Bachelor of Computer Application
(BCA)

Syllabus

Faculty of Science and Technology
Pokhara University

2011

Bachelor of Computer Application (BCA) Program
An introduction

A. General

1. **Title**
   The title of the program is Bachelor of Computer Application (BCA) under science and Technology Faculty

2. **Objectives :** The objectives of the Programme shall be to provide sound academic base from which an advanced career in Computer Application and related fields can be developed. Conceptual grounding in computer usage as well as its practical scientific business application will be provided.

3. **Duration :** The duration of the B.C.A. Degree Program shall be Four years divided into Eight semesters

4. **Course Structure**

- The program follows the credit system. Each course is assigned a certain number of credits depending generally upon its lecture, tutorial and practical work hours in a week. In theory subjects, one lecture per week is assigned one credit as a general rule.

- The BCA course comprises the total of 126 credit hours spreading over eight semesters with the following distinct components:

Analytical Tools: Five courses (15 credit hours in analytical areas to provide a student with a strong foundation required for the program.

Support Areas: Six courses (18 credit understanding of business environment with communicative skill development.)

Hardware Areas: Four courses (12 credit hours) in computer hardware to provide a student with an opportunity to gain real life practical experiences in computer hardware. This will also help student in programming in better concept with internal activities.

Core Areas: Twenty courses (62 credit hours) to help a student broaden the understanding of various facets of computer application in real life.

Project Work: Four projects (10 credit hours) help to a student to deal with real life problem of computer application for their sound practical exposure.

Internship: This internship (3 credit hours) course is most useful to help a student to deal with the real time system development.

Elective Area: There are two elective courses (6 credit hours) which are most applicable to the students who are interested to be specialized in their interest fields. Two additional elective courses can be offered to the students but CGPA is not affected.

- *Analytical Tools:*
  - Mathematics –I
  - Mathematics – II
  - Numerical Methods
  - Probability and Statistics
  - Mathematical Foundation and Computer Science
- *Support Areas:*
  English – I
  Business and Technical Communication
  Financial Accounting I
  Financial Accounting – II
  Economics
  Organization Management
- *Hardware Areas:*

Digital Logic System
Fundamentals of Electrical and Electronics
Microprocessor
Computer Architecture

- *Core Areas:*
  - Computer Fundamental and Application
  - Programming Logic and Techniques
  - Programming Language
  - Object Oriented Programming
  - Data Structure and Algorithms
  - System Analysis and Design
  - Visual Programming
  - Operating System
  - Data base Management System
  - Computer Graphics & Multimedia Technology
  - Network and Data Communication
  - Web Programming
  - Management Information System
  - Software Engineering
  - Electronic Commerce
  - Server Side Programming
  - Simulation and Modeling
  - Java Programming
  - Advance Java Programming
  - Linux
- *Project Areas:*
  - Project I
  - Project II
  - Project III
  - Project IV
- *Elective Areas:*
  - Elective I
  - Elective II

- Each course is identified by the course code followed by the course title (e.g., Eng 101.3 English–I etc).

5. **Normal and Maximum Duration of stay in the University**
   The normal duration for completing the BCA course is four years. In exceptional case, however, the student is allowed normal duration plus four years to complete the course. If a student is unable to complete the course within Eight years from the time of admission, the University registration is annulled.

6. **Academic Schedule**
   The academic session consists of two semesters per years. Generally the Fall Semester (September-February) Starts in September and the Spring Semester (February- August) begins in February, however it may differ slightly in any particular year due to specific circumference.

7. **Medium of Teaching and Examination**
   The medium of instruction and examination for BCA program will be English.

B. Admission and Examination

1. **Entry Requirement for New Student**

   The entry requirement for a new student in BCA will be Minimum of 45 % (Second Division) with 100 marks either math (Basic/Business) or Computer Science (Compute Application) in Higher Secondary Level (10+2) or Proficiency Certificate Level (PCL), or equivalent as recognized by Pokhara University, Besides the basic academic requirement, an entrance examination will be passed by the applicants.

2. **Admission Procedure**

   A notice inviting application for admission is publicly announced. The application forms and information brochures are provided, on request, after the payment of the prescribed fee.

   The concerned college scrutinizes the applications. The eligible candidates are informed to take the entrance test. The date and time for the entrance test is informed to the prospective students by the college. The college may also interview the candidates for final selection for admission.

   The candidates, who are given provisional admission under special condition, are required to submit all necessary documents within a month of the beginning of regular classes. Otherwise, the admission will be annulled.

3. **Student Evaluation**

   The student's academic performance during a semester will be evaluated internally by the college and externally (the final examination) by the university. Internal evaluation will be done by the teaching Faculty and it will be of 50% weight. The remaining 50% will be the final examination, conducted by University.

   To pass a particular course, a student must obtain a minimum of D grade in sectional work (average of internal assessments) and the final examination, separately.

4. **Attendance Requirement**

   The students must attend every lecture, tutorial, seminar and practical classes. However, to accommodate for sickness and other contingencies, the attendance requirement shall be a minimum of 80% of the classes in any particular subject, otherwise s/he shall not be allowed to take the final examination in that subject. If a student is continuously absent in the class for more than four weeks without notifying the authorities, his/her name will be removed from the college roll.

5. **Course Registration**

   The academic record of a student shall be maintained in terms of the courses for which s/he registers in any semester, and the grades s/he obtains in those courses. Registration for courses is done at the beginning of each semester. Since registration is a very important procedural part of the credit system, it is absolutely essential that all students present themselves at the college.

   Generally in a particular semester or year only those courses would be offered for registration which are mentioned in the syllabus, however their sequence may be interchanged if necessary.

6. **Repeating a Course**

   A course may be taken only once for a grade, except when a student receives an 'F' grade. Since passing of all courses individually is an essential requirement to obtain a degree, the student must retake the failing course when offered by the college and must successfully complete the same. A student may also be allowed to retake a course to achieve a minimum CGPA of 2.0. The grade earned on the retake will be substituted for the grade earned first time the course was taken. Student can retake a course only two times for credit.

7. **Transfer of Credit Hours**

   A maximum up to 25% of the total credit hours of course completed in an equivalent program of a recognized institution may be transferred / waived for credit on the recommendation of the head of the faculty. For transfer of credit, a student must have received a grade of B or better in respective course. Courses taken earlier than five years from the time of transfer may not be accepted for transfer of

credit. However, students transferring from one program to another program of Pokhara University may receive a credit transfer of all the compatible courses completed with at least grade C.

The concerned Subject Committee/dean office of the University will make an evaluation of the application for transfer of credit. The awarding of transferred credit will be based on the applicant's score in the University, which s/he has attended previously.

8. Final Examination
University conducts final examination at the end of each semester. The procedure of final examination conduction will be as per the examination rules of the University.

9. Unsatisfactory Results
Students may apply for re-totaling or rechecking of their grades as per University rule, upon payment of prescribed fee.

C. Grading System
The grades (makes) awarded to student in a course is based on his/her consolidated performance in seasonal and final examinations. The letter grade in any particular subject is an indication of a student's relative performance in that course. The pattern of grading will be as follows:

Letter	Grade	Grade point Description
A	4.0	Excellent
A-	3.7	
B+	3.3	
B	3.0	Good
B-	2.7	
C+	2.3	
C	2.0	Satisfactory
C-	1.7	
D+	1.3	
D	1.0	Minimum Requirement
F	0	Falling

In unusual circumstances, the student may be awarded an incomplete grade of "I". If all the requirements are not completed within the following semester, the grade of "I" will be automatically converted to "F". A student receiving an "I" grade does not need to register for that subject in the following semester to complete the required works.

The performance of a student in a semester will be evaluated in terms of the semester grade point average (SGPA). The student's final grade will be calculated on cumulative grade point average (CGPA).
SGPA= Total honor points earned in a semester/total number of credits registered in a semester.
CGPA= Total honor points earned/total number of credits completed.

D. Division Equivalence
In Pokhara University, CGPA 2.5 or more and 3.0 or more are considered as Second and First divisions, respectively.

E. Dismissal from the Program
A student is normally expected to obtain a CGPA of 2.0, the student, whose performance in the past semesters does not show the possibility of maintaining this CGPA, may be advised to leave or dismissed from the program.

F. Award of Degree
On completion of all requirements with CGPA of 2.0 or better, the student will be awarded a degree of Bachelor of Computer Application (BCA)

G. Degree with distinction

To obtain a degree with distinction, a student must obtained CGPA 3.6 or better.

H. Dean's list

The Dean's list recognizes outstanding performances of academic excellence by students. To qualify, a student must obtain a CGPA of 3.7 or better.

Note: The provisions of this document are not to be regarded as a binding contract between the University and the students. The University reserves the right to change any provisions or requirements contained in this document at any time without per-notification, within the student's term of residence.

CURRICULUM FOR THE BACHELOR OF COMPUTER APPLICATION

Course Code	Course Description	Credit Hours		Pre-requisite Course	Core Course
1st Semester					
ENG 121	English – I	3			
MTH 131	Mathematics I	3			
ELX 111	Digital Logic Systems	3			
CMP 116	Computer Fundamental and Application	3			⊗
CMP 117	Programming Logic and Techniques	3	=15		⊗
2nd Semester					
ENG 122	Business and Technical Communication	3			
MTH 132	Mathematics II	3			
ACC 131	Financial Accounting, I	3			
CMP 118	Programming Language	3			⊗
ELX 112	Fundamentals of Electrical and Electronics	3			
PRJ 151	Project I	1	=16		
3rd Semester					
CMP 215	Object Oriented Programming	3			⊗
CMP 227	Data Structure & Algorithms	3			⊗
CMP 221	Systems analysis and Design	3			⊗
ACC 231	Financial Accounting II	3			
ELX 232	Microprocessor	3	=15		
4th Semester					
MTH 230	Numerical Methods	3			
CMP 216	Visual Programming	3			⊗
CMP 230	Operating Systems	3			⊗
CMP 226	Database Management System	3			⊗
CMP 242	Computer Graphics & Multimedia Technology	4			⊗
PRJ 251	Project II	2	=18		
5th Semester					
CMP 332	Computer Architecture	3			
CMP 313	Java Programming	3			⊗
CMP 380	Web Technologies I	3			⊗
MTH 330	Mathematical Foundation and Computer Science	3			
CMP 323	Software Engineering	3	=15		⊗
6th Semester					
CMP 336	Data Communication and Computer Network	3			⊗
MTH 320	Fundamentals of Probability and Statistics	3			
MGT 322	Applied Economics	3			⊗
MGT 322	Organization and Management	3			⊗
CMP 402	Web Technologies II	3			
PRJ 351	Project III	3	=18		
7th Semester					
CMP 401	E-Business	3			⊗
CMP 350	Simulation and Modeling	3			⊗
CMP 337	Linux	3			⊗
INT 461	Internship	3			
	Elective I [Dot Net Programming]	3	=15		
8th Semester					
CMP 404	Mobile Application and Development Technology	3			
MGT 421	Management Information System	3			⊗
	Elective II	3			
PRJ 451	Project IV	4	=13		
Total Credit hours					**126**

Electives

Computer

1. Geographical Information System
2. Artificial Intelligence
3. Distributed Database System
4. COM/DCOM Programming
5. Advanced Techniques in Programming
6. Data Mining and Warehousing
7. Advanced Multimedia
9. Advance Database (PL/SQL)
10   Dot (.) Net Programming.
11. Cloud Computing
12. WAP and WML
13. Information and Network Security
14. Software Testing and Project Management
15. OODBMS
16. Embedded System

Management

1. Project Management
2. International Business
3. Promotion Management
4. International Marketing
5. Marketing Management
6. Sales Management

BCA I Semester:

ENG 101.3 English I (3-0-0)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

This course contains informative reading to improve reading skills, exercise to help improve listening skills, effective writing exercises to develop useful techniques in writing and realistic creative writing to give an opportunity to express oneself. The course aims to develop the overall skills in the use of English language. Especially it aims to:

1. Revise and consolidate on what the students have already learn in their +2 or higher secondary course:
2. Develop and extend their knowledge further;
3. Develop their reading, listening and writing skills;
4. Orient them towards creative writing;
5. Polish students "problem areas" of English grammar;
6. Develop their vocabulary skills; and
7. Develop the knowledge and practice of functional language needed in different situations.

The method of teaching should be student-centered and activity oriented. Extensive use of audiovisuals and workbook should be made.

Course Contents:
Module I
Desert Island, around the world, that's show business!, Food and drink, Crossing the Channel   **16 hours**

Module II
Buildings and homes, put it in writing. The third age, It takes all sorts ………..communication   **16 hours**

Module III
The English- speaking world, Travelers, Love Stories, on business, here is the news   **16 hours**

Text Book:
      1. Jones, Leo: Cambridge Advanced English, Cambridge: CUP

Reference:
      1. Dictionary, Video and Cassettes

MTH 000.3 Mathematics-I (3-0-0)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

This course contains aims to provide students with an opportunity to review basic mathematical tools necessary for computer information system core courses.

Course Contents:

Unit I: Sets   **6 hours**

Introduction, Types of sets, Venn diagram and Number of elements in a set.

Unit II: Real Numbers   **7 hours**

Types of real numbers, Absolute value of real numbers, Open and close intervals, Linear inequality their graph and Mathematical induction.

Unit III: Limits & Continuity   **8 hours**

Introduction, Limit of a function, Techniques of finding limits, Continuity &discontinuity, Demand & Profit function.

Unit IV: Differentiation   **7hours**

Introduction, Techniques of differentiation, Derivative of algebraic, exponential, logarithmic & simple trigonometric functions, Higher order derivative, Application of derivative, Increasing & Decreasing function, Maxima & minima of function of one variable, Concavity of the function, Inflection point, Average cost & Marginal cost, Average revenue & marginal revenue, Profit maximization under perfect competition and Profit maximization under monopoly.

Unit V: Functions of Several Variable   **7 hours**

Introduction, Partial derivative, Homogeneous function, Euler's theorem, Differentiation, Second & Higher order differentials and Implicit functions.

Unit VI: Symbolic Logics   **6 hours**

Introduction, Statements, Logical connectives, Conjunction, Disjunction, Negation, conditional or Implication, Bi - conditional, Logical equivalence, Negation of compound events and Tautology & contradiction

Unit VII: Asymptotes   **7 hours**

Introduction, Determination of asymptotes of algebraic curves, Vertical asymptotes, Horizontal asymptotes, Oblique asymptotes, Asymptotes of Algebraic curves and Asymptotes of curve in polar coordinates.

Text Books
1. Yamane, Taro; *Mathematics for Economist, Prentice Hall of India.*
2. Chaing, Alpha C.: *Fundamental Methods of Mathematical Economics, McGraw Hill International.*

Reference Book:
1. B.C. Das & N.B. Mukharjee *Differential Calculus*.

CMP 111.3 Computer Fundamental and Application(3-0-3)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:

1. To know the basics of computer
2. To understand the basics of operating systems
3. To understand how to use software packages in day to day
4. To familiarize computer hardware and general take care
5. To apply communicative tools (E-mail, Internet etc.) for common practices

Course Contents:

Unit I: Introduction to Computer   **4 hours**

Definition, History of Computer, Generation of Computer, Types of Computer, Characteristics of Computer, Application of Computer

Unit II: Basic Organization of Computer   **3 hours**

Basic function of Computer, Basic functional organization of computer, Input unit, Output unit, Storage unit, Arithmetic and logic unit, Control unit, Central Processing Unit (CPU) and The system concept

Unit III: Computer Software   **3 hours**

Introduction to software and hardware, Different between hardware and software, Logical system, architecture, Types of software, Firmware and Middleware

Unit IV: Accessories (devices) and Data Handing   **8 hours**

The input accessories, Keyboard Devices, Point and Draw Devices, Data Scanning Devices, Digitizer, Electronic Cards Based Devices, Speech Recognition Devices, Vision Based Devices, The Output Accessories, Monitor, Prier, Plotter, Computer Output Microfilm (COM), Screen Image Projector, Voice Response Systems, Ergonomically Designed Devices, How to buy a computer (Detailed Configuration), Computer Network, Definition, Types of Computer Network (PAN, LAN, CAN, MAN, and WAN), Network Topologies, Internet and E-mail

Unit V: Mastering DOS, Windows   **7 hours**

Introduction, Functions of OS, Types of OS, Different between GUI and TUI/CUI, Booting System and its types (Warm and Cold Booting), The DOS (involves different commonly used command), Windows operating system, settings, properties and installation guides, Software Tools and application (Disk Defragmentation, Scan Disk, System Restore, Partition etc.)

Unit VI: Computer Hardware   **13 hours**

Different Components of Computer, Power supply, Types of power supply, ratings, Concepts of SMPS,UPS, Motherboard, Components of Motherboard, System Chipset, System bused, System BIOS,

Processor and types, Storage Devices: Primary Memory and Secondary Memory, Types of Primary and Secondary Memory

Unit VII: System care guide   **10 hours**
Maintenance, Types of Maintenance, Preventive Maintenance (Various Kinds of Preventive Maintenance), Corrective Maintenance, System Care, System Care Factor (General System Care Factors, environmental care factors, cooling and ventilation care factors, power care factors, data loss and virus prevention factors, data problm prevention factors), Backups and Disaster recovery, Backup methods, Devices and Media

Laboratory:
1. **Use of windows environment**
2. **Office Automation (MS-Word, Ms-Excel, Ms-Power Point)**
3. **Assembling and Disassembling of Computer**
4. **E-mail, Internet**

Reference Books:
1. B. Ram: Computer Fundamentals, New Age International (P) Ltd.
2. Foundations of Computing, BPB Publication (Third Edition)
3. Gina Courter & Annette Marquis: Microsoft Office 2007/2010, BPB Publications
4. Allan Simpsons & Elizabeth Olson: Easy Guide to Windows 2007, BPB Publications

CMP 124.3 Programming Logic and Techniques (3-0-0)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

This course is designed to acquaint the student with the concept off fundamental problem analysis, modeling and coding techniques.

Course Contents:

Unit I: Programming Languages   11 hours

Introduction, Analogy with Natural Language, Classification of Computer Language (Low Level Language and High Level Language), Low Level Languages, (Machine and Assembly Language), Advantages and Disadvantages of, Machine Level Language, Advantages of Assembly Language over Machine Level Language, Disadvantages of Assembly Language, High Level Language, Advantages and Limitations of High Level Language, Difference between, Low Level and High Level Language, Program Language Translator, Types of Translator (Compiler, Assembler and Interpreter), Different among Translator, Linker and Loader, Types of Linder and Loader, Generation of Computer Languages, 3GL and 4GL, Advantages of 4GL over 3GL, Feature of 4GL (Object Oriented Language), Machines Independent and Portability of programs and Some Important types of High Level Language

Unit II: Software Development (Program Development)   10 hours

Introduction to program development/software development, Program Development Life Cycle: Problem identification, Problem Analysis/Requirement Analysis, Program Design, Phases of program Design (Data design, Input, Output, Procedure, File design), Program coding, Program Testing and Debugging, Program Delivery/Implementation & valuation, Program, Maintenance, Documentation, Programming Tools, Algorithm, Flowchart, Decision Table, Pseudocode, Comparison of them, Advantages and Disadvantage of Them, Symbols and some examples

Unit III: Programming Technique   8 hours

Introduction, Type of Programming Technique (Approaches), Modular, Top down, bottom up, Structure and Object Oriented approach, Advantages and Disadvantages, Program Development Methods (Models), Types of Program Development Models (Water fall or Traditional model, Prototype or Transformation model, Spiral model, Iterative model, V-model, RAD model, Bog Bang model, Evolutionary models), Advantage and Disadvantages of Waterfall, Prototype and Spiral Model (Simple Introduction to other Models), Cohesion and coupling, Types of Cohesion and Coupling, Use of Cohesion and Coupling in Program Development, Logics Program Development, Types of Logics (Sequential, Selection Iteration and Recursion), Differentiation, Communication between modules

Unit IV: Program Maintenance   8 hours

Introduction, Types of Program maintenance (Corrective maintenance, Adoptive maintenance, Perfective maintenance, Emergency maintenance), Problem Areas in Program Maintenance, Cost issues in software maintenance, Impact of software Errors, Program documentation and its standards, Requirements of

Documentation, Importance of Documentation, Types of Documentation, Program Specification, System Flow Chart, Elements of System Flowcharts, Examples, Data Flow Diagram, Element of DFD, Leveling the data flow diagram, Idea for Drawing DFD and Examples

Unit V: Standalone and Client Server Programming Concept   **8 hours**

Introduction to standalone Programming concept, Advantage and limitations of Standalone Programming, Introduction to Client Server Programming (CSP), Advantages and Disadvantages of CSP, Distinguish between Standalone and Client Server Programming, Client Server Programming Architecture, Introduction to Web-based Programming, Advantages and Disadvantages of web-based programs, Architecture of web-based programming, Web-based System and Programming, Introduction to a few web based languages and their capabilities, Requirement of Platform-Independents system

Reference Books:

a.   V.K. Jain: *Computer Fundamentals, BPB Publication*
b.   *Foundations of Computing, BPB Publication (Third Edition)*

ELX 131.3 Digital Logic Systems (3-1-2)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:

This course aims to develop methods of designing, constructing and building logic circuits and also t o introduce the operation and application of microprocessor. Topics will include basic gates, number system, flip-flops, decoder, encoder and ALU.

Course Contents:

Unit I: Number System   **6 hours**

Introduction to number systems (Decimal, Binary, Octal and Hexadecimal), Conversions, Complements subtraction using1's complement, 2's complement, 9's complement and 10's complement, Application of the complements (1's and 2's) BCD code, Error detection codes, alphanumeric codes, Excess- 3code, Gray code

Unit II: Boolean Algebra and Logic Gates   **6 hours**

Introduction to Digital System, Basic theorem and properties of Boolean Algebra (identity law, boundedness law, idempotent law, complement law, commutative law, distributive law, absorption law, associative law, de-Morgan's law and involution law) Boolean functions, complement of oolean function, Digital logic gates and truth tables (AND, OR, NOT, NAND, NOR, XOR, XNOR), Canonical and standard forms, Minterms and maxterms, sum of minterms, product of maxterms

Unit III: Simplification of Boolean Functions   **6** hours

The Karnaughmap-2, 3 and 4 variables, Simplification and realization using NAND & NOR gates, Practical design steps

Unit IV: Combinational Logic with MS Iand LSI   **8 hours**

Introduction, Design procedures,Half and full adders, Subtractors, Code conversion (BCD to excess- 3, 8, 4,-2,-1 code to BCD, 2, 4, 2, 1 code to 8, 4, -2, -1 code), Decoder, Encoder, Multiplexers and Demultiplexers, BCD to seven segment decoder, ROM and its implementation, PLA

Unit V: Sequential Logic   **10 hours**

Introduction, Flip-Flops: RS flip flop, D-flip flop, J-K flip flop, T flip-flop, Triggering of flip flops, (Positive, negative and level trigger), Master- Slave flip-flop, Analysis of clocked sequential, Circuits with example, state table, state diagram, state Equation, flip-flop input functions, State reduction and assignment, Flip-Flips excitation Tables and design procedures.

Unit VI: Registers and Counters   **6 hours**

Introduction, Shift Registers (Serial in Serial out, Serial in Parallel out, Parallel in parallel out, parallel in Serial out), Ripple counters (binary ripple counter, BCD ripple counter), Synchronous UP/Down counters, Timing Sequences

Unit VII: Processor Logic Design   **6 hours**
Introduction, Processor Organization, Bus organization, scratchpad memory, Accumulator Register, Arithmetic Logic Unit (ALU), Design of arithmetic circuit, design of logic circuit

Laboratory:
1. Verification of basic gates function: OR, AND, NAND, NOR, EX-Or, EX_NOR)
2. Multiplexers and de multiplexers (using the Principle learned in K-Map)
3. Encoders and decoders (using the principle learned in K-Map)
4. Adder and subtractions, in these laboratory students will construct a full adder and subtract or using basic design principle.
5. RS, D-Type, clocked D and master slave. In this laboratory students will design and verify the concepts of different flip-flops based on basic logic gates.
6. Design of counters (decade counters and binary counters). Students will design decade and binary counters verify the concepts suing the CAD tools.
7. Design of shit registers (serial in serial out and parallel in parallel out)

Reference Books:
1. Malvino: *Digital Computer Electronics*
2. Morries Mano: *Digital Logic and Computer Design*
3. Frederic J. Mowle: *A systematic approach to digital logic design*

BCA II Semester:

ELX 133.3 Fundamentals of Electrical and Electronics (3-0-3)
Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:
> After completion of this course students will be able to:
> Analyze electric circuits, Gain familiarity with semiconductor devices, Introduction of semiconductor logic

Course Contents:

Unit I: Electric Circuit Elements   **2 Hours**
> Resistors, Inductors, Capacitors, Voltage and Current Sources

Unit II: DC Circuits   **7 Hours**
> Ohm's Law, Series and parallel circuits, Power and energy, Kirchhoffs voltage and current laws, Loop and nodal equations Maximum power transfer theorem, Thevenin's and Norton's equivalent circuits

Unit III: Single-Phase AC circuits   **7 Hours**
> Sinusoidal waveform, Resistors, inductors and capacitors with sinusoidal excitation, Phasor representation of AC quantities, Concept of complex impedance and admittance, Average and effective values of voltages and currents, Power in AC: instantaneous power, average power, real power, apparent power, power factor

Unit IV: Semi-conducting Materials   **5 Hours**
> Energy band structures of conductors, insulators and semiconductors, Fermi level and energy gap, Conduction principle in semiconductors, electrons and holes, Donor and acceptor impurities n-and p-type semiconductors

Unit V: The P-n Junction diode   **7 Hours**
> Formation of space-charge region in p-n junction, Energy band structure and barrier potential, The p-n junction under forward bias and reverse bias, Characteristic curve, diode load line, Application of diode (logic gates:AND,OR,NOT and rectifiers: half and full wave) Zener diode, characteristics and applications

Unit VI: Bipolar Junction Transistor   **7 Hours**
> Transistor types: pnp and npn transistors, principle of operation, and parameter and their relationships. Transistor configurations: common base, common emitter and common collector, amplification, input and output impedances Biasing, Dc and Ac load lines, operating point, Application of BJT(Resistor Transistor logic gates: AND, OR)

Unit VII: Junction Field-Effect Transistor   **4 Hours**
> Construction, types and principle of operation, JEET quadratic characteristics, Biasing and load line,

Unit VII: Metal Oxide Semiconductor Field Effect Transistor   **4 Hours**

    Construction, n-MOS and p-MOS, principle of operation, Depletion and Enhancement type MOSFETs, quadratic characteristics

Unit VIII: The Operational Amplifier   **5 Hours**

    The ideal operational amplifier and its characteristics, Inverting and non-inverting amplifiers, Summing amplifier, Integrating and differentiating ampliflers

Laboratory
1. Verification of Kirchhoffs voltage and current laws
2. Verification of maximum power transfer theorem
3. Measurement of active, reactive and apparent powers in a single-phase ac circuit
4. Characteristics of different diodes: silicon diode, germanium diode, zener diode
5. To verify Logic gates using diodes and resistors.
6. To rectify ac signals using one and two diodes.
7. Input and output characteristics of a common –emitter transistor
8. Output and transfer characteristics of a common-source JFET
9. Output and transfer characteristic of a common-source MOSFET
10. Inverting and non-inverting operational amplifier circuits

Reference Books:
1. Sedra and Smith: *Microelectronic Circuits*
2. Shaum Series: *Electronic Circuit*
3. BL Thereja: A Textbook of *Electrical Technology* Vol- I
4. J. B. Gupta: *Electronic Device and Circuits*

CMP 121.3 Programming Languages (3-0-3)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:
- To develop various problem solving strategies.
- Implementing various programming technique using C.
- To make foundation in programming languages.

Course Contents:
Unit I: Introduction   3 hours
Flow chart and algorithms, History of C, Characteristics of C and Structure of C Program

Unit II: Variable and data types   7 hours
Constant and variables, Variable declaration, Variable Types, Simple input/output function and Operators

Unit III: Loops and Decisions   8 hours
Introduction, For Loop, While Loop, Do while Loop, Nested Loop, Case, break and continue, statements, The if, if else, else-if and switch statements

Unit IV: Functions   6 hours
Introduction, Returning a value from a function, Sending a value to a function, Arguments, External variables, Preprocessor directives, C libraries, Macros, Header files and prototyping

Unit V: Arrays and Strings   10 hours
Introduction to Arrays, Initializing Arrays, Multidimensional Arrays, String, and Functions related to the strings

Unit VI: Pointers   4 hours
Pointers definition, Pointers and Arrays, Returning multiple values from functions using pointers, Pointer Arithmetic, Pointer and Strings, Double Indirection and Pointer to Arrays

Unit VII: Structure and Unions   4 hours
Definition of Structure, Nested type Structure, Arrays of Structure, Structure and Pointers, Linked Lists Union and application of it.

Unit VIII: File I/O   4 hours
Stream, Text Stream, Binary Stream, File Pointer, Open File, File Open Mode, Closing File, fgets, fputs, fread, fwrite, Random Access I/O (fseek) and fprintf/fscanf

Unit IX: Developing a Project   **2 hours**
    Project definition and functional specifications, Top Down Analysis, Decomposition of Projects in different modules and inter-module relationship, Data flow diagrams, Translation of Different modules in codes

Laboratory
    Laboratory work at an initial stage will emphasize on the verification of programming concepts learned in class and uses of loops, functions pointers structures and unions. Final project of 10 hours will be assigned to the students to put together most of the programming concepts development in earlier exercises.

Reference Books:
1. S.k. Srivastava and Deepali Srivastava: *C in Depth*
2. Kely and Pohl: *A book on C*
3. Wait, Mitchell, Steven Prata and Donald Martin: *C primer Plus*
4. Yeswant Kanetkar: *Let us C*

ACC 101.3 Financial Accounting-I (3-0-0)

Evaluation:

	Theory	Practical	Total
Sessional	50	---	50
Final	50	-----	50
Total	100	-------	100

Course Objectives:
1. *It provides the basic concepts in financial accounting.*
2. *It gives the knowledge to prepare financial statements.*
3. *It helps to collect various information system.*

Course Contents:

Unit I: Introduction   4 hours
Concept of accounting, forms of business organization and nature of business activity; users of accounting information and their needs; fields of accounting; financial statements: the tools for communication; generally accepted accounting principles; qualitative characteristic of accounting information; objectives of financial statements; the accounting profession.

Unit II: Recording, Handling and Summarizing the Accounting Information   9 hours
Role of source documents, Recording of transaction and events, the accounting equation; the double entry system; analysis of transaction; rules of debits and credits for assets, expenses, liabilities, capital and income; cash accrual and hybrid system of accounting; journal-general and special including cash and bank books; role of vouchers, T-accounts; trial balance; concepts of the annual report and financial statements.

Unit III: Income Statement   4 hours
Concepts of income statement; major components of income statements: revenues, cost of sales, gross margin, administrative expenses, selling and distribution expenses, gains and losses, net income and retained earnings; formats of income statements; retained earning statements, preparation of income statement (Vertical multi-step format)

Unit IV: Balance Sheet   4 hours
Concepts of balance sheet; major components of balance sheet: assets, liabilities and stockholder's equity; preparation of balances sheet (vertical, classified format)

Unit V: Work Sheet   8 hours
Accrual and adjusting entries; T-accounts, opening and closing entries; preparation of income statement and Balance sheet with adjustments using a work sheet.

Unit VI: Statement of Cash Flows   8 hours
Cash flows and accrual accounting; purpose of the statement of cash flows; operating, investing and financing activities; formats of statement of cash flows; preparation of cash flow statement (vertical format)

Unit VII: Annual Repot   2 hours
Meaning and components of an annual report

Unit VIII: Accounting Information System and the Use of Computers in Accounting   9 hours

---

Accounting information system in modern business organizations; role of computers in accounting; recording transactions, extracting ledger, trial balance and presenting the financial statements received from the accounting package; using computerized accounting software; retrieving various reports from the system

Text Book
1. Porter, Gary A. Norton, Curtis L., *Financial Accounting*: The Impact on Decision Makers, *The Dryden Press, USA*.

Reference Books:
1. R. Narayanswamy, *Financial Accounting*: A Managerial Perspective, Prentice Hall of India.
2. Accounting Package
3. Sharma, Narendra, Acharya, C: *Financial Accounting*, Budha Academic Centre
4. Koirala, Goet, Bhandari,Sharma,Adhikari, Neupane, Upreti : *Financial Accountancy I, Asmita Publication*

MTH 000.3 Mathematics-II (3-0-0)

Evaluation:

	Theory	Practical	Total
Sessional	50	---	50
Final	50	-----	50
Total	100	-------	100

Course Objectives:
1. It provides the basic mathematical idea to develop various computer information systems.
2. It gives various mathematical tools for the computer system.

Unit I: Fundamental integrals   12 hours
Introduction, Indefinite integrals, Techniques of Integration, Integration by substitution, Integration by parts, Integration by partial fractions, Definite Integrals, Improper integrals, Beta & Gamma function. Double integral (Concept only)

Unit II: Application of integration   7 hours
Introduction, Rectification, Quadrature, Area under a curve, Area between the curves, Numerical, Integration, Rectangular rule, Trapezoidal rule, Simpson's rule, Volume, Surface Area. B. Consumer's surplus & Producer's surplus

Unit III: Vector Space   5 hours
Introduction, Vector space and subspaces with examples, Linear combination of vectors, Linear, Dependence and independence of vectors, Basis and dimension of vector space

Unit IV: Function of complex variables.   8 hours
Introduction, Complex variable, function of complex variables, Analytic function, Necessary & sufficient conditions for f (z) to be analytic (without proof), Harmonic function, Conformal mappings

Unit V: Fourier series and Integrals   11 hours
Introduction, Periodic function and trigonometric series, Fourier series, Fourier sine and cosine series Fourier series in complex form, Fourier integral, Fourier Sine and Cosine integrals, Fourier Sine and Cosine transforms.

Unit VI: Taylor series   5 hours
Introduction, Geometric series, Convergence of the geometric series, Taylor series, Taylor series of a function of one or two variables

Text Books
1. Advance Engineering Mathematics , By Erwin Kreyszig, 8th edition .
2. Calculus and Analytical Geometry, By Thomas and Finney

Reference Books

1. Applied Mathematics, By R . K. Thukurathi and Dr. K.K Shrestha
2. Engineering Mathematics IV,By Toya Narayan Paudel, Sukunda Pustak Bhawan, Kathmandu Nepal.
   Differential Equation:

   By Agnew R.P.; New York, MC GRaw Hill Book Company 1960

3. Introduction to Mathematical Physics:

   By Charlie Happer; prentice Hall of India Pvt. Ltd.

4. Text Book on Algebra & Theory of Equations:

   By chandrika Prasad; Pothishala Pvt. Ltd.

Business and Technical Communication (3-0-0)

1. **Evaluation:**

	Theory	Practical	Total
Sessional	50	---	50
Final	50	-----	50
Total	100	-------	100

Course Objectives:
The main objectives of this course are:-
1. To develop the ability to deliver technical knowledge orally in English.
2. To be able to comprehend and take notes after listening and reading.
3. To fasten reading skills in technical and non-technical reading materials.
4. To develop summarizing skills in writings.
5. To impart the knowledge of effective written and oral communication skills for handling business operations.

Course Contents:

Unit I: Review of English Grammar   **6 hours**

Clause and its types; Sentence structure, sentence types (simple, compound and complex); transformation of sentences; Voice (Active and Passive); Variety levels of English: formal, informal, polite, familiar, impolite, spoken and written.

Unit II: Fundamentals of Business Writing   **3 hours**

Adaptation and Selection of Words (Importance of Adaptation, suggestions for selecting words and suggestions for non- discriminatory writing), Construction of clear sentences and paragraphs

Unit III: Business Correspondence   **9 hours**

Situations requiring directness (Direct inquiries, Favorable
Responses, Adjustments grants, Order acknowledgements,
Claims, Personal evaluation, Order letters)
Indirect Situations: (Refused request, Adjustment and refusals, Credit refusals, Vague and back order.)
Persuasive Request and Collections: (Persuasive Requests, Collection   letters)

Unit IV: Technical Writing Skills   **12 hours**

Preparation of short memoranda (Importance- formats);
Job Application and Bio-data; Description writing (Process, Mechanism, and Place etc.); Seminars papers (Conduction of seminar, Writing Seminar Paper, Preparation of circular), Preparation of reports (Ttypes: short, long letter, memo-reports); Writing Proposals (Grant, Research, Project Proposals); Conduct of Meeting (Agenda, Notification, Minute Preparation); Documentation (APA Format : Citing Author/s, Book/s, Journal, Newspaper, Magazine and Websites)

Unit V: Oral Communication   **6 hours**

Technical talks (Suggested Topics: Environmental pollution, construction, water resources, impact of computer in modern society, impact of satellite communication, urban development); Interview (Effective Techniques, How to prepare, Body Language, What to expect? Dos and Don'ts)

Unit VI: echnology Enabled Communication   **3 hours**

(Using technology in communication task, Tools for presenting messages, Tools for transmitting messages, Tools for collaboration, A look to the future.)

Unit VII: Reading skills   **6 hours**

Comprehension question and exercise (from prescribed passages- Freedom (G. B. Shaw), Knowledge and Wisdom (Bertrand Russel), The Story of an Hour (Kate Chopin), Why Go to University? (Moti Nissani), Beauty (Susan Sontag)

Note Taking and Summary/ Precis Writing (from any passages containing 250-350 words)

Unit VII: Practical Works: **3 hours**

i. To present a seminar paper,
ii. To participate in a group discussion,
iii. To conduct a meeting
iv. To prepare and practice to face an interview

Text Books:

1. Andrea J, Rutherford. *Basic Communication Skills for Technology*. 2nd Edition. Pearson Education Asia (LPE) ISBN8178082810.
2. Lesikar, Raymond V. & et-al: *Business Communication*, TATA McGraw Hill Education Pvt. Ltd.

Reference Books:

1. Anne Eisenberg, *Effective Technical Communication*, Mc- Graw Hill 1982
2. Houp and T. E. Pearsall, *Reporting Technical Information*, Allyn and Bacon, Boston.
3. V. R.Narayanaswami, *Strengthen your Writing*, Orient Longman, Madras.
4. Champa Tickoo and Jaya Sasikumar, *Writing with a Purpose* Oxford University Press , Bombay.
5. Khanal, Arjun. *Communication Skills in English*, Sukunda Pustak Bhawan, Kathmandu 2010

PRJ 141.1 Project I (0-0-1)

Evaluation:

	Theory	Practical	Total
Sessional	-	50	50
Final	-	50	50
Total		100	100

Course Objectives:
1. *To develop the ideas about the programming concept using PLT.*
2. *Implementing various programming technique using C.*
3. *To develop the small project about any real based system using programming language C.*

Course Contents: **16 hours**

The following are documentation guidelines to be given to each student along with an assignment that should cover most of the main topics given in the framework.
- Cover Page
- Executive summary
- Acknowledgment

1. Introduction
2. The Assignment project
3. Objective of Assignment project
4. Time Plan for the work assigned
5. Investigation of the problems
6. System Analysis
   - Feasibility study
   - Context Diagram
   - Data Flow Diagram
7. System Design
   - ER and implementation
   - User interface
8. Program Specification
9. Algorithms
10. Flowchart or Decision tree of Decision Table or Structure English
11. Program coding
12. Input test Data
13. Program Testing
14. Output/Reports
15. Computer (software and Hardware) requirement to run this program
16. Software Installation and operation procedures
17. Comments on the Assignment project if any (How did he/she find it? Time provided and resources along with teacher's guidance at required of the student or not. What improvement you would make if certain asked thing provided to you?
18. Conclusion and recommendation
19. Users Manual

<u>Special attention</u>
Each student should be given ample opportunity to use computer system for the assigned project work. Sample format of project work could be given to the students before assigning the work.

The computer system must have required necessary software packages and program installed in order to accomplish the tasks assigned to them. Teacher could guide students during the development work assign to students. **Generally, individual project is more preferable** because he/she can learn more on project but project work can be done in group (maximum of 5 persons in each group).

BCA III Semester:

CMP 225.3 System Analysis and Design (3-1-0)
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:
1. *This course aims to provide to the student the theory and practice of designing information systems to meet user needs, including problem investigation and the analysis, design and implementation of system.*
2. *Topic include the systems development cycle, system modeling techniques, interface to database management systems, monitoring and control, review and maintenance, and project management. Includes class projects using a CASE tool.*

Course Contents:

Unit I: The Context of Systems Analysis and Design   **4 hours**
> **Introduction**
>> **A framework for system analysis and design**
>> **The players-System Stakeholders:** system owners, system users, system designers, system builders, system analyst, external service providers and the project manager.
>> **Business Drivers for today's information systems:** Globalization of the economy, Electronic commerce and business, security and privacy, Globalization and partnership, Knowledge asset management, Continuous improvement and Total quality management and Business Process redesign.
>> **Technology Driver's for today's information:** Network and the internet, mobile and wireless technologies, Enterprise application.
>> **A Simple System Development Process:** System initiation, system analysis, system design, system implementation, system support and continuous improvement.

Unit II: Information System Building Blocks   **3 hours**
> **Introduction**
> **The Product-information systems**
> **A Framework for system development architecture:** Knowledge Building Block, Process Building Block, Communication Building Block
> **Network Technologies and the IS Building Blocks**

Unit III: Information Systems Development   **4 hours**
> **Introduction**
> **The Process of system development:** The capability maturity model, Life Cycle versus Methodology and Underlying principle for system development.
> **A System Development Process:** Where do system development projects come from? The FAST project phases, Cross life cycle activities, sequential versus iterative development.
> **Alternative Route and Strategies:** The model driven development strategy, The rapid Application development strategy, The Commercial Application Package Implement strategy, Hybrid Strategy and System Maintenance
> **Automated Tools and Technology:** Computer Assisted System Engineering, Application development Environment, Process and Project Managers.

Unit IV: Project Management   4 hours
Introduction
What is Project Management? The Causes of Failed Projects, The Project Management Body of Knowledge; The Project Management life Cycle: Activity 1-Negotiate Scope, Activity 2-Identify Tasks, Activity 3- Estimate task Duration, Activity 4-Specify intertask Dependences, Activity 5-Assign Resources, Activity 6-Direct the Team Effort, Activity 7-Monitor and Control Progress, Activity 8-Assess Project Result and Experiences.

Unit V: System Analysis   6 hours
Introduction
What is Systems Analysis?
Systems Analysis Approaches: Model-Driven Analysis Approaches, Accelerated Analysis Approaches, Requirements Discovery Methods, Business Process Redesign Methods, Fast Systems Analysis strategies.
The Scope Definition Phase: Task 1.1 – Identify baseline Problems and Opportunities, Task 1.2 – Negotiate Baseline Scope, Task 1.3 – Asses Baseline Project worthiness, Task 1.4– Develop baseline schedule and budget, Task 1.5 – Communicate the Project Plan.
The Problem Analysis phase: Task 2.1 – Study the Problem Domain, Task 2.2 – Analyze Problems and Opportunities, Task 2.3- Analyze Business Process, Task 2.4 – Establish system Improvement Objectives, Task 2.5- Update the Project Plan Task 2.6- Communication Findings and Recommendation.
The Requirements Analysis Phases: Task 3.1 – Identify and Express Requirements, Task 3.2 – Prioritize System Requirements, Task 3.3 – Update the Project plan, Task 3.4 – Communicate the requirement statements.
The Logical Design Phase: Task 4.1a- Structure Functional Requirements, Task 4.1b- Prototype Functional Requirements(Alternative), Task 4.2- Validate Functional Requirements, Task 4.3- Define Acceptance Test cases.
The Decision Analysis Phase: Task 5.1 – Identify and Express Candidate solution Task 5.2 – Analyze candidate solution, Task 5.3 – Compare Candidate solution, Task 5.4 – Update the Project Plan, Task 5.4 – Update the project plan Task 5.5-Recommend a System Solution.

Unit VI: Fact Finding technique for requirement discovery Requirements Discovery   6 hours
Introduction
An introduction to Requirement Discovery
The process of Requirement Discovery: Problem Discovery and Analysis, Requirements Discovery, Documenting and analyzing Requirements, Requirements Management; Requirements Fact Finding Techniques: Sampling of Existing Documentation, Forms and Files, Research and sites Visits, Observation of the work Environment, Questionnaires, Interviews, how to conduct an Interview, Discovery Prototyping, Joint Requirements Planning (JRP); A Fact Finding Strategy.

Unit VII: Modelling System Requirements with use cases   6 hours
Introduction
An Introduction to use case Modelling
System concepts for Use case diagram: Use case, Actors, Relationships
The Process of Requirement Use Case Modelling: Step 1-Identify Business Actors, Step 2- Identify Business requirements use cases, Step 3- Construct use case model diagram, Step 4- Document business requirements use case narrations.
Use case and Project Management: Ranking and Evaluating use cases, Identify Use Cases Dependencies

Unit VIII: Data Modelling and analysis
Introduction
What is data Modeling: Entities, Attributes, Relationships;
The Process of Logical Data Modeling: strategy Data modeling, data modeling during Systems Analysis, Looking ahead to systems Design, Automated tools for Data modeling;
How to construct data models: Entity Discovery, the context data model, the context data model, the key based data model, Generalized Hierarchies, the fully Attributed data model; **Analyzing the data model:** What is a Good data model? Data Analysis, Normalization Example; Mapping Data Requirements to Location

---

Unit IX: Process Modeling   **6 hours**
   Introduction
   An Introduction to Process Modelling
   System concepts for process modeling: External Agents, Data stores, Process concepts, Data flows,
   The process of Logical Process Modeling: Strategic system Planning, Process modeling for Business Process Redesign, Process Modeling during systems analysis, looking ahead to System Design Fact-Finding and information Gathering for process modeling, Computer-Aided System Engineering (Case) For Process modeling:
   How to construct processes Models: The context data flow diagram, the   functional Decomposition Diagram, The Event-Response or Use case list, Event Decomposition Diagrams, Event Diagrams, the system Diagram (s), Primitive Diagrams, Completing the specification:
   Synchronizing of system models: Data and Process Model synchronization, process Distribution, The Next Generation

Unit X: Feasibility Analysis and the System Proposal   **4 hours**
   Introduction
   Feasibility Analysis and the System Proposal: Feasibility Analysis- A Creeping Commitment Approach, system Analysis-preliminary investigation Checkpoint, System Analysis-Problem Analysis Checkpoint, System Design Decision Analysis Checkpoint; Four Tests for feasibility, Economic Feasibility, The Bottom line; Cost-Benefit Analysis Techniques: How Much will the system cost?, What Benefits will the system Provided ?, Is the Proposed system cost effective?, Feasibility Analysis of Candidate systems" Candidate systems Matrix, Feasibility Analysis Matrix; The system Proposal: Written Report Formal Presentation.

Unit XI: System Design Methods   **5 hours**
   Introduction
   Systems Design:
   What is systems Design?
   System Design Approaches: Model-Driven Approaches, Rapid Application Development (RAD) Fast system design strategies;
   System Design for in-house Development- The "Build" solution: Task 5.1 – Design the Application Architecture Task 5.2 – Design the system Database (s), Task 5.3 – Design the system interface Task 5.4- Package design specification, Task 5.5-Update the Project Plan; **System Design for integrating commercial software The "Buy" solution:** Task 4.1-Research Technical Criteria and Options, Task 4.2-Solicit Proposals (or Quotes) from vendors, Task 5a.1 – Validate Vendor Claims and Performances, Task 5a.2-Evaluate and Rank vendor Proposals, Task 5a.3-Award (or Let) Contract and Debrief Vendors, Impact of Buy Decisions on Remaining Life Cycle Phase.

   Text Book:
   1. Jeffery L. Whitten Lonnie D. Bently Kevin C. Dittman, *"Systems Analysis and Design Methods"*, Tata McGraw-Hill, 7th Ed.

CMP 224.3 Data Structure and Algorithm (3-0-1)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

This course aims to provide fundamental knowledge on data structure designing and implementation for storing information, and various algorithms used in computer sciences.

Course Contents:

Unit I: Introduction   **3 hours**

Introduction of DSA, Abstract Data Types(ADTs), its scope, data structure and its types, brief introduction to Recursion

Unit II: Algorithms Analysis   **2 hours**

Mathematical background, Model, what to analyze? Running time calculations

Unit III: Lists, Stacks and Queues   **6 hours**

The list ADT (linear, linked list), The stack ADT, The queue ADT (linear and Circular)

Unit I: Trees   **6 hours**

Preliminaries, Binary trees, The search tree ADT- Binary search trees, ABL trees, Splay trees, Tree traversals (revisited), B-trees

Unit I: Hashing   **6 hours**

General idea, hash function, load factor Open hashing (separate chaining), Closed hashing (Open addressing), Rehashing, Extendable hashing

Unit I: Priority Queues   **6 hours**

Simple implementation, Binary heap, Applications of priority queues, D-heaps, Leftist heaps, skew heaps, Binomial queues

Unit I: Sorting   **7 hours**

Preliminaries, Indentation sort, A lower bound for simple sorting algorithms, Shell-sort, Heap-sort, Merge-sort, Quick-sort, Sorting large objects, A general lower bound for sorting, Bucket sort, External sorting

Unit I: Graph Algorithm   **6 hours**

Definitions, Topological sort, Shortest-path algorithm, Network flow problems, Minimum Spanning Tree Applications of Depth-first search

Unit I: Algorithm Design Techniques   **6 hours**

Greedy algorithm, Divide and conquer, Dynamic programming, Randomized algorithms, Backtracking algorithms

Laboratory

There shall be 10 lab exercises based on C or C++
1. Implementation of stack
2. Implementation of linear and circular queue

3. Solution of TOH and Fibonacci recursion
4. Implementation of Link list: Singly, and doubly linked
5. Implementation of tree: AVL tree, Balancing of AVL
6. Implementation of merge sort
7. Implementation of search: sequential, Tree and Binary
8. Implementation of Graphs: Graph traversals
9. Implementation of hashing
10. Implementation of heap

Text Books:
   1. Langsam, Y., Augustin, M.J. and Tanenbaum, A.M: *Data Structure Using C and C++, Prentice Hall of India*
   2. Rowe, G.W.: Introduction to *Data Structure and Algorithms with C and C++, Prentice Hall of India*
   3. Mark, Allen, Weiss: *Data structure and Algorithm Analysis in C++*

Recommended: Any C and C++ book

CMP123.3 Object Oriented Programming

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:
1. This course aims to provide an introduction to Windows Programming using object oriented Language.
2. Students learn the concepts needed to write programs using event-driven, object-oriented.
3. It also helps the students in learning the object-oriented Database Management System.

Course Contents:

Unit I: Introduction to Object Oriented programming   **4 hours**

Limitation of Procedural Language, object oriented approach, features of object oriented language: Classes, Object Inheritance, Reusability, Polymorphism

Unit II: Classes and Objects   **8 hours**

Components of Class, scope of Public, Private and protected members, Constructors and constructor overloading Destructors, Class, Object and Memory, Static Data and Class Member

Unit III: Inheritance   **6 hours**

Derived class and base class, Derived class constructors, Overriding member function

Unit IV: Operator Overloading and data type conversion   **6 hours**

Overloading Unary Operators, Overloading Binary Operators, Data type conversion

Unit V: Pointers   **7 hours**

Address and Pointers, Pointer and Arrays, Pointers and Function, Pointer and String, Memory management using new and delete

Unit VI: Virtual function and Polymorphism   **7 hours**

Virtual function and normal function, pure virtual function, Polymorphism

Unit VII: Exception Handling   **4 hours**

Compile time exception handling, Run Time exception handling

Unit VIII: Miscellaneous Topics   **6 hours**

Friend function, pointer, Templates: Class and Function

Reference Books:
1. R. Lafore: Object *Oriented Programming in Turbo C++, Galgotia Publications Ltd. India, 1999*
2. David Parsons: *Object Oriented Programming with C++*

Financial Accounting II (3-0-1)

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

This course aims to equip students with the knowledge and skill in handling financial accounting system. specifically, it aims to acquaint students with the
* Recording, accounting, valuation and disclosure in the financial statements of the inventories and the cost of goods sold:
* Accounting and disclosure of cash equivalents and receivables;
* Accounting and disclosure of non-current assets and liabilities.
* Accounting and disclosure of current liabilities; and
* Accounting and presentation of owners' equity and dividends.

Course Contents:

Unit I: Accounting for Inventories and cost of Goods Sold   8 hours
The nature of inventory; cost of goods sold model; inventory valuation and income measurement; inventory costing methods; choice of a method; methods of inventory estimation; effect of inventory valuation method on the cost of goods sold; disclosure in the financial statements

Unit II: Accounting for cash, Cash Equivalent and receivables   8 hours
Cash and cash equivalent: components of cash and cash equivalents; Preparation of the bank reconciliation statement and the need for adjustments to accounting records; petty cash, balance sheet presentation cash and cash equivalent. Accounts receivable: valuation of accounts receivables, methods to account for uncollectible amount, balance sheet presentation; notes receivable: interest bearing notes, non-interest-bearing notes, presentation of the notes receivable and related aspects in the financial statements.

Unit III: Accounting for Non-current Assets   11 hours
Concepts of capital, revenue and deferred revenue expenditure; types of operating assets; acquisition of operating assets and the capitalization process; depreciation: concepts, methods, and accounting (straight line and diminishing balance method including accelerated depreciation method), disposal of assets and accounting for gains and losses; disclosure in the financial statements.

Unit IV: Accounting for Current Liabilities   5 hours
Accounts payable; notes payable, tax payable, warranties and accrued liabilities; balance sheet presentation

Unit V: Accounting for Non-current Liabilities   9 hours
Bonds payable: issuance of bonds, characteristics of bonds, factors affecting bond price, premium of discount on issuance of bonds, bond amortization, redemption of bonds, disclosure in financial statements. Accounting for lease; Operating and financial lease; balance sheet of presentation.

Unit VI: Accounting for Stockholders' Equity and Dividends   **7 hours**

Stockholders' Equity: components of the stockholders' equity section of the balance sheet; Stocks; type of stock, issuance of stock, stock issued for cash and non-cash consideration and on a subscription basis, treasury stock, retirement of a stock; presentation in the financial statements; Dividends; Meaning and types of dividend-cash dividend, cash dividend for ordinary stock and preferred stock; stock dividend and stock split, disclosure in financial statements.

Text Book:

1. Porter; Gray A. and Norton, Curtis L, *Financial Accounting*: *The Impact on Decision Makers, The Dryden Press, USA*.

eference Book:

1. Narayanswamy, R., *Financial Accounting*: *A Managerial Perspective, Prentice Hall of India. New Delhi*.
2. Sanjib Neupane, Dharma Raj Upreti, *Financial Accounting II Asmita Publication*

Microprocessor (3-1-1)
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:
1. This course will provide the fundamental knowledge to understand the basics, operation.
2. It also provides the basic idea of assembly level programming and application of microprocessor.

Course Contents:
Unit I: Introduction   **3 hours**
Introduction to Microprocessors, Review of Processor Bus Organization, Arithmetic Logic Unit (ALU)\

Unit II: Basic Computer Architecture   **14 hours**
SAP-1 Architecture, 8-bit "W" bus, 4 – bit program counter only counts up (starts execution at 0)
4 – bit memory Address register (MAR), 16x8- bit memory, 8-bit instruction register (IR), 6-cycle
controller with 12-bit micro-instruction word, 8-bit accumulator, 8-bit B register, 8-bit adder-subtractor
8-bit output register, SAP-1 Instructions, Fetch & Execution, Micro program
- Fetch Cycle
- Execution cycle
- microprogram
- Controller implementation

Unit III: SAP 2   **3 hours**
SAP 2 Architecture, Architectural differences with SAP-1, Bi-directional registers, Instruction set, Flags

Unit IV: Instruction Cycle   **3 hours**
Fetch Operation and Timing Diagram, Execute Operation and timing Diagram, Machine Cycle and States

Unit V: Intel 8085   **9 hours**
Functional Block Diagram and Pin configuration, Timing and Control Unit, Registers, Data and Address
Bus, Intel 8085 instructions, Operation Code and Operands, Addressing Modes, Interrupts, Flags,
Instructions and Data Flow inside 8085, Basic Assembly Language Programming Using 8085 Instruction
Sets

Unit VI: Basic I/O And Memory R/W Operations   **5 hours**
Memory Read, Memory Write, I/O Read, I/O Write, Introduction to Direct Memory Access

Unit VII: Digital interface   **6 hours**
Introduction PPI Device 8255 A, Internal Block Diagram, 252A Modes, Initialization and generation
control words, Example of 8255 A interfacing to a micro-computer

Unit VIII: Input and Output Interfaces   **5 hours**
Serial and parallel Communication, Data transfer wait interface, RS-232, IEEE 488-1978 general purpose
interface standard.

Unit IX: Overview Of Intel 8086   **2 hours**

Block Diagram and Pin Configuration, Introduction to to 8086, Introduction to 8086 Assembly Language Programming

Reference Book:
1. Malvino: Digital Computer Electronics and Introduction to Microcomputers
2. Ramesh S. Gaonkar: Microprocessor Architecture, Programming and Application with 8085, Prentice Hall
3. Morris Mano: Computer System Architecture, Prentice Hall
4. Dougals V. Hall: Microprocessor and Interfacing programming and Hardware, McGraw Hill.

BCA IV Semester:

Computer Graphics and Multimedia (3-1-2)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objective:
1. The students will get the knowledge about basic concepts of drawing.
2. The students will get the knowledge of various graphics and their technique.
3. The students will get the knowledge of multimedia and its other blocks.

Course Contents:

Unit I: Introduction of CG and Basic Concepts of Drawing   **2 hours**

Introduction and Development of Graphics system and Field of Computer graphics

Unit II: Overview of Graphics system   **3 hours**

Video display devices: Refresh cathode-Ray Tubes, Color CRT display, Flat-panel display(LCD, LED and Plasma Display), Raster-Scan systems and Random-scan systems

Unit III: Graphics Algorithm   **4hours**

DDA line drawing algorithm, Bresenham's line drawing algorithm and Midpoint Circle Algorithm

Unit IV: GraphicsDimensions   **12 hours**

- Two-Dimensional Geometric transformations: Translation, Rotation, Scaling, Composite transformation, Homogenous Co-Ordinate System, Two-Dimensional object to screen viewing(Window to viewport co-ordinate transformation only), Clipping and Cohen Sutherland clipping algorithm, Three- Dimensional object to screen viewing, Extension of two-dimensional display methods: Parallel Projection(Oblique and orthographic) Perspective Projections

Unit V: Illumination and Rendering   **10 hours**

Non planner surfaces(Bezier Curve and surfaces), Methods of generating non-planner surfaces(Polygon Table, Polygon mesh and Plane equation), Visible surface detection methods(Back face, Z buffer and Scanline), Polygon-Rendering methods: constant-Intensity shading, Gouraud Shading, Phong shading, Fast phong shading, Introduction to OPENGL and its application

Unit VI: Introduction to Multimedia   **3hours**

Definitions, Application of Multimedia, Multimedia Terms (Project Manager, Multimedia Designer, Interface Designer, Writer, Video Specialist, Audio Specialist, Multimedia Programmer, The Sum of the parts)

Unit VII: MediaSoftware   **5 hours**

Basic Tools (Painting and Drawing Tools, 3-D Modeling and Animation Tools, Image Editing Tools, OCR Software, Sound Editing Programs, Animation, Video and Digital movies and Players),

Multimedia Authoring Tools, Types of Authoring Tools, Card and Page-bases Authoring Tools, Icon-Based Authoring Tools, Time-Based Authoring Tools, Object-Oriented Tools

Unit VIII: Multimedia Building Blocks   16 hours
Text, Typefaces and fonts, Design Issue, Beyond the Basics, Bitmap, True Type, Postscript (ATM), The Jaggies, Fontographer, Font Monger, Font Chameleon, Icons and Symbols, Animating text and 3D effects, Logo Motion, Tapestry, ASCLL- standard only 0-127, Sound and Music, The power of sound, Multimedia system sounds, MIDI Vs. Digital Audio-Choosing between MIDI and Digital Audio, Digital Audio, Professional Sound standard (Red Book Standard)-Quality and space considerations, Color Theory, Electromagnetic Spectrum, ROYGBIV: 400nm-600nm, Additive Color:- RGB, Subtractive Color-CMYK, Color Models-RGB,HBS,BSL,CIE YUV, Perception of Color, Graphics and Imaging:
Color Depth and File Size, Palette Management, Importing Graphics (Painting vs Drawing, Photoshop and Illustrator, Scanning, PhotoCD, Digital Photography, still images, Screen Capturer (CMb-Shft-3 or Printscreen), Animation: The Power of Motion and Principle of Animation, Animation Technique and Animation file formats, Video: Broadcast Video standards (NTSC, PAL SECAM, HDTV), Integrating computer and Television, Recording Formats, Video compression (JPEG, MPEG, DVI Indeo, Other Compression Methods, Optimizing Video Files

Laboratory:
1. Implementation of Bresenham's line drawing algorithm using C/C++
2. Implementation of mid-point drawing algorithm using C/C++
3. Implementation of Two-Dimensional-Translation, Scaling)
4. Implementation of Two-Dimensional-Rotation
5. Implementation of Two-Dimensional-Scaling
6. Demonstration of multimedia(Integration of multimedia component)
7. Demonstration of Video Compression Technique using library file
8. Demonstration of Animation technique using any programming language

Reference Books:
1. Dnaild Hern and M. Pauline Baker: *Computer Graphics, Prentice-Hall.*
2. Tay Vaughan: Multimedia: Making it work, 4th ed, Osborne McGraw-Hill Publisher; 1998
3. *Malay K. Pakhira, Computer Graphics Multimedia and Animation Second Edition PHI Publicatin.*

Database Management System (3-0-3)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives
- *To be familiar the application of the RDBMS in enterprise.*
- *Students will be exposed to file organization and secondary storage structure.*
- *To create the normalized database and create the correct forms of joins.*
- *Automatically complete or revert the transaction.*
- *To Create advance level database constraints.*
- *To understand the concept of Object Oriented Database and its* advantages.

Course Contents:

Unit I: Operating System Overview   **3 hours**
Introduction to Database management system, Brief History of Database Management system Approach, components of a database management system.

Unit II: Designing a Database   **5 hours**
Introduction, the Feasibility study, Designing systems, Identifying user requirements Designing systems with E-R Diagram, UML Class Diagrams, Use Case Diagram,Activity diagram, System sequence diagram, Classes and Entities, Associations and times, Binary Objects, Computed values.

Unit III: Data Normalization   **6 hours**
Introduction, Tables, Classes, and Keys, First Normal form, Second Normal Form, Third Normal form, Beyond Third Normal from, Data Rules and Integrity, Business Rules and Its effects, converting a class Diagram to Normalized Tables, Data Dictionary

Unit IV: Queries in Database   **3 hours**
Introduction, Creating a Query, Computations, Multiple Tables: Joining Tables, Identifying, Columns in Different Tables, Joining Many Tables, Hints on Joining Tables, Table Alias, Creating a View

Unit V Advanced Queries in Database   **6 hours**
Introduction, Sub queries, More features and Tricks with SQL SELECT: Outer Joins, UNION, INTERSECT, EXCEPT, Multiple join Columns, Reflexive join, CASE Function, Inequality joins, Cross Tabulation, Questions with "Every" Need the EXISTS clause, SQL SELECT summary; SQL Data Definition Commands, SQL Data Manipulation Commands: INSERT and DELETE, UPDATE, Union.

Unit VI: Developing Stored Procedures   **6 hours**
Managing stored procedures, Create, Alter, Drop ,Execute stored procedure ,Encryption, Passing data to stored procedures , Parameter default, Table valued parameter, Returning data from stored procedure output parameter using the return statement

Unit VII: Creating DML triggers   **4 hours**

Transaction flow, Creating Triggers, Triggers limitation, Disabling trigger, Developing multi row enabled triggers

Unit VIII: PhysicalDesign   **3   hours**
Introduction, Physical Data Storage, Data Storage Methods, Data Clustering and Partitioning

Unit IX: Database Application Types   **4 hours**
Database Application Types: On Line Transaction Processing, On-Line Application Processing, Data Warehouses and Data Mining; Backup and Recovery.

Unit X: Distributed Database System

                                                                                   4 hours
Introduction, Distributed Databases, Client/Server Databases, Client/server versus File server, Brief Introduction to data Assess API (ODBC, DB Library, DAO, ADO, JDBC, OLEDB), Three-Tier Client/Server Model, The Back End: server Databases.

Unit XI: Objected oriented database   **4 hours**
Introduction, Data Types and Objects, Object-Oriented Databases and SQL3.

Text Book:
   1. Gerald V.Post: Database Management Systems, McGraw Hill International Edition.

Reference books
   1. *Microsoft SQL server* 2008 –Bible Nielsen White &Parui , publication Wiley India .
   2. *Database System Concepts*" by *Henry F.Korth& Abraham Silberschatz* .
   3. *System Anallysis* and *Design Method* 7'th Edition , Author: Jeffer L Whitten, Lonnie D, Bentely, Kevin C Dittman

Visual Programming (3-0-3)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:
After the completion of this course students will be able to:
1. *Describe how executable code is created with a complied language*
2. *Apply the power of .Net technologies and reasons why it is more powerful today.*
3. *Comfortably use the visual basic.NET editor*
4. *Create fairly sophisticated visual Basic.NET Programs.*
4. *Know what is meant by object oriented event-driven programming.*
5. *Build, Compile and execute VB .NET Program*
6. *Apply Technique to develop error - free software*

Course Contents:
Unit I: Introduction   **3 hours**
Introduction to Visual Studio 2010, Introduction of .NET framework 4.0, New Features of NET Framework 4.0, NET Framework class library, Meta Data and Assemblies, LINQ

Unit II: To Develop the VB.NET Projects With Simple Components   **5 hours**
Creating Windows Applications, Docking the Windows, Specifying the .NET framework version for Project, Creating multiform windows application, Loading, Showing, and Unloading Form

Basic Components
i) Label, Link Label, Text box, Button, Checked List Box, Radio Button, Check Box list, Hscrollbar, Vscrollbar, Combo Box, List Box, Group Box, Text Box, RitchText Box, Timer, List View, Masked Text Box, Picture Box
ii) Code Editor, WPF Designers, Class View, IntelliSense, Object Browser, The Solution Explorer, Property Window, The Output Window, Command Window

Unit III: The Language   **4 hours**
Option and Import Statement, Namespaces, Data Types, Variables and Constants, Datatype conversion, Scope and lifetime of Variables, Operators:Arithmetic, assignment, comparison, concatenation, logical bitwise, Arrays, Dynamic arrays and Enumerations.

Unit IV: Control Flow Statements   **4 hours**
1 Conditional Statements: if—else statement, if-elseif- else statement, select case statement, 2 Iteration Statements: Do while loop, While loop, For loop, for each, For Each-Next loop, 3 Jump Statements: goto, exit, continue, return

Unit V: Procedures, Function, Scope and Exception   **5 hours**
Sub Procedures and Arguments, Functions and Arguments, Scope, Block Scope, Procedure Scope, Module Scope, Namespace cope, Exception Handling, unstructured Exception Handling, Structured Exception Handling, Raising an Exceptional Intentionally (by using unstructured method), Exception

filtering in the Catch Block, Multiple Catch, Finally Statement, Throwing an Exception, Throwing a Custom Exception

Unit VI: Object Oriented Programming   **4 hours**
Creating Class, Creating constructor, Creating object, Creating destructor,   Implementation inheritance, Implementing shadowing, Creating abstract classes and methods, Creating and implementing interface

Unit VII: Windows Forms: User Interface Elements their properties, method and events   **5 hours**
Text box, Retch Text Box, Labels, Masked Text Box Control,   Buttons, Checkboxes and Radio Buttons

Unit VIII: Windows Forms: Advance User Interface Elements their properties, method and events   **8 hours**
List boxes, Checked List Boxes, Split Container Control, Combo Box, Picture boxes, Scroll bars, Image List, Tree View, List View, Tab Control, Tool tips contro, Panels, Timer

Unit IX: Windows Forms: Menus, and Built-in Dialog Boxes   **4 hours**
Tool Strip Control, Tool Strip Item Class, Menu Strip Control, Tool Strip Menu Item Class, Context Menu Strip control, Status Strip Control, Dialog Box Control, Open File Dialog Control, Save File Dialog Control, Font Dialog Control, Color Dialog Control and Printing Control

Unit X: Database programming with ADO.NET   **6 hours**
Over view of ADO.NET, Architecture of ADO.NET, Data Provider in ADO.NET, Data Set, Data Repeater, Accessing Data using Server Explorer ,Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Adding Data from Textboxes to Database, Display Data on data bound controls, display data on data grid view.

REFERENCE BOOKS :
1. Steven Kogent,"VB.NET 2010 Programming Black Book" ,Dream tech pub.
2. "Introduction to .NET frame work", Wrox publication
3. "Mastering VB.NET by Evangelospetroutsos" BPB publications
4. Istvan Novak, Andras Velvart, Adam Granicz."Visual Studio 2010 and .NET "ISBN-0470499486

CMP 230 Operating System (3-1-0)
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Objectives:
The main objective of this course is to provide basic operational principles and concepts that govern the design of modern operating system used in PC. In particular, the course will cover kernel, types of operating system (zoo), function (process management, memory management, I/O device management, security management, file management etc).

Course Contents:
Unit I: Introduction to Operating System   2 hours
Introduction and history, Objectives (Resource manager and extended machine) , Types of operating system, Function of operating system, Different views of OS

Unit II: Operating System Structure   2 hours
Kernel of Operating System, Monolithic System, Layered System, Microkernel, Exokernels, Client-server Model, Virtual Machines

Unit III: Process Management
- Process Concepts   (3 hours)
Definitions of Process, Process states, Process state transition, The process Control Block, Operations on processes (creation, Termination, Hierarchies, Implementation), The Process Model
Cooperating Processes

- Threads   (2 hours)
Definitions of Threads, Types of thread process (Single and multithreaded process), Benefits of Multithread Multithreading Models (Many-to-one model, One-to-One Model, Many-to many model)

- Process Scheduling   (5 hours)
Basic Concept, Type of scheduling (Preemptive scheduling, Nonpreemptive scheduling, batch, Interactive, real time scheduling), Scheduling Criteria or performance analysis, Scheduling Algorithm (Round-robin, First come first served, Shortest-job- first, Shortest process next, Shortest remaining Time next, real time, priority fair share, guaranteed, Lottery scheduling), Some examples on scheduling

- Interprocess Communication and synchronization   (6 hours)
Introduction, Race condition, Critical Regions, Avoiding critical region : Mutual Exclusion and Serializability, Mutual exclusion conditions, Proposals for achieving Mutual exclusion: disabling interrupts, Lock variable, Strict Alteration (Peterson's Solution), The TSL instruction, Sleep and wakeup, Types of mutual exclusion (Semaphore, Monitors, Bounded buffer), Serializability: Locking Protocols and Time Stamp Protocols

---

Unit IV: Input/ Output Device Management   **5 hours**

System model, Ways to manage Input / Output Devices: Memory mapped I/O, programmed I/O, Principle of I/O Hardware : I/O Devices, Device Controllers, Direct memory Access, Principle of I/O, Software : Interrupts Handlers, Device driver, Device Independent I/O Software User –Space I/o Software, System Resources : Preempt able and Non preemptable, Method of handling Deadlocks Deadlock prevention, Deadlock avoidance: Banker's Algorithm, Deadlock detection: Resource allocation graph, Recovery from Deadlock

Unit V: Memory Management   **10 hours**
- **Basic memory management**   **(6 hours)**

Introduction: Logical versus physical address space, Memory management with Swapping: Memory management with bitmaps and with linked list, Memory management   without swapping, Contiguous-memory allocation: memory protection, memory allocation, Fragmentation (Inter fragmentation and external fragmentation), Paging, Structure of page Table: Hierarchical page table, Hashed page table, Inverted page table, Shared Page Table, Segmentation, Segmentation with paging

  - Virtual memory   **(4 hours)**

Background, Demand paging, Page replacement, Page replacement algorithms: FIFO, OPR, LRU, Some examples on page replacement, Thrashing

Unit VI: File System interface management   **3 hours**

File concept: File Naming, File structure, File Type, File access, File attributes, and File operation, Directories: Single-level directory systems, Hierarchical Directory systems, Path names, Directory operation, Access Methods: Sequential, Direct, other access methods, Protection: Types of access, Access control, File System Implementation: Contiguous allocation, Linked list allocation, linked list allocation using an Index

Unit VII: Security management   **3 hours**

Introduction, Security problems, User Authentication : Passwords, password Vulnerabilities, Encrypted password, One time password, Biometrics password, User Authorization, Program Threats : Trojan Horse, Trap Door, Stack and Buffer overflow, System Threats : Worms, Viruses, Denial of Services, Cryptography: Encryption and Decryption, Protection Mechanism : Protection Domain, Access Control List, Capabilities, Trusted System,

Unit VIII: Distributed operating system   **3 hours**

Introduction, Advantages of distributed system over centralized System, Advantages of distributed system over Independent PCs, Disadvantages of distributed System, Layered protocols, The Client server Model, message passing, Remote procedure Call, Process in distribution system

Unit IX: Case Study Issues   **3 hours**

DOS and Windows Operating system and Unix Operating system

Unit X: Future issues   **1 hours**

Memory wall and Some future of OS about speed

Reference Books:
1) Andrew s. Tanenbaum, *"Modern Operating System"* ,   PHI, 3rd Ed. 2011
2) A. Silberschatz, P.B. Galvin, G. Gagne *" Operating System Concepts"*, Wiley, 8th Ed.
3) Andrew s. Tanenbaum, *"Distributed Operating System"* ,   Pearson
2) D M Dhamdhere , *"System Programming and Operating System"* - Tata McGraw-Hill , 20

MTH 214.3 Numerical Methods (3-0-1)
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

This course aims to provide familiarity with the theory of numerical analysis for solving algebraic and transcendental equations, solution of ordinary and partial differential equations related to engineering problems, numerical differentiation and integration.

Course Contents:

Unit I: Solution of Nonlinear Equations   **10 hours**

Review of calculus and Taylor's theorem, Errors in numerical calculations, Trial and error method, Bisection method, Newton's method, Secant method and their convergence, Fixed point iteration and is convergence

Unit II: Solution of Linear Algebraic Equations   **10 hours**

Review of the existence of solutions and properties of matrices, Gaussian Climination method, pivoting, ill conditioning, Gauss-Jordan method, Inverse of matrix using Gauss elimination method, Method of factorization, Dolittle algorithm, Cholesky's factorization, Iterative solutions, Solving eigen value problems using power method

Unit III: NumericalDifferentiation and Integration   **6 hours**

Newton's differentiation formulas, Maxima and minima of tabulated function, Netwon-ote's quadrature formulas, Gaussian integration algorithm, Romberg integration formulas

Unit IV: InterpolationandApproximation   **8 hours**

Lagrange's polynomials, Newton's interpolation using difference and divided differences. Cubic spline interpolation, Least squares method for linear and nonlinear data

Unit V: Solution of Ordinary Differential Equations   **8 hours**

Review of differential equations, initial value problem, Taylor series method picard'smethod, Euler's method and its accuracy, Henu's method, Runge-Kutta methods, Solution of the higher order equations, Boundary value problems, Shooting method and its algorithm

Unit VII: Solutionof Partial Differential Equations   **6 hours**

Review of partial differential equations, Deriving difference equations, Laplacian equation and Poisson's equation, engineering examples

Text Book:
1. C.F. Gerald and P.O. Wheatly: Applied Numerical Analysis, 4th Edition, addison Wesley publishing Company, New York.

Reference Book:
1. W. Chency and D. Kinciad: *Numerical Mathematics and Computing*, 2nd Edition, Brooks Cole Publishing Co, 1985.
2. W.H. Press, B.P. Flannery et.al.: *Numerical Recipes in C, 1st Edition, Cambridge press*, 1988.
3. S. Yakwitz and F. Szidarovszky: *An Introduction to Numerical Computations*, 2nd Edition, Macmillan Publishing Co., New York.

PRJ 141.2 Project II (0-0-2)

Evaluation:

	Theory	Practical	Total
Sessional	-	50	50
Final	-	50	50
Total		100	100

Course Objectives:
4. *To develop the concept about programming using PLT.*
5. *Implementing various programming technique using SAD.*
6. *To develop the real based project using programming language VB .Net and database System language.*

Course Contents: **30 hours**

The following are documentation guidelines to be given to each student along with an assignment that should cover most of the main topics given in the framework.

- Cover Page
- Executive summary
- Acknowledgment

Introduction, The Assignment project, Objective of Assignment project, Time Plan for the work assigned, Investigation of the problems, System Analysis: Feasibility study, Context Diagram, Data Flow Diagram, System Design: ER and implementation, User interface, Program Specification, Algorithms, Flowchart or Decision tree of Decision Table or Structure English, Program coding, Input test Data, Program Testing, Output/Reports, Computer (software and Hardware) requirement to run this program, Software Installation and operation procedures, Comments on the Assignment project if any (How did he/she find it? Time provided and resources along with teacher's guidance at required of the student or not. What improvement you would make if certain asked thing provided to you? Conclusion and recommendation, Users Manual

Special attention

Each student should be given ample opportunity to use computer system for the assigned project work. Sample format of project work could be given to the students before assigning the work.

The computer system must have required necessary software packages and program installed in order to accomplish the tasks assigned to them. Teacher could guide students during the development work assign to students. Generally, individual project is more preferable because he/she can learn more on project but project work can be done in group (maximum of 4 persons in each group).

Java Programming (3-0-3)
(Semester V)

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:
1. To enable the students to understand the core principles of the Java Language.
2. To use visual tools to produce well designed, effective applications and applets.
3. To enable students to learn to produce well designed, effective standalone applications.
4. To enable students to do socket programming, database handling using JDBC

Unit	Topic	Hours
1	**Introduction to Core Java:** History of java, platform independency, Introduction to JVM architecture, Object Oriented features with respect to Java, Class and Object, Operators, data types, arrays, Inheritance, Interfaces, Packages and Exception Handling	7
2	**Applet As Java Applications:** Introduction to application, Lifecycle of Applets, Applets and its methods, Applet Vs Applications	4
3	**Multithreading:** Introduction to thread, Multithreading concepts, Thread Life cycle, Creating multithreaded application, Thread priorities and Thread synchronization	4
4	**Java Input Output:** Java IO package, Byte/Character Stream, Buffered reader / writer, File reader / writer, Print writer and File Sequential / Random	5
5	**Java GUI Components:** Containers, Frames and Panels, Layout manager, Introduction to Netbeans IDE, Event delegation Model, Event source and handler, Event categories, Listeners, interfaces, adaptor classes, Swing Libraries, Model view Controller design pattern Different layout and All swing components	10
6	**Networking with Java:** Networking basics, Sockets, port, Proxy servers, Internet addressing URL, java.net – Networking classes and Interfaces, Implementing TCP/IP based Server and Client, Datagrams–Datagram packet, Datagram server and client, connections	6

7	**JDBC:** Java database connectivity, Types of JDBC drivers, Writing first JDBC applications, Types of statement objects (Statement, PreparedStatement and CallableStatement), Types of resultset, ResultSetMetadata, CRUD operations in database, JDBC and AWT and Connection pooling	6
8	**Generics:** Introduction to generics, Generics class with parameters, General form of a generic class, Creating a generic method, constructors, interfaces and Polymorphism in generics	6
	Total Hours	**48**

Laboratory
1. Demonstrate uses of arrays, operators.
2. Write a java code to demonstrate inheritance, multilevel inheritance, multiple inheritance using interfaces, creation and use of own packages.
3. Demonstrate exception handling (try-catch-finally, throws etc).
4. Create an Applet and embedded it in HTML page.
5. Demonstrate multi-threading
6. Demonstrate sequential and random reading and writing of files
7. Design AWT/Swing form with all swing controls.
8. Demonstrate TCP and UDP based client server connection.
9. Demonstrate CRUD operations of database with help of AWT/Swing controls
10. Demonstrate use of generic method, constructors and interfaces

Text Book
1. Herbert Schildt, Java The Complete Reference, Tata McGraw Hill Edition

Reference Books
1. Kogent, *Java 6 Programming* Black Book, Dreamtech Publication
2. Cay S Horstmann, Fary *Cornell Core Java 2 Volume* – I, Sun Microsystem press
3. Cay S Horstmann, Fary *Cornell Core Java 2 Volume* – II, Sun Microsystem press
4. E.Balguruswami *Programming with Java, A Primer,* Tata McGraw Hill Edition

MTH 122.3 Mathematical Foundation of Computer Science (3-2-1)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	80	-	100

Course Objectives:

1. The main objective of this course is to buildup the mathematical foundation for the study of computational science and computer technology.
2. This course introduces the student to discrete mathematics and finite state automata through an algorithmic approach and focuses on various problems solving technique.
3. It helps the target student in gaining fundamental and conceptual clarity in the area of Logic Reasoning. Algorithms, Recurrence relation. Graph Theory, and Theory of Automata.

Course Contents:

Unit I: Graph Theory   **15 hours**

Definitions, Directed and Undirected Graphs. Walk, Path, Circuits, Connected Components. Connected Component Algorithm, Shortest –Path Algorithm.Computer representation a graph (Static Representation only, like Adjacency Matrix, Incidence Matrix, Path Matrix): Bi-partite graphs. Regular graphs, Planar graphs. Euler graph. Hamilton graph and their properties and characterization.Application of graph theory in computer science (with example).

Unit II: Logic and Induction   **8 hours**

Propositions and Truth functions, Predicates and Quantification, Propositional and Predicate Logic, Expressing statement in the language of Logic. Deduction in Predicate Logic, Elementary Step-wise Induction and Complete Induction.

Unit III: Introduction to Mathematical Reasoning   **7 hours**

Formal Languages and Inductive Definitions: Axioms, Rules of Inference and Proofs, Direct Proof and Indirect Proof. Formal Proof and Informal Proof.

Unit IV: Recurrence Relations   **7 hours**

Recursive Definition of Sequences. Differencing and Summation, Solution of Linear Recursive Relation, Solution of Non-linear Recurrence Relation.

Unit V: Finite State Automata   **8 hours**

Alphabets and Language, Notion of a State. State Machine (FSM and DFA). Regular Expression, Equivalence Relation.

Reference Books:

1. Richard Johnsonbaugh, Discrete Mathematics, Fifth Edition, Addison Wesley, Pearson Education Asia (LPE), ISBN: 81-780-82799, 2000
2. Mott, Joe L., Kandel Abraham and Baker, Theodoe P., Discrete Mathematics for Computer Scientists and Mathematicians, Second Edition, Prentice-Hall, ISBN: 81-203-1502-2
3. Liu, C.L., Elements of Discrete Mathematics, TMH, 2000, ISBN: 0-07-043476-X
4. Trus, J.Discrete Mathematics for Computer Scientists, Second Edition, Addision Wesley ISBN: 0-201-36061,1999

Computer Architecture (3-1-0)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives
The general objectives of the course are as follows:
- To acquaint the students with the fundamentals of computer systems.
- To apprise the students with the architectural and associated components of computer systems.
- To aware the students about the architecture of the computer systems available in the market.

Course Contents
Unit I: Introduction   4 **hours**

Computer Organization and Computer Architecture , Review of Evolution of Computer System Basic Structure of Computer System, Examples of Computer Families, Future Trends in Computer, Review of Instruction Sets, Addressing Modes and Instruction Formats

Unit II: Register Transfer and Micro Operations   2 **hours**

Register Transfer and RTL, Micro operations, Data Transfer Micro operations, Arithmetic and Logical Micro operations, Shift Micro operations, Introduction to HDL and VHDL

Unit III: Central Processing Unit   3 **hours**

CPU Organization/Structure, Register Organization and Data Paths, Instruction Cycle, Arithmetic and Logical Unit and Design Principles for Modern Systems

Unit IV: Computer Arithmetic   6 **hours**

Integer Representation, Integer Arithmetic, Unsigned Binary Addition and Subtraction, Unsigned Binary Multiplication Algorithm, Booth's Algorithm, Unsigned Binary Division Algorithm, Floating Point Representation, BCD Arithmetic Unit, BCD Adder, Arithmetic Pipelining

Unit V: Control Unit   6 **hours**

Control of the Processor, Hardwired Control Unit: Control Unit Inputs and Control Unit Logic Micro programmed Control Unit: Micro Instructions and Its Types and Architecture of Micro programmed Control Unit, Micro Instruction Sequencing, Micro Instruction Execution, Applications of Hardwired and Micro programmed Control Units

Unit VI: Memory Organization   6 **hours**

Memory Hierarchy, Main Memory: RAM and ROM, Auxiliary Memory: Magnetic Disks and Tapes, Optical Disks, Flash Drives, Review of RAID. Associative Memory: Hardware Organization, Address Matching Logic, Read/Write Operations. Cache Memory: Cache Initialization, Mapping Cache Memory, Direct, Associative and Set Associative Memory Mapping Write Policy

Unit VII: Input Output Organization   4 **hours**

External Devices, I/O Module Structure, Review of Programmed I/O and Interrupt Driven I/O, Review of DMA, I/O Channels and I/O Processors, External Interfaces,

Unit VIII: Reduced Instruction Set Computers   **4 hours**

RISC VS. CISC, RISC Pipelining, Instruction Pipelining, Conflicts in Instruction Pipelining and their Solutions, Introduction to Register Windows and Register Renaming

Unit IX: Introduction to Parallel Processing   **6 hours**

Parallelism in Uniprocessor System, Multiprocessor Systems and their Characteristics
Flynn's Classification, Interconnection Structures in Multiprocessors, Cache Coherence
Introduction to Vector Processing and Array Processors, Introduction to Multithreaded Architecture

Unit X: Multicore Computers   **3 hours**

Hardware Performance Issues: Increase in Parallelism, Alternative Chip Organizations, Power Consumption, Software Performance Issues: Software on Multicore, Multicore Organization, Dual Core and Quad Core Processors, Power efficient Processors

Laboratory

The individual student should develop a project or perform a case study on Computer Architecture. The topic could be either initiated by the student or selected from a list provided by the instructor. An oral presentation with a demonstration in case of project should be part of the laboratory. Reports must be prepared.

Text Books

- Stallings, W., "*Computer Organization and Architecture*", Eighth Edition, 2011, Pearson.
- Mano, M.M., "*Computer Systems Architecture*", Third Edition, 2011, Pearson.

References

- Tanenbaum, A.S., "*Structured Computer Organization*", Fourth Edition, 2003, Pearson Education.
- Carpinelli, J.D., "*Computer Systems Organization and Architecture*", 2012, Pearson.
- Rajaraman, V. et all, "*Computer Organization and Architecture*", 2011, PHI.
- Sima, D. et all, "*Advanced Computer Architecture*", 2000, Addison Wesley.

Software Engineering

	Theory	Practical	Total
Sessional	40	10	50
Final	50	-	50
Total	90	10	100

Course Objectives:

The course objective is to provide required knowledge on planning, design, development, implementation, and maintenance of software.

Course Contents:

Unit I: Introduction 4 hours

History of software engineering, Introduction, Role of software engineering, Software Development and Software Engineering, Attribute of good software, Different between software engineering and system Engineering, Some challenges of software Engineering. Software Engineering Ethics

Unit II: Software Specification 4 hours

The Uses of Specification: A statement of User requirement, A statement of the interface between the machine and the control environment, A statement of the requirement for the implementation, A reference point during product maintenance, Specification Qualities, Classification of Specification styles, Verification of specifications, Types of Specification: Operational and descriptive specifications, Operational specifications: DFD UML diagrams for specifying Behaviors, Finite State Machine

Unit III: Software Testing Techniques and Strategies 7 hours

Software Testing Fundamentals: Testing objectives, How test information flows, Testing lifecycle, Test Cases (What it is?) **Levels of Testing:** Unit Testing, Integration Testing, System Testing, Acceptance Testing, Alpha testing & Beta testing, Static vs. Dynamic testing, Manual vs. Automatic testing, Testers workbench, steps of testing process (Only steps should be covered)
Different types of Testing: Installation Testing, Usability testing, Regression testing, Performance Testing, Load Testing, Stress testing, Security testing **Black Box & White Box Testing (Test Case Design Techniques):** Functional Testing (Black Box), Structural Testing (White Box), Domain Testing Non functional testing techniques, Validation testing Activities (Low level testing, high level testing) Black box vs. White Box

Unit IV: Software Qualities and Software Quality Assurance 10 hours

Software quality and quality assurance, Software quality factors, Software quality assurance, SQA activates, Software quality standards: SEI, ISO, Software reviews, Cost impact of software defects, Defect amplification and removal, Formal technical reviews, The review meeting, Review reporting and record keeping, Review guidelines, A review checklist, Formal approaches to SQA, Proof of correctness Statistical quality assurance, The clean room process

Unit V: Software reliability 6 hours

Measures of reliability and availability, Software reliability models, Software safety

---

Unit VI: Management of Software Engineering   **7 hours**

Responsibilities of a software project manager, Job responsibilities of a software project manager, Skills necessary for software project management, Project Planning, The SPMP document, Metrics for project size estimation, Line of code (LOC), Function point metric, Project estimation techniques, Empirical estimation techniques, Expert judgment technique, Delphi cost estimation, Heuristic techniques, Basic COCOMO model, Analytical estimation techniques, Scheduling, Organization and team structure, Organization structure, Team structure, Staffing, Quality of software engineer, Risk Management, Risk Identification, Risk assessment, Risk containment, Software configuration management, Necessity of software configuration management, Configuration management activities, Source code control system (SCCS) and RCS

Unit VII: Object-Oriented Concepts and Principles   **4 hours**

Object-Oriented Paradigm, Object-Oriented Concepts, Management of Object-Oriented Software Projects

Unit VIII: Emerging Trends   **3 hours**

Client server software, CORBA, COM/DCOM, Service oriented architecture (SOA), Software as a service (SaaS) **Case Study:** An individual case study should be given to each student on software project. 10% of sessional marks should be allocated for evaluation, **Text Books:** Pressman. R. S. : Software Engineering a practitioners Approach. McGraw Hill, 2. Mall. R.: Fundamentals of Software Engineering. PHI.

Reference Books:

1. C. Ghezzi, M. Jazayeri, and D. Mandrioli: *Fundaments of Software Engineering, Prentice Hall of India, Ltd.* Sommerville. I.: *Software Engineering, Pearson*

2. Bali-Bali : *Software Engineering*, S.K. Kataria & Sons

3. Pankaj Jalote's*: Software Engineering-* A precise Approach Wiley India

4. Richard Fairley: *Software Engineering* Concepts, Tata McGraw-Hill Edition

5. Eve Adersson, Philip Greenspun, Andrew Grumet: *Software Engineering or Internet Applications, PHI*

Web Technologies I

Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

Course Objectives:
1. To focus on the phenomenon known as World Wide Web (WWW) and Domain name hierarchy.
2. To impart the new concepts in Web Technologies.
3. To identify, evaluate and apply appropriate technologies for web development.
4. To develop understanding about the different technologies used in World Wide Web including the concept of HTML, CSS, Java script, XML and jQuery.

Learning Outcome
1. This course enables students to understand web page site planning and management.
2. Students will be able to develop advanced HTML pages with help of frames, scripting languages and evolving technologies like CSS, jQuery and XML.

Unit I: Internet and WWW   **4 hours**

Introduction to internet and its applications, Internet service   providers, domain name server, internet address; Protocols used in internet (HTTP, HTTPS, FTP, SMTP, TCP, IP, UDP); World Wide Web and its evolution, uniform resource locator (URL), web server and browsers; search engine, meta search engine; Domain name and its hierarchy, Issues related with domain name registration, DNS concept; Client server architecture, cross browser communication

Unit II: HTML and Graphics   **10 hours**

Introduction to HTML,<!doctype>, Creating basic HTML file, core elements and   attributes, comment, <meta>;

- **HTML basis** Basic text formatting, Phrase elements, lists, ordered lists, unordered lists, nesting of lists, Using character entities for special character, <font> element and attributes; Grouping elements
- **Links and Navigation**   Linking to other web pages, linking to email address, Understanding directories and directories structure, Understanding URLs, Absolute and relative URLs, Advanced email links;

- **Images, Audio and Video**
  Adding images, images as link, Image maps, Client side and server side image maps; Choosing the right image format, Gif images, animated gif, jpeg, png, keeping file size small; Working with multimedia, Exploring audio and video file formats, describing multimedia elements, <embed>, <object>, <audio>, <video>, embedding video from other websites, initializing an object using <param> element
- **Tables**
  Introducing tables Basic table elements and attributes , Grouping section of;**,** table, Nested Tables, Accessible tables, How to linearize tables using ID, scope and header attributes;
- **Form**

Introducing forms, attributes, controls in form, <fieldset> and <legend> elements; Focus, Tabbing order, access keys, Disabled and read only controls, Sending form data to the servers, http get, http post

- **Frames**
  Introducing frameset, When to use frames, <frameset> element, Attributes, Nested framesets, Inline or floating frames with <iframe>;
- **Exploring new elements of HTML 5**
  <input> types,<keygen>, <progress>, <meter>, <command>, <menu>, <header> and <footer>,Spell check attribute;

Unit III: Scripting language   10 hours
Introduction to scripting language, Difference between client side and server side scripting language, Features of javascript, What javascript can and cannot do, Using javascript in HTML document;

- **Programming fundamentals**
  Variables, operators, control flow statements, popup boxes;
- **Javascript functions**
  Defining and invoking a function, function argument, return statement, calling function with timer;
- **Events and Event Handlers**
  General Information about Events, Defining Event Handlers, events in javascript
- **Javascript objects**
  Properties of an object, methods of an object,
- w**orking with browsers object**
  Understanding window object, object collection, object properties, object methods;
- **DOM**
  Exploring document object methods, understanding DOM nodes;

Unit IV: Style sheets   10 hours
Introduction to stylesheets, Value of stylesheets, stylesheet rules and syntax; Creating simple stylesheets, adding comments on style sheets, exploring cascading order, working with properties and selectors, applying multiple properties to selector, grouping selector, applying contextual selectors, applying selector class, applying with accociated elements; Applying <div> tag to style sheet, applying <span> to stylesheet, linking stylesheets, creating CSS file, linking multiple page to CSS file; **CSS properties** Controlling text, Text formatting, Text pseudo-classes, lengths, Introducing the box model; Links, backgrounds, lists, tables, outline, positioning and layout with CSS;

Unit V: Extensible Markup Language (XML)   6 hours
XML: Introduction, Structure of XML: Logical Structure, Physical Structure; Naming Rules, Element Content Models, Element Occurrence Indicators, Character Content Document Type Declaration (DTD) and Validation, Developing a DTD, XML Schema, basic example; XSL (Extensible Style Sheet Language) or CSS (Cascading Style Sheet); XML processors: DOM and SAX;

Unit VI: Introducing j Query   2 hours
Why jquery, Jquery fundamentals, Page layout using jquery;

Unit VII: Page layout and Design issues   **3 hours**

Page Layout : Understanding site audience, page size and screen resolution, designing pages, coding your design, developing for mobile devices; Design issues : Typography, navigation, tables, forms;

Laboratory Work

List of Practical:
1. Design a web page using different text formatting tags.
2. Design a web page with links to different pages and allow navigation between pages.
3. Design a web page with Imagemaps.
4. Design a web page with different tables. Include nesting of tables in web page.
5. Design a webpage using frames.
6. Using Java Script design a web page that prints factorial / Fibonacci series / any given series.
7. Design a form with a text box and a command button. Using Java Script write a program whether the number entered in the text box is a prime number or not.
8. Design a form with all controls and validate all the controls placed on the form using Java Script.
9. Design a website using style sheets so that the pages have uniform style.
10. Design a DTD, corresponding XML document and display it in browser using CSS.
11. Design an XML document and display it in browser using XSL.
12. Design XML Schema and corresponding XML document.

Text Books
1. *HTML black book* – Steven Holzner, Dreamtech press
2. *Beginning HTML, XHTML, CSS and Java Script* – Jon Duckett, Wiely India Edition

Reference Books
1. *Web Technologies Black Book* - Kogent learning solutions
2. *Java Script step by step* - Steve Suehring East economy edition
3. *Jquery in Action* – Bear Bibeault, Yehuda Katz
4. *The complete reference* HTML and CSS - Thomas A. Powell Tata Mcgraw Hill edition

BCA VI and VIII Semester:

ECO 311 Applied Economics (3-0-0)
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objective:
The main objective of this course is to impart the fundamental concept of micro and macro economic theory; it aims to enhance the skill of the students in analysis and interpretation ofthe economic concept with respect to business decision.

Course Contents:

Unit I: Introduction   **3 hours**
Concept of Micro Economics and Macro Economics, Measurement of Inequality, Equilibrium, Statics and Dynamics, Stock and Flow ratio variables

Unit II: Theory of Consumer Demand   **6 hours**
Ordinal Approach (Indifference Curve Analysis), Consumer equilibrium, price, income and ubstitution effect, Price elasticity of demand and its determinants; Income and Cross elasticity of demand; Price and cross elasticity of supply, Economics of Speculation

Unit III: Analysis of Cost and Revenue   **5 hours**
Nature and types of cost curves (traditional as well as modem), relationship among total, average and marginal cost curves, Nature and types of revenue curves, relationship among total, average and marginal revenue curves

Unit IV: Theory of Production   **4 hours**
Producer's equilibrium in long run (In terms of minimization of cost and maximization of output), Cobb-Douglas Production Function

Unit V: Product Pricing   **6 hours**
Concept of market equilibrium, concept of firm's equilibrium, tax and subsidy upon market equilibrium and price, Linear programming and Cost Benefit method.

Unit VI: Factor pricing   **3 hours**
Modem theory of factor pricing (Demand and Supply Theory)

Unit V
II: National Income   **2 hours**
Methods and difficulties of measurement

Unit VIII: Theories of Employment   **2 hours**
Principle of Effective demand

Unit IX: Consumption, Saving and Investment Functions   **4 hours**

Propensity to consume and multiplier, Propensity to save and Paradox of thrift, investment, marginal efficiency of capital and accelerator

Unit X: Business Cycle   **2 hours**

Meaning, types, causes, effects and remedies

Unit XI: The Mechanism of Foreign Exchange   **3 hours**

The determination of the rate of foreign exchange, The adjustable 'Peg' system, Fixed exchange rates and floating exchange rates

Unit XII: Macro Stabilizing Policies   **2 hours**

Fiscal policy Monetary Policy

Unit XIII: Economics of Development   **6 hours**

Meaning, challenges and prospects in Nepal, Global Economy, Concepts of Liberalization, Privatization and Globalization, Regional Trade Agreements in South Asia, SAARC, BIMSTEC, SAPTA and SAFTA j, Multinational Companies FDI in Nepal, WTO

Text Books:
1. Mankiew, N.G.: *Principles of Microeconomics*, Harcourt Brace College Publishers
2. Sampat Mukhcrjee: *Modem Economic Theory*; W'ishwa Prakashan, (A Division of Wiley Eastern Ltd.), New Delhi.
3. Mankiew, N.G.: *Macroeconomics*, New York: Worth Publisher

References:
1. D.N. Dwivedi: *Microeconomics Theory anti Applications, Pearson.*
2. Dominick Salvatore: *Theory and Problems of Microeconomics*, Schaum's outlines cries McGraw hill Inc, Singapore.

MGT 322 Organization Management (3-0-0)
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:
This course enables the students to achieve the management skills at professional level and to achieve the goal of organization through it with the help of use of technology.

Course Contents:

Unit I: Introduction   **8 hours**
Concept of management, Functions of management, Levels of management, Scope and, application of management, Concept of organization, Characteristics of organizations, Culture of organization, Formal and informal organizations, Organization chart, Types of organization-line and staff, Functional and matrix, Authority and responsibility and their interrelationships, Relationship between organization and management

Unit II: Motivation   **8 hours**
Concept of motivation, Need of motivation, Financial and non financial motivation, Theories of motivation: Maslow Need hierarchy; Alderfer's ERG theory, McClelland's theory of learned needs, McGregor theory X and Y Contemporary issues of motivation in Nepalese organization and Application of case

Unit III: Leadership   **9 hours**
Concept of leadership, Need and importance of leadership, Qualities of effective leadership, Theory of leadership: trait theory, behavioral theory, transactional theory, transformational theory, charismatic theory, Leadership styles: Participative management. Management by objectives, management by exception. Contemporary issue of leadership in Nepali organizations Application of case

Unit IV: Introduction to Industrial Relations   **9 hours**
Meaning and nature of Industrial Relations, Objective of IR, Concept of grievance, Causes and settlement of grievances, Grievance settlement process in Nepal, Trade union, Collective, bargaining, Trade union movement in Nepal, Employee discipline, Causes and settlement of disciplinary problem, Employee health and safety, Challenges of industrial relations in Nepal Application of case

Unit V: Contemporary issues in organizational management   **14 hours**
- Human Resource Management:- Meaning and function of HR, Job Analysis and Job Description, Recruitment and Promotion, Performance Appraisal, Compensation management Training and development, Role of HR professional in changing Environment - Globalization:- Introduction to Globalization, Globalization and its effects to management and leadership - Corporate Social Responsibility:- Ethical Issue, Issues on Employment Practices, Human Rights, Environmental Regulations, Corruption Conflict Management:- Conflicts and its sources, Issues on settling conflicts, Negotiation and Facilitation, Mediation, Arbitration, Legal Action

References:
1. Harold Koontz and Heinz Weihrich: Essentials of Management
2. Goodinda Ram Agrawal: Organization and Management in Nepal.
3. C.B. Mamoria: Personnel Management

4. Fred Luthan: Organizational Behavior, McGraw Hill

MTH 320 Fundamentals of Probability and Statistics (3-0-0)

Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

This course aims to provide students with a thorough understanding of descriptive and inferential statistical tools used in decision making.

Course Contents:

Unit I: Introduction   **3 hours**

Statistics and data, quantitative and categorical variables, fundamental elements of a statistical analysis

Unit II: Data collection   **4 hours**

Sources of data, Experimental research, survey research, Questionnaire, Data preparation - editing, coding, and transcribing

Unit III: Tables and Charts   **4 hours**

Steam-and-leaf display, Frequency distribution, Relative frequency distribution, Cumulative, polygon and Time-plots

Unit IV: Summarizing and Describing Numerical Data   **5 hours**

Measure of central tendency: mean, median, mode and mid-hinge, Measures of variation: range, inter quartile range, standard deviations, and coefficient of variations. Shape five-number summary and box-and-whisker plot

Unit V: Probability   **5 hours**

Basic concepts, Counting rules, Objective and subjective probability, Marginal and joint probability Addition rule, Conditional probability, Multiplication rules, Bays' Theorem

Unit VI: Discrete Probability Distribution   **5 hours**

Random variables, Mean and standard deviation of discrete random variables, Mathematical, expectation, Binomial distribution, Poisson distribution

Unit VII: Continuous Probability Parameters   **5 hours**

Normal distribution and its applications, Assessing normality, Normal approximation of binomial and Poisson distribution

Unit VIII: Estimation of Population Parameters   **5 hours**

Law of large numbers, Central limit theorem, Statistical confidence, Confidence intervals Confidence for means and populations

Unit IX: Hypothesis Testing   **6 hours**

Testing of significance, P-value approach to hypothesis testing, Connection between confidence intervals and hypothesis testing, Comparing two means (two sample z and t- test procedures) Comparing two proportions

Unit X; Correlation and Regression Analysis   **6 hours**

Correlation Coefficient, Properties, Simple Linear Regression Model, Residual Analysis, Coefficient of Determination, Standard Error

Text Books:

Levin, Richard I. And David S. Rubin: *Statistics for Management*, Prentice-Hall of India

CMP 402 Web Technologies II (3-0-3)
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:
The student would be able
1. To expose the students with client and server side web programming.
2. To know flexible but powerful languages for developing dynamic web pages.
3. To get practical knowledge of server side scripting languages like Servlet, JSP andPHP.
4. To help the students to understand the concept of HTML. Servlet. JSP and PHP

Unit I: Web Essentials: Clients, Servers, and Communication   **4 hours**

Review of Web Technologies I, Basic internet protocols, HTTP request message, HTTP response message, web liens, web servers, Different architectures of connection, Client side Vs server side scripting language

Unit II: Web-based scripting using PHP   **12 hours**

Introduction to PHP: Installation of Web Server, PHP Server Configurations; PHP My Admin, Writing simple PHP, program, Arrays, Control statements, loops. User defined functions (with argument and return values), global variable, URL encoding, HTML Encoding **PHP and Database connectivity:** Need for database, php supported database. Introduction to My SQL, CRUD - select statements, creating databasc/tables, inserting values, updating and deleting **File handling in PHP:** Reading and writing from and to FILE, file system and directory functions **More features of PHP:** Working with cookies and sessions, Sending email in php

Unit III: Java for Server Side Programming   **12 hours**

Java Servlets: Servlet architecture, servlet lifecycle, parameter data, session, cookies, url rewriting,data storage **JSP technology:** Introduction to JSP, JSP and servlet, Database Access, Database Programming usingJDBC Studying Javax.sql.* package. Accessing a Database from a JSP Page

Unit IV: Web-based frameworks   **6 hours**

Content'Management Systems, Web-programming frameworks,   Introduction to general web programming frameworks, Java frameworks, PHP frame work

Unit V: Web Services   **4 hours**

introduction to web sendees and service-oriented architecture, **SOAP:** SOAP elements. RPC representation, SOAP encoding of struct data, WSDL, Concept of UDD, RESTful web services

Unit VI: Security in web applications   **7 hours**

Web application security fundamentals: Foundations of security, threats, vulnerabilities, attacks, security principles, **Threats and countermeasures:** Anatomy of attack, network threats and countermeasures, host threats and countermeasures, application threats and countermeasures,

configuration managements, **Design guidelines for secure web applications:** Architecture and design issues for web applications, deployment considerations, input validations, authentication, authorization, configuration management, sensitive data, session management, cryptography, parameter manipulation, exception management, auditing and logging

List of Practical:
- Demonstrate use of variables, operators, conditional statements and loopingconstructs.
- Demonstrate use of array,
- Design a web page with controls like text box, radio button, check box, combo box etc, and check field data and their validity.
- Demonstrate reading and writing to a text file.
- Design a web page which will help user to send an enquiry to site admin email account. (Hint: take users email id, subject, and body in suitable controls and abutton).
- Design a web page to develop applications using back-end tools

Text Books:
1. Jeffry C. Jackson-*Web Technologies*: A *computer Science Perspective, Pearson*
2. Steve Suehring, Tim Converse and Joyce park -*PHP 6 and Mysq1*

References:
1. B M Harwani -*Developing Web Applications in PHP* and AJAX, McGraw Hill
2. Mark Curphey, Joel Scambray, Erik Olson and Michel Howard-Improving *Web Application Security Threats and Countermeasures, Microsoft*
3. N.P. Gopalan, J Aklandeswari-*Web Technology*: A Developer's Perpective, PHI
4. Uttam K. Roy- *Web Technologies*, Oxford University Press
5. Kognet Learning Solution- *Web Technologies Black Book*, Dream tech publication

CMP 336 Data Communication and Computer Network
Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:
1. This course aims to provide the-study of computer systems, computercommunicationsand computer networks.
2. The Course includes different kinds of networking topologies and their structure and
3. This course also covers the telephone system, electronic email, data flows,networkingprotocols, and organization around ISO-OS1 seven-layer architecture, with review ofeach layer.

Course Contents:

Unit I: Background Study and revision   **3 hours**
Introduction and necessity of computer networking, Networks goals/ motivation, Networks protocols, and networking model. Application and use of networks

Unit II: Bata transmission   **3 hours**
Transmission terminology (Simplex, Duplex, Half Duplex), Bandwidth and frequency, Serial and parallel communication, Analog and digital transmission, Transmission impairments (attenuation and delay distortion, concept of delay, noise), Asynchronous and synchronous transmission

Unit III: Multiplexing and Switching   **4 hours**
Multiplexing (Frequency division multiplexing, synchronous time division multiplexing, time division multiplexing), Modems, modulation and its types (pulse, amplitude, frequency and phase), Switching and its types

Unit IV: Reference Model   **5 hours**
Protocol Layers: Introduction, layered architecture, The Internet protocol stack, 3 network entities and layers, OSI reference Model

Unit V: Physical layers and its design issues   **3 hours**
Bounded transmission media (Twisted-Pair Cable, Co-axial: Base-band cable, Broad band cable, fiber Optical), Unbounded transmission media (micro wave, satellite, 3 Introduction of ISDN and PSTN

Unit VI: Data Link Layer   **7 hours**
Framing, Basics of error detection and correction, Cyclic redundancy Check code for error detection. Flow control, Retransmission strategies (stop-&-wait ARQ, GO-Back-NARQ, Selective Repeat ARQ, and Pipelining), Sliding window protocols.

Unit VII: TCP/IP Reference Model   **9 hours**

Introduction of TCP/IP Model, IPV4 frame Format, IP Addresses and class, Subnet class, Subnet calculation masking, Introduction of IPV6, Internet multicasting, mobile IP, Comparison with OSI Reference Model

Unit VIII: Network layer and Internet Layer   **6 hours**
Network layer and design Issues, virtual Circuit and Data grams, Introduction of Routing: (Shortest Path Routing Algorithm. Flow Based Routing Algorithm Distance Vector Routing Algorithm), Congestion Control and Leaky Bucket Algorithms

Unit IX: Network Servers   **5 hours**
Servers (HTTP, DHCP, SMTP, DNS, PROXY, FTP), Examples of client and servers tools

Unit X: VPN and Network security   **3 hours**
VPN (Virtual private Networks), Cryptography (symmetric key algorithms, public key algorithm), Communication security- and web security

Laboratory Work
List of Practical:
- LAN cabling
- Networks utilities (telnet, netstat, ipconfig, ping, arp, tracert, netview)
- Computer Networking on Windows Based Platform
- Installation and Configuration of Different Types of servers'
  a. DHCP Server   b. DNS server   c. Webserver   d. Print Server
- Networking with Unix
- Network Security and Policies

Text Books:
1. Neil Jenkins and Stan Schatt: Understanding Local Area Networks, PHl
2. Andrew S. Tanenbaum: Computer Networks. PHI

PRJ 351 Project III

Course Objectives:

The goal of die project work is to provide the students an opportunity to experience the demands and solving real-world problems. During the course, students have to design and complete a Functional project which should require integration of various course concepts based on any ofthe computer core areas covered in the syllabus or from the management areas subject to the approval of Project Committee. Students will develop various skills related to project management like team work, resource management, documentation and time management todevelop effective and efficient software.

Project work need to be conducted based on following guidelines:

Unit I: Group formation (Not exceeding 4 persons per group)

Unit II: Proposal Defense

The first stage is worth 10% of the grade and the grading shall be based on the following: Specification (Define the Problem), Project plan (Draw up a project plan identifying the different components) The overall budget

Unit III: Development Stage (Work performed)

The second stage is worth 50% of the overall grade which is evaluated as follows: System design (if applicable), Thoroughness of the work done, Familiarity with other work in the field, Ability to critically evaluate work of others, Understanding of methods used in the project, Amount of work performed, Significance of the work performed, Level of achievement with respect to the degree of difficulty, Correctness, Ability to identity problem areas and suggest appropriate solutions, Ability to work with others, Project management skills

Unit IV: Reporting Stage

a. Documentation (20%)

This criterion evaluates the final document presented. This includes the final project reportincluding journals of the student's experiences during the project, the programmer's manual,the user's manual, the source code listings, and data used for program verification, validation and output. It consists of 20% of the total marks. In particular, the following points are evaluated: Report organization (systematic and logical), Text formatting style (clarity and conciseness), Completeness of the repot Readability of manuals, Readability of programs, Organization and analysis of data and output

b. Presentation 20%

At the end of the semester the students will have to give a presentation.. The students must present their work in the presence of external examiners (all students must attend all presentations). This criterion evaluates the ability of student in presenting his/her work to other people. It consists of 20% of the total marks. In particular, the following points are evaluated: Organization and smartness of appearance of presenters, Delivery, Clarity, Content, Ability to answer questions, Demonstration of the system, Application of audio-visual aids

CMP 404 Mobile Application Development Technology (3-0-2)

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	100	-	100

Evaluation:
Objectives:
1. *To provide students with the knowledge of recent trends in mobile application development.*
2. *To give the overview of existing mobile operating systems and the development SDKs required to develop applications based on them.*
3. *To teach students the basics of application development with reference to Android environment.*

Course Contents:

Unit I: Introduction to Mobile OSes   **7 hours**

Introduction to Mobile OSes: Android, iOS, Ubuntu, Touch, Blackberry, Tizen. Firefox OS, Symbian. Windows Phone, Build and Structures of Mobile OSes, Introduction to development environment (Native v/s HTML5), Introduction to Android, API levels/versions of Android, Pros and Cons of Android - Comparison of Android with other Mobile OSes, Introduction to Android VM and Runtime (Dalvik and ART), Installation and configuration of Android SDKs and Eclipse IDE - Their integration using ADT Plugin - Running an emulator, Using ADB command line interface

Unit II: Java Architecture and OOPS   **7 hours**

Java Classes and Objects, Class Methods and Instances, Inheritance and Polymorphism in Java, Interface and Abstract Class

Unit III: Android Classes an Basics   **9 hours**

Android Fundamentals, Creating an Android App, Android Manifests File, The Activity Class, Activity Lifecycle, Extending the activity class, Creating Default Activity, Creating Splash and Login Activities, The Intent Class, Creating Intent, Switching between Activities, using Intent, Permissions, Allow APP permissions in Android Manifest, The Fragment Class and Its usage

Unit IV: Android User Interface   **8 hours**

Introduction to Multiple Screen Size and Orientation Interfaces, User Interface Classes, Android XML Layouts. Resources and Style, Android 3rd party UI/UX Libraries

Unit V: Advanced Topies   **6 Hours**

User Notifications, The Broadcast Receiver class, Threads, Async Task and Handlers, Alarms, Networking

Unit VI: Graphics and Multimedia   **6 hours**

Graphics and Animations, Multitouch and Gestures, Multimedia

Unit VII: Packaging and Monetizing   **8 hours**

Data Management (using sqlite database, local storage), The Content Provider Class, The Service Class, Google Mobile Ads SDK, Signing and Exporting an APP, Publishing your app to the play Store

Laboratory: The laboratory classes should be based on the topics covered in the lecture classes that should give the students a hands-on training and familiarize them the development environment. The Laboratory works should enable students to setup and run their own development environment and provide them with the base for their application development and publishing. It should also focus on publishing the application to the App Store and also monetize the app using one of the advertising networks provided by the SDK.

Text Books:
1. ZigurdMednieks, Liard Dornin, G. Blake Meike, Mausami Nakamura "*Programming Android: Java Programming for the New Generation of Mobile Devices*", 2nd Edition, O' Reilly 2012
2. Reto Meier, "*Professional Android Application Development*:,Weily Publishing Inc, 2009, ISBN: 978-0-470-34471-2

Reference Book:
1. Barry Burd, *Android Application Development* All-in-One For Dummies, John Wiley & Sons, INc 2012

MGT 421 Management Information System

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	100	-	100

Objectives:
1. *To provide the basic knowledge of information and it application*
2. *To provide the conceptual knowledge of information system specially the use of MIS*
3. *To provide application of KDD for knowledge generation*
4. *To provide the concept of the knowledge management with the use of ICT.*

Course Description:
This course covers the all of today's leading edge technologies explaining their relationship to organization and management and emphasize, how managers can and should be involved with system planning, development, and implementation. The course also present several electronic commerce projects to provide students through a deep exploration of Internet-based electronic commerce functions such as ordering products, making travel arrangements, finding investment support unities.

Course Contents:
Unit I: Information and System Concept   6 hours
Data and Information, Introduction, Difference between data and Information, Types of Information Component/Dimension of Information, Quality, Cost and value of Information, Organization Dimension of Information (Information Flow and granularity), System: System Concepts with general model, Elements of a system, Types of System, Subsystem, Feedback Control, Systems approach to organization, Application of System Concepts, Mini cases related to Feedback Control

Unit II: Information System   2 hours
Introduction of IS, Components of I formation System, Types of Information System (Office Information System, Transaction Processing System, Management Information System, Decision Support System, Integrated Information System etc.)

Unit III: Management Information System   4 hours
Definitions, Historical Development of MIS, Characteristics of MIS, Components of MIS, Advantages and Disadvantages of MIS, Role of MIS, Importance of MIS for Managers, Simple Case study

Unit IV: Strategic and Competitive Opportunities   4 hours
Introduction, Organizational Horse Power (OHP), The Strategies for Increasing OHP, Selecting and Adopting Organizational Horsepower Strategies, Simple Case Study

Unit V: Data warehouse and Data Mining   9 hours
Preview of Introduction to data, information, field, record, table, file, database, data repository and data warehouse, Database Management system, Types of data, Objectives of Data base approach, Data base system and Hierarchy. Knowledge discovery in database (KDD), KDD process, Need for a data warehouse, Building a data warehouse, Data warehousing Terminologies, OLTP and OLAP with differential table, Data Mart, Metadata, Drill-down and Roll-up Analysis, ROLAP and MOLAP

Star and Snowflake Schemas, Data Mining, Classification of Data Mining Algorithm, Data Mining Techniques, Implementation of Data warehouse and Data Mining (Lab.)

Unit VI: Decision support system and Artificial Intelligence   **9 hours**

Concept of Decision support System (DSS), Components of DSS, Phases of Decision Making Process, Types of DSS, Group Decision Support System (GDSS), Phases of GDSS process Components of GDSS, Geographical Information System, Artificial Intelligence and types Expert System, Components of Expert System, Neural Networks, Genetic Algorithms, Intelligent Agent, Combining IT Brainpower System, Executive Information and Support Systems, Enterprise & Executive Information System Concept and Definition, Information needs of Executives, Characteristics and, benefits of EIS, Comparing and Integrating EIS and DSS, Case study

Unit VII: Managing IT System   **3 hours**

Managing Information, Managing Information Technology, Managing Knowledge

Unit VIII: Knowledge Management   **3 hours**

Introduction, Managing Knowledge and Knowledge worker, Knowledge Management in E-business

Unit IX: Legal and Ethical Issues   **2 hours**

Ethical and Social Issues, Ethics and Moral Dimension Management Challenges, Implementation of Information system, Change Management, Critical Success factors Advanced balanced Scored

- Advanced Strategic foundations development
- Advanced objective & strategy map development
- Advanced performance management
- Implementation & Visualization
- Strategic initiative prioritization & management
- Advanced scorecard alignment and Cascading

Unit X: Future Trends in MIS   **3 hours**

Trend and information, Intellectual Computing (Speech Recognition, decision, making), Technology and mobility, Technology Challenges

Lab: Implementation of Data warehouse and Data Mining

- Developing SQL Server Data warehouse from foodmart.mdb using DTS package
- Implement the ETL process and create the OLAP cubes. And also retrieve the data from the OLAP cubes using MDX Sample Application.
- Implement K-nearest neighbor technique to demonstrate prediction and analysis under XL Miner/SPSS.
- Implement Decision Tree algorithm to demonstrate the concept of classification using XL Miner/SPSS.

Reference Books

1. *Management Information Systems* by Stephen Haag, M Cummings, A Phillips, Tata McGraw Hill P. L., 6th Edition
2. *Management Information Systems* by P.T. Joseph, Sanjay Mohapatra, PHI,
3. *Management Information Systems* by Indrajit Chatterjee, PHI,
4. *Management Information Systems* by C.S.V. Murthy, Himalayan Publishing House
Information Technology for *Management* by Efraim Turban, Linda Volonino, 7th Edi