman and Dr. M. Alamgir Hossain, Computer Fundamentals
2. Computer Fundamental, Schaum's Outline Series.
3. Computer Fundamentals, P. K. Sinha
4. Peter Norton, Introduction to Computers.

### **CSE111L: Computer Fundamentals Lab**

Laboratory Works based on CSE111.

### **CSE112: Structured Programming Language**

Basic Programming concepts and notations; Variables, Constants, Data types; Input and output statements; Control Structures; Functions and Subroutines; Working with structured data: Arrays, Records, Pointers, Link lists; Files; Utility functions; Graph, Strings, Sound using programming language C..

#### **Books:**

1. C/C++ and Object Oriented Programming Language, Md. Lutfuzzaman
2. Teach Yourself C, Herbert Schildt
3. Teach Yourself C++, Herbert Schildt
4. Programming Language in C, Schaums Outline Series

### **CSE112L: Structured Programming Language Lab**

Laboratory Works based on CSE112.

### **MAT113: Mathematics-I (Differential Calculus, Co-ordinate Geometry)**

**Differential Calculus:** Functions, Limit, Continuity, Differentiation, Successive Differentiation, Expansion of function, Partial differentiation, Tangent & Normal, Maxima & Minima.

**Co-ordinate Geometry:** Change of axes, Pair of straight lines, Circles, Parabola, ellipse, hyperbola and the plane.

#### **Books:**

1. B.C.Das and B.N. Mukherjee, Differential calculus.
2. Mohammad and Bhattacharjee, A text book on differential calculus.
3. Rahman and Bhattacharjee, A text book on Co-ordinate Geometry.
4. Abdur Rahman, Co-ordinate Geometry of two dimensions

## ENV114: Environmental Science

### Environmental Science

1. Environmental Science: Concept and components: The challenge of sustainability poverty and under-development building a sustainable society at the global and national context. Natural Resource and population, Environmental degradation, resource use, pollution, economic growth and environment. Human impact on the earth; Historical perspective; Hunting and gathering society, agricultural society and industrial society; impact on environment and sustainability.
2. Matter and Energy; Types of matter and energy, use and conservation of matter energy, Laws of matter and energy. Use, environmental problems. **Ecosystem**: Definition, structure & function; Biochemical cycle; flow of energy and matter in ecosystems; examples from Bangladesh.
3. Ecosystem changes; equilibrium and sustainability of ecosystems; human impact on Ecosystems; restoration of ecosystems. **Population**: population growth, impact; distribution; population control; national & global concerns.
4. Resources water, soil, land biodiversity, mineral resources; energy resources, air as resource; conservation resources, desertification and salinity problems. **Pollution**: Air/ water pollution; pollution and global climate change; fertilizers and pesticide use and their impacts; prevention measures.
5. Environmental and society; environmental ethics, economics and culture; sustainable human economy; challenges faced by less-developed countries. Government, politics and environmental protection; sustainable earth. **Environmental Law**: Legal issues; international, national and individual levels.
6. Awareness building, media; and environment, Environment education, research

#### Books:

1. Tyler Miller : Environmental Science
2. D. D. Chiras : Environmental Science
3. Cunningham: Principles of Environmental Science
4. Firoz Ahmed: Bangladesh Environment.

## LAN115: English-I

**Communicative Grammar** : 2. Article 2. Verbs and Tenses 3. Subject-Verb Agreement  
4. Preposition

**Writing skill** : 2. Application (mainly regarding academic affairs and to newspaper editions)  
2. Paragraph 3. Dialogue Writing

**Reading skill**: 2 Reading small passages for specific answers.

2. Reading passages related to the majors taken by the students.
3. Reading short stories and English Poems for overall idea.

**Speaking skill**: 2. Asking questions, inviting, agreeing, disagreeing, drawing attention etc.

1. Controlled speaking practice: speaking in classroom on prepared topics.

**Listening Skill** : 2. Listening to Social English, Listening to small dialogues.

2. From *New Headway* By Liz & John Soars, Oxford University Press.

#### Books:

1. Leech and Svartvik : A Communicative Grammar of English
2. Raymond Murphy: Intermediate English Grammar
3. Wren and Martin : High School Grammar
4. English Phonetics and Phonology, Peter Roach, Cambridge University Press
5. Dr. M Manirzaman: Basic English Language Skills
6. Rahman M. Mahbub: From Shakespeare to Robert Frost: Some Timeless Poems, Translated
7. Dean Curry : Read On
8. Pat Caterino Short: English Conversation Book II, Compiled
9. Ann, Baker : Ship or Sheep (with cassettes)
20. Selected Short Stories
22. The News Week, The Time, The Reader's Digest
22. The Norton Anthology of Poetry- 4th Edition
23. Michael A. & Pyle, M.A: Cliffs TOEFL
24. Liz & John Soars : New Headway, Oxford University Press.

## LAN116: Bengali (Communication oriented)

১. ভাষা কি ? ভাষার বৈশিষ্ট্য , পৃথিবীর ভাষা সমূহ , বাংলা ভাষার স্থান ।
২. ভাষা শেখার দক্ষতা : শোনা , বলা , পড়া ও লেখা
৩. ধ্বনি , মূল ধ্বনি ।  
(ক) বাগযন্ত্র (খ) ধ্বনি সৃজন প্রক্রিয়া - স্বরধ্বনি ও ব্যঞ্জনধ্বনি  
(গ) মৌখিক ও নাসিক্য ধ্বনি (ঘ) তুলনামূলক ও বৈপরিত্যমূলক ধ্বনিতত্ত্ব : বাংলা , ইংরেজি , ফরাসি ও কিছু অন্য ভাষার উদাহরণ
- (ঙ) কথ্য বাংলার ধ্বনিমূল নির্ণয় এবং কথ্য বাংলা ও বিভিন্ন বাংলা উপভাষার ধ্বনির তুলনামূলক পর্যালোচনা ।
৪. রূপমূল এবং শব্দ ।
৫. বাক্যের গঠন প্রক্রিয়া:  
(ক) উদ্দেশ্য , বিধেয় , আকাংক্ষা , আসক্তি , যোগ্যতা (খ) শব্দ থেকে বাক্য উৎপাদন ও গঠন : সরল , জটিল ও মিশ্র বাক্য (গ) বাক্যের উপরিতল ও গভিরতলের ধারণা ।
৬. শব্দার্থতত্ত্ব কি ? শব্দার্থের প্রয়োগ ।
৭. ভাষারীতি - সাধু ও চলিত ।
৮. কবিতা : (ক) কবিতার গুরুত্ব ও প্রকারভেদ (খ) গদ্য ও কবিতার শৈলীগত পার্থক্য (গ) কবিতায় উপমার ব্যবহার ।  
নির্বাচিত পাঠ বিশ্লেষণ - কবিতার - বিদ্রোহি - নজরুল ইসলাম
৯. লাল সালু ।

## YEAR-1, SEMESTER-2

### CSE121: Object Oriented Programming Language

An overview of object oriented programming: The need of the object oriented program procedure language, the object oriented approach, advantage of object oriented program, characteristics of object oriented languages: object, classes, inheritance, reusability, new data types, polymorphism and overloading.

**Object oriented Programming using C ++:** An overview of C, concepts of objects and OOP, C++ console I/O, C++ comments, and introduction of class: difference between C and C++, C++ keywords. Assigning objects, structure and Unions. Passing objects to functions, returning objects from functions, friend functions, in-line function and automatic in-lining. Function overloading, operator overloading. Arrays, pointers and reference. Introduction to inheritance, base class access control, using protected members constructor, destructor and inheritance, multiple inheritance. Virtual functions. Virtual functions applying polymorphism. Generic functions and classes, static class members, virtual base classes. C++/I/O and file I/O basics, array based I/O, linkage specifies and the asm keyword. Creating and conversation function.

Books:

1. Object Oriented Programming Language, Robert Lafore
2. C/C++ and Object Oriented Programming Language, Md. Lutfuzzaman
3. Teach Yourself C, Herbert Schildt
4. Teach Yourself C++, Herbert Schildt

### CSE121L: Object Oriented Programming Language Lab

Laboratory Works based on CSE121.

## CSE122: Digital Logic and System Design

**Boolean Algebra:** Basic theorems and properties, Boolean functions and their simplification. Digital logic gates.

**Combinational logic:** Adder, Subtractor, Multiplexer and Demultiplexer, Encoder and Decoder, Comparator.

**Synchronous Sequential Logic:** Flip-flops, Analysis and design of sequential circuits.

**Processor logic Design:** Processor organization; Arithmetic Logic Unit ;Design of Logic Circuit; Design of ALU;

**Control Logic Design:** Control organization; Control of Processor unit ; PLA control;

**Memory devices:** Memory Basics; RAM characteristics ; Bipolar RAM; MOS static & MOS Dynamic RAM; ROM; EPROM; EEPROM; Flash memory.

**Computer Design:** System configuration; Computer instructions; Timing and control; Execution of instruction; design of computer registers; design of control; Computer console.

**Microcomputer System Design:** Microcomputer & microprocessor organization; Instruction & addressing mode; Stack , Subroutines & interrupts; memory organization; Direct memory address; microprocessor based design

Books:

1. M. Mano, Digital Logic & Computer Design.
2. V.T. Rhone, Fundamentals of Digital System Design.
3. Mark, Zwo Linski, Digital System Design and VHDL.
4. Martin Bolton, Digital System Design with Programmable Logic.

## CSE122L: Digital Logic and System Design Lab

Laboratory works based on CSE122

## MAT123: Mathematics-II (Integral Calculus & Vector Analysis)

**Integral Calculus:** Integration by the methods of substitution; Integration by parts; Standard Integrals, Definite Integrals with properties, Interpretation as area, Fundamental theorem of integral calculus( for continuous function), Determination of length and area of plain curve, Volume and Surface area revolution.

**Vector Analysis:** Scalars and vectors, Vector addition and subtraction, scalar and vector products, Vectors differentiation and integration, Gradient, divergence and curl of a vector.

Books:

1. B.C.Das, Integral Calculus.
2. M. Abdul Matin, Integral Calculus.
3. M.R. Spiegel, Vector Analysis
4. M. A. Sattar, Vector Analysis

## PHY124: Physics(Electricity, Magnetism & Optics)

### Electricity and Magnetism

**Static electricity:** Charge, Electric field, and Electric dipole in an electric field, Calculation of electric field from electric dipole. Gauss's theorem and its application. **Current:** Current and current density, Drift speed, EMF, RC circuit. **Electromagnetism:** Ampere's law, Faraday's law, Biot-Savart law, Inductance, Calculation of inductance (LR circuit). **Magnetism:** Intensity of magnetism, Permeability, Susceptibility, Paramagnetic, Diamagnetic and Ferromagnetic substances.

**State of Matter:** Solid, Liquid and Gas, different types of bonds, Inter-atomic force, Conductor, Insulator and semiconductor, Energy band description of semiconductor, effect of temperature on semiconductor, P-type and N-type semiconductor, P-N junction.

### Waves and Oscillations

**Oscillations:** Simple harmonic motion (SHM), Damped harmonic motion, Forced oscillation, Combination and composition of simple harmonic motions, Lissajous figures. Transverse and Longitudinal nature of waves, Traveling and standing waves, Phase velocity and group velocity.

**Sound waves:** Velocity of longitudinal wave in a gaseous medium, Doppler effect.

**Physical Optics:**

Theories of light: Different theories of light, Huygen's principles and constructions.

Interference of light: Coherent source, Relation between path difference and phase difference, Definition of interference, Young's double slit experiment, Interference in thin film, Newton's ring.

**Diffraction of light:** Fresnel and Fraunhofer diffraction, Diffraction by single slit, Diffraction by double slit

**Polarization of light:** Brewster's law, Malus law.

Books:

1. David Halliday, Robert Resnick, Physics Part-II, Wiley Eastern Limited.
2. D.K. Cheng, Field and Wave Electromagnetics.
3. D.N. Vasudeva, Fundamentals of Magnetism and Electricity.
4. K.K. Tewari, Electricity and Magnetism with Electronics.

## LAN125: English-II

**Communicative Grammar :** 1. Voice 2. Degree of comparison 3. Linking device

4. Wh-question 5. Relative clauses 6. Conditional Sentences

**Reading skill:** 1. Reading Scientific English, short stories, English poems 2. Understanding meanings of words and sentences 3. Understanding text – organization 4. Understanding figures of speech

5. Comprehending the meaning of the whole text. 6. Comprehending the gist or summary of the text.

**Writing skill:** 1. Paragraph 2. Letter 3. Report 4. Précis

**Speaking Skill :** 1. Taking interview 2. Debating 3. Situational Conversation & role playing

**Listening skill :** 1. Listening for an overall idea .

Books:

1. Leech and Svartvik : A Communicative Grammar of English
2. Raymond Murphy: Intermediate English Grammar
3. Wren and Martin : High School Grammar
4. English Phonetics and Phonology, Peter Roach, Cambridge University Press
5. Dr. M Manirzaman: Basic English Language Skills
6. Rahman M. Mahub: From Shakespeare to Robert Frost: Some Timeless Poems, Translated
7. Dean Curry : Read On
8. Pat Caterino Short: English Conversation Book II, Compiled
9. Ann, Baker : Ship or Sheep (with cassettes)
20. Selected Short Stories
22. The News Week, The Time, The Reader's Digest
22. The Norton Anthology of Poetry- 4th Edition
23. Michael A. & Pyle, M.A: Cliffs TOEFL
24. Liz & John Soars : New Headway, Oxford University Press.

## LAN126: Liberation War of Bangladesh

১. কোর্স ও বিষয় পরিচিতি: ভূমিকা ।
২. প্রাচীন বাংলার ভৌগোলিক অবস্থান ও ভূ-প্রকৃতি, প্রাগৈতিহাসিক পটভূমি, বাংলার প্রাচীন জনগোষ্ঠীর নৃতাত্ত্বিক পরিচয় ।
৩. গুপ্ত- পাল ও সেন বংশ : রাজ্যশাসন পদ্ধতি, ধর্ম ও সামাজিক শ্রেণীবিন্যাস/জাতিভেদ প্রথা, পূজা-পার্বণ, উৎসব ও বিনোদন, ভাষা- সাহিত্য-শিল্পকলা ও অর্থনীতি ।
৪. তুর্কী বিজয় : সুফিবাদ ও বাংলার সুফি-দরবেশ, বৈষ্ণব ধর্ম : শ্রীচৈতন্য দেব, সুলতানী বাংলা : রাজ্যশাসন ব্যবস্থা, হিন্দু-মুসলমানের সামাজিক জীবন ও সম্পর্ক, শিক্ষা-সাহিত্য- ভাষা ও অর্থনীতি ।
৫. মোগল আমল: শাসনব্যবস্থা, সামাজিক শ্রেণীবিন্যাস, হিন্দু-মুসলমানের অবস্থান, নারীর মর্যাদা, সামাজিক আচার-অনুষ্ঠান ও রীতি-নীতি, ভাষা-শিক্ষা-সাহিত্য-শিল্পকলা ও অর্থনীতি ।
৬. বাংলায় ইউরোপীয়দের আগমন ও বাণিজ্যিক প্রয়াস, ইস্ট-ইন্ডিয়া কোম্পানির বাণিজ্যিক প্রতিষ্ঠা ও রাজলিপ্সা, পলাশীর যুদ্ধ ।



৭. ব্রিটিশ সাম্রাজ্যের গোড়াপত্তন : শাসনব্যবস্থা ও প্রতিক্রিয়া, হিন্দু সমাজ-সংস্কার আন্দোলন, ইংরেজি শিক্ষার প্রচলন, প্রাচ্য ও প্রতীচ্য সংস্কৃতির দ্বন্দ্ব, সন্ন্যাসী ও ফকির বিদ্রোহ, ওয়াহাবী আন্দোলন, ফারায়জী আন্দোলন, সাঁওতাল বিদ্রোহ, কৃষক আন্দোলন, সংবাদপত্র ও সাহিত্য প্রকাশনা, ১৮৫৭ সালের স্বাধীনতা সংগ্রাম, মুসলিম জাগরণ, বঙ্গভঙ্গ, বঙ্গভঙ্গ রদ, ঢাকা বিশ্ববিদ্যালয় প্রতিষ্ঠা, অসহযোগ ও খিলাফত আন্দোলন, হিন্দু ও মুসলমানদের মধ্যে পৃথক জাতীয় চেতনার লালন, দ্বিতীয় বিশ্বযুদ্ধ, পাকিস্তান আন্দোলন, দ্বিতীয় বঙ্গভঙ্গ ও পাকিস্তানের অভ্যুদয়।
৮. পাকিস্তান পর্ব : পূর্ব বাংলার সামাজিক, রাজনৈতিক, অর্থনৈতিক ও সাংস্কৃতিক পরিস্থিতি, রাষ্ট্রভাষা আন্দোলন: বাঙালি জাতীয়তাবাদের উদ্ভব, পাকিস্তানী শাসন-শোষণের বিরুদ্ধে প্রতিবাদ আন্দোলন, যুক্তফ্রন্ট ও একুশ দফা, ৬ দফা (স্বায়ত্বশাসন) দাবি, ৬৯-এর গণ অভ্যুত্থান, নির্বাচনোত্তর পাকিস্তানী ষড়যন্ত্র, ৭১-এর গণহত্যা ও মুক্তিযুদ্ধের সূচনা।
৯. বাংলাদেশ প্রতিষ্ঠার সংগ্রাম : স্বাধীনতা।
১০. স্বাধীন বাংলাদেশের সামাজিক, রাজনৈতিক, অর্থনৈতিক, সাংস্কৃতিক ও ভাষাগত অগ্রগতির পরিচয়।

#### Books :

১. অতুল সুর	:প্রাগৈতিহাসিক ভারত
২. অতুল সুর	:বাঙালির নৃতাত্ত্বিক পরিচয়
৩. অতুল সুর	:বাংলার সামাজিক ইতিহাস
৪. অজয় রায়	: বাঙলা ও বাঙালী
৫. আব্দুল করিম	:বাংলার ইতিহাস : সুলতানী আমল
৬. আব্দুল করিম	:বাংলার ইতিহাস : মুঘল আমল
৭. আবদুর রহিম	:বাংলার সামাজিক ও সাংস্কৃতিক ইতিহাস (১ম খন্ড)
৮. আবদুর রহিম	:বাংলার সামাজিক ও সাংস্কৃতিক ইতিহাস (২য় খন্ড)
৯. আবদুর রহিম ও অন্যান্য	: বাংলাদেশের ইতিহাস , ১২শ সং
১০. নীহাররঞ্জন রায়	:বাঙালির ইতিহাস (আদিপর্ব), ২য় সং
১১. বিনয় ঘোষ	:বাংলার সামাজিক ইতিহাসের ধারা
১২. সৈয়দ আলী আহসান	:বাংলাদেশের সংস্কৃতি
১৩. আহমদ মায়হার	:বাঙালির মুক্তিযুদ্ধের ইতিহাস
১৪. আবুল কাসেম ফজলুল হক	:মুক্তি সংগ্রাম
১৫. আবুল কাসেম ফজলুল হক	:একুশে ফেব্রুয়ারি আন্দোলন
১৬. বদরুদ্দীন উমর	:ঈশ্বরচন্দ্র বিদ্যাসাগর ও উনিশ শতকের বাঙালি সমাজ
১৭. মঈনুল হাসান	: মূলধারা ৭১,
১৮. মনসুর মূসা (সম্পাদক)	: বাংলাদেশ
১৯. সুপ্রকাশ রায়	: ভারতের কৃষক বিদ্রোহ ও গণতান্ত্রিক সংগ্রামকলকাতা
২০. সুপ্রকাশ রায়	:ভারতের বৈপণ্ডবিক সংগ্রামের ইতিহাস
২১. হাসান হাফিজুর রহমান সম্পাদিত	: বাংলাদেশের স্বাধীনতায়ুদ্ধ

## YEAR-2, SEMESTER-3

### CSE231: Data Structures

Concept of data structures. Elementary data objects. Common data structures. Arrays, Lists, Stacks, Queues, Graphs and Trees. Application of data structures. Sorting, Searching, Hashing. Solving computational problems.

#### Books:

1. Seymour Lipchutz, adapted by G.A. Vijayalakshmi Pai, Data Structure
2. ISRD, Data structures using C, Tata McGraw-Hill.
3. Ford. Topp, Data Structures with C++

### CSE231L: Data Structures Lab

Laboratory works based on CSE231

## CSE 232: Electronics & Electrical Circuits

**Instrumentation:** Avometer, signal generator, oscilloscope, pH-meter, spectrophotometers, thermostats.

**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 multivibrators, astable and monostable multivibrator.

**Amplifiers:** Voltage and current amplifiers. Operational amplifiers. Off-set null adjustments. Differential input and output impedance, frequency response and noise.

**Oscillators:** Hartley, Colpitts & Wine-Bridge oscillators. Introduction to JFET, MOSFET, PMOS, NMOS, AND CMOS. Biasing and application in switching circuits.

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

Books :

1. R.L Boylestad, Electronic Devices and Circuit
2. R. K. Mozumdar, Principles of Electronic Circuits
3. Jacob Millman and Christos C. Halkias, Electronic Devices and Circuits, *McGraw-Hill Inc.*
4. Albert D. Helfrick and William David Cooper, Modern Electronics Instrumentation and Measurement Techniques, *Prentice Hall*

## CSE 232L: Electronics & Electrical Circuits Lab

Laboratory experiments based on CSE232.

## COM233: Management

**The Basis of Organization and Management:** Historical development of organization and management, Organization and management, Organization and environment, Management responsibility and ethics, Employee personality, Perception, Attitude, Job satisfaction and commitment.

**Project and Risk Management:**

Defining the phases of a project, Creating a project team, Risk management, Creating and maintaining project plans, Schedules, status report, Budgets, Closing a project out.

**Managerial Decision Making and Organization:**

Managerial decision making, Relational vs group decision, Organizational planning process and MBO, Strategic planning concept.

**Organizing Process of the Organization:**

Organizing process and informal organization, Delegation of power, Authority and responsibility, Management accountability and transparency, Departmentalization in the organization, Line and staff authority and decentralization, Organization culture, HRM-Human Resource Management.

**Motivating and Leading the Organization:**

Employee motivation techniques and principles, Leading the organization, Organization communication, Power and policies in the organization, Group building and conflict management.

Books:

1. C.M. Kornberger, managing and organization: an introduction to theory and practices.
2. Y. Gabriel S. Fireman, Organizing and organizations: an introduction.
3. Mantel merediths, Core concepts: Project management in Practice.
4. Management body of knowledge.

### STA234: Statistics & Probability

Frequency distribution. Mean, Median, Mode and other measures of central tendency. Standard deviation and other measures of dispersion. Moments, Skewness and Kurtosis, Elementary probability theory and discrete probability distribution e.g. Uniform, Normal and Poisson. Hypothesis testing and Regression analysis

Books:

Hines, W.W, Montgomery, D.C. etl., Probability and Statistics in Engineering.

### MAT 235: Mathematics-III (Differential Equations & Special Functions)

**Differential Equations:** Degree and order of ordinary differential equations. Formulation of differential equations. Solution of first order differential equations by various methods. Solution of general linear differential equations of second and higher orders with constant coefficients. Solution of homogeneous linear equations. Solution of differential equations by operator methods. Concept of partial differential equations.

**Laplace Transform:** Definition. Laplace transform of some elementary functions. Inverse Laplace transformations. The unit step function. Periodic function. Evaluation of improper integrals.

**Fourier Analysis:** Fourier series, Fourier integral, Fourier transforms.

**Special Function:** Gamma and Beta functions, Bessel functions, Orthogonal functions, Legendre.

Books:

1. B.D. Sharma, Differential Equations
2. F. Ayres, Differential Equations
3. M. R. Spiegel, Laplace Transform
4. P.N. Chatterjee, Special Functions.

### ECO236: Economics

**Introduction:**The scope and method of Economics.

The Economic Problem:Scarcity and choice demand,Supply and Market Equilibrium,Demand and supply applicationa and elasticity;Household behaviour and consumer choice.

**The Production Process:**The behaviour of profit maximizing firms,Short run cost and output decisions,Monopoly and antitrust policy;Monopolistic,Competition and oligopoly,introduction to macroeconomics:Measuring national output and national income.

**Long run and short run concerns:**Growth,Productivity,Unemployment and inflation,Aggregate expenditure and equilibrium output,The government and fiscal policy,Money demand,The equilibrium interest rate and monetary policy.

**Books:**

1. Case & Fair,Principles of economics.
2. William Boys & M Melvin,Fundamentals of economics.
3. D. Salvatore,Introduction of Intern. Economics.

## Year-2, Semester –4

### CSE 241: Algorithm

Algorithmic complexity analysis. Methods for the design of efficient algorithms: Divide and Conquer, Greedy method, Dynamic programming, Backtracking, Branch and Bound, Polynomial evaluation, Lower bound theory.

**Books:**

1. Computer Algorithms, Henry F. Korth
2. Algorithm, Schaums Outline Series
3. Udi Manber. Introduction to Algorithms.
4. Anny V. Levitin. Introduction to the design and analysis of Algorithms

### CSE 241L: Algorithm Lab

Laboratory works based on CSE241.

## CSE242: Digital Image Processing

**Introduction to Image Representation:** Image representation, sampling, quantization, gray scale and color images, histograms, cumulative histogram (CDF), noise in images, DFT/FFT, image data formats.

**Image Enhancement:** Point processing, histogram equalization, modeling, and histogram specification, spatial processing – image smoothing, median filtering, edge detections – Sobel, Laplacian and Canny edge detectors, region segmentation.

**Shape Detection:** Image moments, central moments, moment invariants.

Image morphology: Basic morphological concepts, thinning, thickening, opening and closing operations.

Books:

1. K. Jain, Fundamentals of Digital Image Processing.
2. R. C. Gonzalez and R.E. Woods, Digital Image Processing.
3. Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins, Digital Image Processing Using MATLAB.
4. Nick Efford, Digital Image Processing using Java 6.

## CSE242L: Digital Image Processing Lab

Laboratory works based on CSE242

## CSE 243L: Assembly Language Program Lab

System Architecture for the Assembly Language. Assembly Programming basics. Assembly Instruction types and their formats: Arithmetic, Logical, Transfer control and conditional processing, String processing, Input/Output, Interrupts; Procedures; Interfacing using Assembly language.

Books:

1. Maruth, Assembly Language Programming

## CSE 244: Discrete Mathematics

**Introduction to Discrete Mathematical Structure:** Set theory, Mathematical reasoning and proof techniques, Propositional calculus and predicate calculus. **Elementary Number Theory:** Relations, Function, Algebraic structures, Graph theory, Paths and trees, Generating Function, Permutation groups.

**Discrete Probability:** Induction, Contradiction and recursion, counting, Principles of inclusion & execution, recurrence relations, rings and groups.

Books:

1. Rosen, K.R., Discrete Mathematics & its Application.
2. Lipschutz S., Lipson M., Discrete Mathematics, Schaum's Outline Series.
3. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science.
4. K.D. Joshi, Fundamentals of Discrete Mathematics.

## MAT 245: Mathematics IV (Matrices & Complex Variables)

**Matrices:** Concepts of Matrices, Different types of matrices. Transpose, Adjoin and Inverse of a matrix, Determinants, Cramers Rule, Solution of linear equations. The characteristics roots and the characteristic equation of a matrix, Determination of Eigen values and Eigen vectors of a square matrix, Caley Hamilton theorem.

**Complex Variables:** Complex number system. Complex function, Analytic function, Cauchy Riemann equations, Cauchy's Integral theorem, Cauchy's Integral formula, Mapping and conformal mapping of elementary functions, Poles and singularities.

Books:

1. Md. Abdur Rahman, Linear Algebra.
2. F. Ayres, Matrices
3. M. R. Spigel, Complex Variable
4. M.L.Khanna, Complex variables.

## **COM246: Accounting**

Principles of accounting: Accounts, transaction, accounting procedures and financial statements. Cost in general: Objectives and classifications, overhead costing, Operational costing and process costing. Marginal costing: Tools and techniques, cost-volume-profit analysis.

Relevant costing: Analyzing the profitability within the firm, guideline for decision-making. Capital budgeting.

### **Year-3, Semester -5**

## **CSE351: Database Systems**

Basic concepts of data and database systems. Data models. Query languages: Relational algebra and calculus, SQL; Query processing, interpretation, cost estimation, optimization; Functional dependency and normalization; File organization; Data Dictionary and directory systems; Database management: Database administration, security and integrity; Introduction to distributed database.

Books:

1. A. Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts.
2. Ramez Elmasri and S.B. Navathe, Fundamentals of Database Systems.
3. D. Kronke and D. Auer, Database Concepts.
4. C. Churcher, Beginning Database Design, From Novice to Professional.

## **CSE351L: Database Systems Lab**

Laboratory works based on CSE351

## **CSE352: Microprocessor**

Introduction to different types of microprocessors and programmable circuits. Study of primitive microprocessors: architecture, instruction set, interrupt structure, interface I/O devices. Distinguishing features of some advanced microprocessors from Intel, Motorola, IBM, Sin and so on.

**Books:**

1. Mohammed Rafiqzaman, Ph.D., Microprocessors and Microcomputer Based System Design.
2. Yu-Cheng Liu, Glenn A. Gibson, Microcomputer Systems: The 8086/8088 Family.
3. Aditha Mathur, Introduction to Microprocessors.
4. Douglas V. Hall, Microprocessors and Interfacing: Programming and Hardware.

## **CSE 352L: Microprocessors Lab**

Laboratory works based on CSE352.

## **CSE353: Data Communication**

Introduction: Communication model, Data communication tasks. Data communication network, standard and organization, Introduction to OSI and TCP/P models. Data Transmission Basics; Transmission impairment; Transmission Media; Terrestrial and Satellite microwaves, Radio waves, VSAT. Data Encoding; ASK, FSK, PSK QPSK, QAM encoding, spread spectrum technique, modems, Pulse Code modulation technique. Data transmission; Interfacing and EI"A 232D or RS 232, Null modem connection. Data Link Control; Flow Control and Error Control technique – Sliding Window; Stop and wait ARQ, selective – Reject ARQ and HDLC protocols. Multiplexing; Data and telecommunication networking; Packet switching, datagram and virtual circuits. ISDN and frame relay, BISDN and introduction to cell relay.

**Books:**

1. Data Communication, William Stallings
2. Data Communication and Engineering, R.P. Jain
3. S. Haykin, Communication Systems
4. Fred Hatsall, Data Communications, Computer Networks and Open Systems

## CSE 354: Automata Theory

Computational model including finite automata, regular expressions, context-free grammars, pushdown Automata, Turing machines, and techniques for analyzing them, Languages described by these machines and their properties, Chomsky Hierarchy. Basic computability theory and Church-Turing Thesis. Undecidability, Post correspondence Problem.

Books:

1. Rozen, Automata Theory
2. Jaien, Introduction to Automata Theory

## CSE355L: Java Programming Lab

Object Oriented Programming Concepts and features, Java as OOP language, Comparison between Java and C++ as OOP, Typical Java Development Environment. Java's Primitive Data Types, Operator (arithmetic and logical) and Control Structures. Java Classes, Objects, Methods and instance variables, Program Modules in Java, static Methods, static Fields, Methods with Multiple Parameters, Java API Packages. Arrays, Enhanced for Statement, Passing Arrays to Methods, Variable-Length Argument Lists, Using Command-Line Arguments. Encapsulation and data hiding, the notions of data abstraction and abstract data types (ADTs), use of static variables and methods, Inheritance, Polymorphism, Packages. Exception and error handling. 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. The design principles of graphical user interfaces (GUIs), 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.

Laboratory works based on these topics.

**Books :**

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

## CSE356: Numerical Methods

**Introduction:** Numerical Computing, Errors in Computation, Stability and convergence. **Roots of Nonlinear Equations:** Bisection, False position and Newton-Raphson method. **Solution linear equations:** Gaussian Elimination, Gauss-jordan Method, Jacobi's and Gauss-Seidal Method. **Regression:** Linear and exponential. **Interpolation:** Lagrange and Newton Polynomials. **Numerical Differentiation and Integration:** Trapezoidal and Simpson. **Numerical Solution of ordinary Differential Equation:** Taylor series, Picard, Runge-Kutta, Euler's method.

**Books:**

1. E Balagurusamy, Numerical Method.
2. Robert J. Schilling and Sandra Harries, Applied Numerical Method for Engineers.
3. A. R. Vasishtha, Vipin Vasishtha, Numerical Analysis.
4. S. Balachandra Rao & C.K. Shantha, Numerical Method.
5. Kendall Atkinson, Elementary Numerical Analysis

## YEAR-3, SEMESTER-6

### **CSE 361: Operating System**

Introduction to operating system concepts. Process management: Inter process communication, concurrency and scheduling.

**Memory management:** Addressing, virtual memory techniques (paging, segmentation). File systems: Implementation, security and protection. Management of I/O. Deadlock handling. Distributed operating systems. Hardware/Software concepts, communication and synchronization.

**Books:**

1. Sylberschatz, Galvin, Gagne, Operating System Concepts.
2. Andrew S. Tanenbaum, Operating System: Design and Implementation.
3. A. N. Haberman, Introduction to Operating System.
4. Andrew S. Tanenbaum, Modern Operating System.

### **CSE 361L: Operating System Lab**

Laboratory works based on CSE 361

### **CSE 362: Web Engineering**

**Web Engineering:** Attributes of Web based system and Application, Web App Engineering Layers, Web Engineering Process

**Web Apps Analysis:** Requirement Analysis, Analysis Model, Web Apps Estimation, Content Model.

**Web Apps design:** Design issues of Web Apps, Interface Design, Typography, Layout design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Object Oriented Hypermedia Design, Design Metrics for web Apps.

**Web Apps Implementation:** Client side scripting: Java Script, AJAX, JQuery; Server Side Scripting: ASP.NET, PHP; Framework: PHP MVC frameworks (Code Igniter, Symfony, Zend, CakePHP) ASP.NET MVC Framework, Web Service.

**Web Apps Security:** Encryption techniques (digital signatures, certificates, PKI), Security threats, securing client/server interactions, Vulnerabilities at the client (desktop security, phishing, etc.) and the server (cross-site scripting, SQL injections, etc.), Building Secure Web Apps.

**Testing Web Apps:** Content Testing, User Interface Testing, Navigation Testing, Configuration Testing, Security Testing, Performance Testing.

**Maintenance of Web Applications:** Web Server and Database server load balancing, web apps performance assessment, Application usage monitoring and report generation

**Books:**

1. Roger Pressman and David Lowe, Web Engineering, *Tata McGraw Hill Edition*, 2008
2. Dino Esposito Programming Microsoft ASP.NET 2.0, *Microsoft Press*, 2005
3. J. Castagnetto, H. Rawat, S. Schumann, C. Scollo and D. Veliath, Professional PHP Programming , *Wrox Publications*, 1999.
4. Leon Atkinson, Core PHP Programming, *Prentice Hall Professional*, 2004.

### **CSE 362L: Web Engineering Lab**

Laboratory works based on CSE 362.

### CSE 363: Computer Architecture

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

#### Books:

1. Computer Architecture and Organization, John P. Hayes
2. Digital Logic and Computer Design, Morris Mano
3. Digital Logic Design, Floyd

### CSE 364: Computer Peripherals and Interfacing

Introduction to I/O organization of a typical computer; Computer peripheral interfacing input and output devices; Micro computer ports: Serial, Parallel, Mouse; I/O multi processing interfacing; Inter Processor communication schemes; Human computer interface; Virtual reality: Interface for real application, wireless interfacing; Optical computing devices; Intelligent interface machines.

#### Books:

1. Driscoll, F.F. Coughlin, R.F. and Villanucci, Data Acquisition and Process Control with the M68HC11 Microcontroller.
2. Hall, Douglas V., Microprocessors and Interfacing / Programming and Hardware.
3. Triebel, Walter A. and Singh Avtar, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications.
4. Mazidi, Muhammad A. and Gillispie Mazidi, Janice Catherine, 80X86 IBM PC and Compatible Computers. Assembly Language, Design and Interfacing, Vol 1 and 2.

### CSE365: Multimedia Systems

**Computer Graphics: Applications**: entertainment, CAD for Architecture, Mechanical engineering, Aeronautical and Automobile industry, others areas: Simulation, Animation, Video Games etc.

**Graphics devices**: Display system: raster scan display: refresh CRT, gray shades, look up tables, interfacing: Color monitors: RGB, shadow masks, look up tables, Flat Panel; displays: plasma panel, liquid crystal display, VGA, SVGA resolution, Graphics- input devices: Digitizing tables: electromagnetic, electrical, acoustics types, mouse: mechanical and optical track balls, data gloves light pens, Touch panels: optical, capacitive, conic types Image scanners: type, typical resolutions, sizes, output formats available.

**Graphics creation**: Geometry and line generation, creating points, lines, rectangles, polygons, circles, arcs curves, charts and graphs in 2D and 3D, light color, shading applications such as Adobe PhotoShop, Paintbrush etc.

**Animation**: Tweening, morphing.

**Concept of multimedia**: Concepts of hypertext/hypermedia, Multimedia applications: hardware: CD-ROM, Audio speaker, Sound card, video cameras, scanners, MIDI, Images, bit maps, windows paint brush, Currently available multimedia software.

**Digital audio**: Video and sound – working with digital audio-video and sound, hardware and software requirements.

**CD-ROM**: Creation, uses, advantage, and disadvantages.

#### Books:

1. Steve Holzner and Steven Holzner, Visual Basic 6 Black Book.
2. Richard Mansfield, Visual Basic 6 Database Programming for Dummies.
3. Eric A. Smith, Valor Whisler, and Hank Marquis, Visual Basic 6 Bible.
4. Evangelos Petroustos and Kevin Hough, Visual Basic 6 Developer's Handbook.



## CSE366L: Mobile Application Lab

Introduction to Android and Mobile Devices, Setting up Development Environment, Application Architecture and Lifecycle, Java Language Basics and Syntax, Object Oriented Programming in Java, Vertical and Horizontal Libraries in Java, Object Oriented Principles and Practice, Building Android Applications, Android User Interface, Advanced Android User Interface, Common Controls, Android Application Components: Activity, Broadcast Listener, Service, Content Provider, Data Storage and Relational Database: SQLite, Maps, Geocoding and Location Based Services, Communication with Internet, RESTful Web Services, Working with Multimedia and Content Providers in Android, Basic Game Development Concepts, Performance Tuning, Some More about Object Oriented Programming, Debugging, Testing & Deploying Android Applications (with Digital Signature).

Laboratory works based on these topics.

### Books :

1. Ed Burnette , Hello, Android
2. Andrew Atkinson, Android Mandroid
3. Donn Felker, Android Application Development All-in-one for Dummies
4. Sams OutLines, Sams Teach Yourself Android Application Development in 24 Hours

## Year-4, Semester -7

### CSE 471: Computer Networks

**Computer network:** Basic concepts, server, workstation, data communication, signaling, analog & digital communication, synchronous, asynchronous, circuit and packet switching. **Network topology:** Bus, tree ring and star topology, transmission media, coaxial, UTP and optical fiber. LAN, MAN, WAN, LAN architecture, IEEE standard protocols for LANs and MANs, Internetworking, bridges, routers, gateway. **Protocol:** OSI model and TCP/IP, TCP/IP protocol suit, layers, comparisons, TCP/IP addressing, address classes, Ipv4, Ipv6, address masking, network address, DNS and DHCP. **Domain:** Primary and secondary domain, host, name server, resolve, reverse resolution, DHCP assigning dynamic IP. **DNS and internet configuration:** Root server, cache file, boot file, zone, primary and secondary zone, reverse zone, DNS records such as A, CNAME, MX, NS, PTR, SOA etc, hosts file.

### Troubleshooting and maintenance

#### Books:

1. Andrew S. Tanenbaum, Computer Network.
2. W. Stallings, Data Communication and Computer Network.
3. Gilbert Held, Data Communication Networking Devices.
4. D.E. Comer, Computer Networks and Internets with Internet Applications.

### CSE 471L: Computer Networks Lab

Laboratory works based on CSE 471.

### CSE 472: Software Engineering

Introduction to system engineering and software engineering. Software requirements analysis, modeling and specification. Software Designing: Principles, concepts (abstraction, refinement, modularity, hierarchy etc), models and specification. Software testing: Objective and principles, testability, testing design, implementation models and documentations, verification, validation and debugging. Quality factors and methodologies for different software engineering phases. Software project management issues.

#### Books:

1. Ian Sommerville, Software Engineering.
2. Roger S. Pressman, Software Engineering.
3. David Alex Lamb, Software Engineering.
4. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandroili, Fundamentals of Software Engineering.

## CSE 472L: Software Engineering Lab

Student will develop software in group/individually using any object oriented programming language.

### Books:

1. Diane Zak, Programming With Visual Basic 6, Enhanced Edition.
2. Michael Vine, Visual Basic Programming for the Absolute Beginner.
3. Kevin Loney, Oracle Database 10g: The Complete Reference.
4. Richard Niemice, Oracle Database 10g Performance Tuning and Techniques

## CSE 473: Digital Signal Processing

**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 :

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

## CSE 474: Compiler Design

Compilers, Lexical Analysis: Lexical Analysis, regular expressions, and regular languages syntax. Analysis: syntax analysis, context free grammars, bottom-up parsing, LR (0) parsing, SLR parsing, LR (2) parsing, LALR (2) parsing, classification of context-free grammars and languages, syntactic error recovery, syntax-directed definitions, attributes evaluation, Abstract syntax trees, symbol Tables, type checking, semantic checks for Inheritance/Sub typing, and for Overloading. Generation of intermediate code: Generation of intermediate code --- translation of Boolean expressions, switch/case statements, runtime structures, back patching Generation of un-optimized target code, Intro to code optimization: control flow graphs, live-variable analysis, live-variable analysis (contd.), register allocation, optimized register allocation by graph coloring, value numbering, Available expression analysis, Global Common sub-expression elimination, Dominators.

### Books:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools.
2. Allen I. Holub, Compiler Design in C.
3. M. Tim Jones, GNU/LINUX Application Programming.
4. Charles N. Fscher, Richard J. LeBlanc Jr., Crafting a Compiler with C.

## **CSE 475: Simulation and Modeling**

Simulation methods and model building: Introduction to simulation Packages. Random number generation. Random variate generation. Queuing systems: Characteristics of queuing system, Steady state behavior infinite population Monrovia models (M/M/1/N, M/M/C/C, M/M/1, Stages-Erlang, M/E/1, E/M/1, bulk arrival and service systems), Steady state behavior of finite population models (M/M/1/M, M/M/M, M/M/C/K/M, M/M/C/K/K). Input modeling. Validation and verification of simulation models. Output analysis for simulation models.

### **Books:**

1. Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicol, Discrete Event System Simulation.
2. Geoffrey Gordon, System Simulation.
3. Averill M. Law, W. David Kelton, Simulation Modeling and Analysis.
4. Narsingh Deo, System Simulation with Digital Computer.

## **Year-4, Semester -8**

### **CSE 481: Computer Graphics**

**Graphics:** Standard Graphics Primitives, Graphical user Interface; Graphics hardware; Coordinate conventions; Raster Scan Graphics Antialiasing; Polygons; Windowing and Clipping; Transformations; parallel and perspective, isometric projection; Segments with their applications. Three Dimensional Viewing and representation; Hidden Lines and Surface removal; Painters' algorithm, Z-Buffering; Rendering: Light Models, shading Interpolation Techniques; Introduction to graphics Programming. Concept of multimedia; Multimedia applications; Multimedia hardware; Digital audio; CD-ROM;

### **Books:**

1. Zhigang Xian, Roy A. Plastrock, Schaum's Outline of Computer Graphics.
2. Angel, Interactive Computer Graphics: A Top-Down Approach Using Open GL.
3. Xiuzhen Cheng and dechang Chen, Pattern Recognition and String Matching.
4. William Givson, Pattern Recognition.

### **CSE 481L: Computer Graphics Lab**

Laboratory works based on CSE483

### **CSE 482: Artificial Intelligence**

Survey of basic Artificial Intelligence concept and controversies. Knowledge representation: First order predicate logic and rule-based representation, inconsistencies and uncertainties, structured representation. Knowledge organization and manipulation: Search and control strategies, game playing, planning, decision making. Perception and communication: Languages (LISP and PROLOG), basic problem solving techniques, knowledge representation and computer inference, natural language understanding and processing, visual image understanding, machine learning, computer vision, robotics.

### **Books:**

1. Stuart J. Russel and Peter Norving, Artificial Intelligence -- A Modern Approach.
2. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems.
3. M. Tim Jones, Artificial Intelligence Application Programming.
4. Ian Bratko, PROLOG: Programming for Artificial Intelligence.

### **CSE 482L: Artificial Intelligence Lab**

Laboratory works based on 482

## CSE 483: Data Mining

**Introduction:** Models, methodologies, and processes. The KDD process. Generic tasks, Application, Example: weather data Data

**Warehouse and OLAP:** Data Warehouse and DBMS, Multidimensional data model, OLAP operations, Example: loan data set

**Data preprocessing:** Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Experiments with Weka - filters, discretization

**Data mining knowledge representation:** Task relevant data, Background knowledge, Interestingness measures, Representing input data and output knowledge, Visualization techniques, Experiments with Weka - visualization

**Attribute-Value Learning Techniques:** Attribute generalization, Attribute relevance, Decision trees. Decision lists. Classification and regression trees. Association rules. Correlations. Rule-based mining. The prediction task, Statistical (Bayesian) classification, Instance-based methods (nearest neighbor), Linear models, Experiments with Weka - using filters and statistics,- mining association rules, decision trees, prediction.

**Evaluating what's been learned:** Training and testing, Estimating classifier accuracy (holdout, cross-validation, leave-one-out), Combining multiple models (bagging, boosting, stacking), Experiments with Weka - training and testing.

**Clustering:** Basic issues in clustering, First conceptual clustering system: Cluster/2, Partitioning methods: k-means, expectation maximization (EM), Hierarchical methods: distance-based agglomerative and divisible clustering, Conceptual clustering: Cobweb, Experiments with Weka - k-means, EM, Cobweb.

### Books:

1. J. Han and M. Kamber, Concepts and Techniques, *Morgan Kaufmann Publishers*.
2. Ian H. Witten and Eibe Frank, Data Mining, Practical Machine Learning Tools and Techniques, *Morgan Kaufmann*
3. Tan, Steinbach, Kumar, Introduction to Data Mining, *Addison-Wesley*
4. David L. Olson and Dursun Delen, Advancesd Data Mining and Techniques, *Springer*
5. Maimon, O. and Last, M., Knowledge Discovery and Data Mining - The Info-Fuzzy Network (IFN) Methodology, *Kluwer Academic Publishers, Massive Computing Series*
6. Mitchell, T.M Machine Learning, *McGraw-Hill*.