ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY
Guwahati

Course Structure and Syllabus

(From Academic Session 2018-19 onwards)

B.TECH

ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

6th SEMESTER

ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY
Guwahati
Course Structure

(From Academic Session 2018-19 onwards)

B.Tech 6th Semester: Electronics and Communication/Telecommunication Engineering

Semester VI/ B.TECH/ECE/ETE

Sl. No.	Sub-Code	Subject	Hours per Week			Credit	Marks	
			L	T	P	C	CE	ESE
Theory								
1	ECE181601	Digital Signal Processing	3	0	0	3	30	70
2	ECE181602	Advanced Programming	3	0	0	3	30	70
3	ECE181603	Electromagnetic Waves	3	0	0	3	30	70
4	ECE1816OE1*	Open Elective- 1	3	0	0	3	30	70
5	ECE1816PE1*	Program Elective-1	3	0	0	3	30	70
6	HS181606	Accountancy	2	0	0	2	30	70
Practical								
1	ECE181612	Advanced Programming Lab	0	0	2	1	15	35
2	ECE181617	General Viva-II	0	0	2	1	-	50
3	ECE181618	General Aptitude, Proficiency and Behavioural Remodelling-II	0	0	2	1	-	50
4	ECE181621	Mini Project	0	0	4	2	50	100
TOTAL			**17**	**0**	**10**	**22**	**245**	**655**
Total Contact Hours per week: 27								
Total Credits: 22								

N.B. 4-6 weeks Mandatory Industry Internship need to be done in the 6th semester break and the report is to be submitted and evaluated in 7th semester

OPEN ELECTIVE–1 SUBJECTS		
Sl. No	**Subject Code**	**Subject**
1	ECE1816OE11	Advanced Microcontrollers
2	ECE1816OE1*	Any other subject offered from time to time with the approval of the University

PROGRAM ELECTIVE–1 SUBJECTS		
Sl. No	**Subject Code**	**Subject**
1	ECE1816PE11	Digital System Design using Verilog
2	ECE1816PE12	Optical Fiber Communication
3	ECE1816PE13	Integrated Circuit Technology
4	ECE1816PE1*	Any other subject offered from time to time with the approval of the University

Detailed Syllabus:

Course Code	Course Title	Hours per week L-T-P	Credit C
ECE181601	**Digital Signal Processing**	**3-0-0**	**3**

Course Outcome: At the end of this course students will be able to

CO1: Represent signals mathematically in continuous and discrete time and frequency domain.

CO2: Apply z-transform for the analysis of signals and LSI systems.

CO3: Deduce filter structures.

CO4: Apply Fast Fourier transform techniques to derive discrete Fourier transformation of signals and systems.

CO5: Design of different types of digital filters for various applications

CO6: Explain quantization errors and their effects on performance of digital signal processing applications and estimate spectral density of random signals.

MODULE 1: Introduction (8 Lectures)

What is DSP, block diagram of DSP System, its application and advantages

An overview of Discrete time signals: Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of signals

An Overview of Discrete time Systems: Definition, representation, impulse response, derivation of the output sequence, linear convolution, graphical and analytical method, stability and causality condition, recursive and non-recursive systems, FIR and IIR systems. Linear Time Invariant (LTI) systems characterized by constant coefficient difference equations. Inverse System

MODULE 2: Analysis of LSI systems using Z Transform (5 Lectures)

Transfer function of LSI discrete time system, convolution and deconvolution using z transform, causality and stability of LSI discrete time system

MODULE 3: Realization of Digital Systems (6 Lectures)

Recursive and non-recursive structures. Block diagram and signal flow graphs. Cascade and parallel realizations

MODULE 4: Discrete Fourier Transforms (7 Lectures)

Discrete Fourier transform (DFT) and properties. Linear and Circular convolution. Computation of DFT. Fast Fourier Transforms (FFT) - basic D-I-T and D-I-F algorithms Computational efficiency considerations

MODULE 5: Design of Digital Filters (8 Lectures)

IIR Filter Design: Design of Lowpass, Bandpass, Bandstop and High pass filter using Butterworth, Chebyshev and Elliptic Approximation, impulse invariance method and bilinear transformation method

FIR filters Design: Window method, Park-McClellan's method

MODULE 6: Finite Word Length Effects (2 Lectures)

Effect of finite register length in FIR filter design, Quantization errors and their effects on performance of digital signal processor

MODULE 7: Power Spectral Approximation **(2 Lectures)**

Parametric and non-parametric spectral estimation

MODULE 8: Multi-Rate Signal Processing **(2 Lectures)**

Introduction to multi-rate signal processing

Textbooks/Reference Books:

1. S. K. Mitra, "Digital Signal Processing: A computer based approach", McGraw Hill, 2011.
2. A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
3. J. G. Proakis and D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms And Applications", Prentice Hall, 1997.
4. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall, 1992.
5. J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.
6. D. J. DeFatta, J. G. Lucas andW. S. Hodgkiss, "Digital Signal Processing", John Wiley & Sons, 1988.
7. ANagoorkani, "Digital Signal Processing", McGraw Hill Education (India) Pvt. Ltd (2e)
8. J.G.Proakis, D.G. Manolakis and D. Sharma, "Digital Signal Processing: Principles, Algorithm and Application", Pearson
9. P.Ramesh Babu, "Digital Signal Processing", Scitech

Course Code	Course Title	Hours per week L-T-P	Credit C
ECE181602	**Advanced Programming**	**3-0-0**	**3**

Course Outcome: At the end of this course students will demonstrate the ability to

CO1: Develop programs using variable, operators, condition, loop, string, list, tuple, dictionaries.

CO2: Design user defined functions; develop programs by importing modules; use external files; solve exceptions.

CO3: Apply Object Oriented concepts while writing programs; design regular expressions.

CO4: Apply multiple execution concepts and develop programs.

CO5: Apply networking concepts and design programs using sockets; describe database programming, CGI programming, GUI programming

MODULE 1: Introduction (6 Lectures)

History, Concept of OOP, Features, environment setup, Basic syntax, variable and data types, operators. Control Statements: If, If-else, Nested If-else, Loop: for, while, nested loops, break, continue, pass String Operations: Accessing strings, basic operations, string functions

List: Accessing List, operations, Functions

Tuple: Accessing tuples, operations, Functions

Dictionaries: Accessing dictionaries, working with dictionaries, properties, functions

MODULE 2: Functions (7 Lectures)

Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables

Modules: Importing module, Math module, Random module, Packages, Composition

Input-Output: Opening and closing file, Reading and writing files

Exception Handling: Exception Definition, Exception Handling, Except clause, Try, finally clause, User Defined Exceptions

MODULE 3: OOPs Concepts (10 Lectures)

Class and objects, Attributes, Inheritance, Overloading, Overriding, Data hiding

Regular Expressions: Match function, Search function, Matching VS Searching, Modifiers, Patterns

MODULE 4: Multi-Threading (7 Lectures)

Thread, starting a thread, threading module, Synchronizing threads, Multi-threaded Priority Queue, multiprocessing module

MODULE 5: Networking (10 Lectures)

Socket, Socket Module, Methods, Client and server, Internet modules

Basic introduction to Database programming, Basic introduction to CGI programming

Basic introduction to GUI programming

Textbooks/Reference Books:

1. Python The Complete Reference Matin C Brown , TMH
2. Core Python Programming, Dr. R. NageswaraRao, Dreamtech Press.
3. Python How to Program, DEITEL, Pearson

Course Code	Course Title	Hours per week L-T-P	Credit C
ECE181603	**Electromagnetic Waves**	**3-0-0**	**3**

Course Outcomes: At the end of this course students will be able to

CO1: Use vector calculus for the analysis of static electric field, magnetic field and electromagnetic field

CO2: Analyse transmission lines and estimate voltage and current at any point on transmission line for different load conditions

CO3: Characterize uniform plane wave

CO4: Calculate reflection and transmission of waves at media interface

CO5: Visualize TE and TM mode patterns of field distributions in a rectangular wave-guide

MODULE 1: Review of Electromagnetic Field (12 Lectures)

Vector Calculus: Gradient, Divergence, Curl, Laplacian and Divergence theorem, Stokes theorem.
Electromagnetic field: Basic quantities of Electromagnetics, Basic laws of Electromagnetics: Gauss's law, Ampere's Circuital law, Faraday's law of Electromagnetic induction. Maxwell's equations, Surface charge and surface current, Boundary conditions at media interface

MODULE 2: Transmission Lines (7 Lectures)

Introduction, Concept of distributed elements, Equations of voltage and current, Standing waves and impedance transformation, Lossless and low-loss transmission lines, Power transfer on a transmission line, Analysis of transmission line in terms of admittances, Transmission line calculations with the help of Smith chart, Applications of transmission line, Impedance matching using transmission lines

MODULE 3: Uniform Plane Wave (7 Lectures)

Homogeneous unbound medium, Wave equation for time harmonic fields, Solution of the wave equation, Uniform plane wave, Wave polarization, Wave propagation in conducting medium, Phase velocity of a wave, Power flow and Poynting vector

MODULE 4: Plane Waves at Media Interface (8 Lectures)

Plane wave in arbitrary direction, Plane wave at dielectric interface, Reflection and refraction of waves at dielectric interface, Total internal reflection, Wave polarization at media interface, Brewster angle, Fields and power flow at media interface, Lossy media interface, Reflection from conducting boundary

MODULE 5: Waveguides (7 Lectures)

Parallel plane waveguide: Transverse Electric (TE) mode, transverse Magnetic(TM) mode, Cut-off frequency, Phase velocity and dispersion. Transverse Electromagnetic (TEM) mode, Analysis of waveguide-general approach, Rectangular waveguides

Textbooks/Reference Books:

1 John D. Krauss, Electromagnetics, McGraw Hill
2. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005
3. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India
4. NarayanaRao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997., David Cheng, Electromagnetics, Prentice Hall

Course Code	Course Title	Hours per week L-T-P	Credit
ECE1816OE11	Advanced Microcontrollers	3-0-0	3

Course Outcome: At the end of the course, the students will be able to:

CO1: Explain the working of basic microcontroller systems

CO2: Write program using 8051

CO3: Make use of theoretical knowledge to interface different peripheral devices with 8051 microcontroller

CO4: Develop understanding of the architecture of PIC series microcontrollers and ARM microcontrollers and write program using PIC and ARM

CO5: Develop understanding of Real time operating System and design and analyse embedded systems

MODULE 1: Introduction to Embedded System (2 Lectures)

Definition of Embedded System, Embedded System Vs General Computing Systems, Classification. Major application areas. Purposes/ specific features, Recent Trends

MODULE 2: Designing Embedded System With 8 Bit Microcontroller Intel's Mcs-51 Series (6 Lectures)

Factors to be considered in selecting a controller,
Intel 8051 Architecture. Memory Organisation

MODULE 3: 8051 Instruction Set and Programming (6 Lectures)

Different addressing modes supported by 8051, 8051 Instruction Set and Programming

MODULE 4: Hardware Features Of 8051 (10 Lectures)

8051 timers, 8051 interrupts, 8051 serial ports, 8051 interface examples

MODULE 5: Overview of Advanced Microcontrollers (10 Lectures)

Introduction to PIC16F877 microcontoller, Architecture, Memory Organisation, Instruction set and programming
Introduction to ARM processor. Architecture, Instruction set and programming

MODULE 6: Real Time Operating System (3 Lectures)

Operating system basics, types of operating system, tasks, process and threads. Multi-Processing and Multi-tasking

MODULE 7: Embedded System Design (3 Lectures)

Process of Embedded System Development, Different models overview - waterfall model, Iterative model, Prototype model, Spiral model Testing of Embedded systems
Embedded product development life cycle EDLC and its importance

Textbooks/Reference Books:

1. The 8051 Microcontroller – Architecture, Programming and Applications – Kenneth J. Ayala
2. The 8051 MICROCONTROLLER and EMBEDDED SYSTEMS- Manish K. Patel
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C , M.Mazidi, J MAzidi, R. Mckinlay
4. Shibu, Introduction to to Embedded Systems, K V Mc Graw Hill Education
5. Raj Kamal, Embedded systems. Architecture, programming and design, Tata McGraw Hill
6. K K Prasad , Embedded Real Time Systems Concept, Design and Programming.
7. An Embedded software Primer - David E. Simon: Pearson Education, 1999
8. Jonathan W Valvano, Embedded Microcomputer systems, Real time interfacing, Thomson Brooks/col 2002.
9. Raj Kamal, Microcontrollers architecture, programming, interfacing and system design, pearson education

Course Code	Course Title	Hours per week L-T-P	Credit C
ECE1816PE11	**Digital System Design using Verilog**	**3-0-0**	**3**

Course Outcome: At the end of this course students will be able to
CO1: develop the basic concepts of verilog HDL
CO2: model digital systems in verilog HDL at different levels of abstraction
CO3: analyse the simulation techniques and test bench creation.
CO4: discuss the design flow from simulation to synthesizable version

MODULE 1: Introduction to Verilog HDL (8 Lectures)
Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools

Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators

MODULE 2: (8 Lectures)
Gate Level Modeling: Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Design of Flip-flops with Gate Primitives, Delays, Strengths and Construction Resolution, Net Types, Design of Basic Circuits

Modeling at Dataflow Level: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vectors, Operators

MODULE 3: (8 Lectures)
Behavioral Modeling: Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, Always Construct, Assignments with Delays, Wait construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non-Blocking Assignments, The case statement, Simulation
Flow i*f* and i*f*-else constructs, Assign-De-Assign construct, Repeat construct, for loop, the Disable construct, While loop, Forever loop, Parallel Blocks, Force-Release construct, Event

MODULE 4: (8 Lectures)
Switch Level Modeling: Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets, Exercises

System Tasks, Functions and Compiler Directives: Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives

MODULE 5: (8 Lectures)
Sequential Circuit Description: Sequential Models – Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional Register, Static Machine Coding, Sequential Synthesis

Components Test and Verification: Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification

Textbooks/Reference Books:

1. Verilog HDL: A Guide to Digital Design and Synthesis, S. Palnitkar,"Prentice Hall NJ, USA),1996
2. Fundamentals of Digital Logic with Verilog Design, Stephen Brown and Zvonko Vranesic, “McGraw Hill”
3. Advanced Digital Design with the Verilog HDL, Michael D. Ciletti, Prentice Hall India, 2005
4. VHDL: Analysis and Modeling of Digital Systems, Z. Navabi, McGraw Hill International Ed. 1998
5. VHDL Primer, J.Bhaskar, Pearson Education Asia,2001

Course Code	Course Title	Hours per week L-T-P	Credit C
CSE1816OE11	**Software Engineering**	**3-0-0**	**3**

MODULE 1:

Software Process – Introduction – S/W Engineering Paradigm – life cycle models (waterfall, incremental, spiral, WINWIN spiral, evolutionary, prototyping) – system engineering – computer based system – life cycle process – development process

MODULE 2:

Software Requirements – Functional & non-functional – user-system requirement engineering process – feasibility studies – elicitation – validation & management – software prototyping – S/W documentation – Analysis and modeling

MODULE 3 :

Design Concepts and Principles – modular design – design heuristic – S/W architecture – data design – architectural design – transform & transaction mapping – Introduction to SCM process – Software Configuration Items, Abstraction Architecture, pattern modularity, information hiding, design classes, refactoring etc., Design of web application, architectural design, component level design, user interface design

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MODULE 4:

Software Testing and Quality Management – Taxonomy of S/W testing – levels - black box testing – testing boundary conditions – structural testing –– regression testing– S/W testing strategies – unit testing – integration testing – validation testing – system testing and debugging, Quality concepts, quality assurance, software reviews, statistical quality assurance.

MODULE 5 :

Software Project Management - S/W cost estimation – Function point models – COCOMO model – Delphi method – S/W challenges – S/W maintenance.

Textbooks/Reference Books:

1. R. S. Pressman, Software Engineering - A practitioners approach, III Edition, McGraw Hill International editions, 1992
2. Ian Sommerville, Software Engineering, Pearson Education Asia, VI Edition, 2000
3. PankajJalote, An Integrated Approach to software Engineering, Springer Verlag, 1997
4. James F. Peters and WitoldPedryez, Software Engineering – An Engineering Approach, John Wiley and Sons, New Delhi

Course Code	Course Title	Hours per week L-T-P	Credit C
ECE1816PE12	**Optical Fiber Communication**	**3-0-0**	**3**

Course Outcome: At the end of this course students will be able to

CO1: Explain concepts of fiber optics communication system and characterize the different components used in it

CO2: Analyse transmission characteristic of Optical fiber cable

CO3: Analyse various optical sources, detectors and receivers in terms of their parameters

CO4: Design optical network using various design parameters and sensors

MODULE 1: Introduction **(6 Lectures)**

Introduction to optical communication system- block diagram, individual components & advantages. Introduction to optical fiber-Ray theory transmission, Total internal reflection, Acceptance angle, Numerical aperture, Skew & meridional rays

Different types of optical fibers & modes- step index and graded index fibers, single-mode fibers, multimode fibers

Electromagnetic mode theory of optical propagation-EM waves, modes in Planar guide, phase and group velocity

MODULE 2: Transmission Characteristics of Optical Fibers **(10 Lectures)**

Attenuation – Material absorption losses in silica glass fibers – Linear and Non linear Scattering losses -Fiber Bend losses – Intra and inter Modal Dispersion –Over all Fiber Dispersion – Polarization-non linear Phenomena

Optical fiber connectors, Fiber alignment and Joint Losses – Fiber Splices

Glass materials, fiber fabrication, and characterization techniques

MODULE 3 : Optical Sources and Detectors **(12 Lectures)**

Optical sources- Basic concepts, optical emission from semiconductor injection lasers. Multimode and single mode, injection lasers. Laser characteristics. LEDs' structures and characteristics. Modulation response, modulation of lasers and LEDs. Source-fiber coupling.

Optical detectors - Photodetectors, receivers. Receiver noise and sensitivity. Photo detector noise and thermal noise. Receiver structures, preamplifiers and receiver performance calculations

MODULE 4: Optical System and Networks **(6 Lectures)**

System design: link power budget, rise time budget and range System design, LED and laser drive circuits, sub-carrier modulation and coherent system

Basic Networks – SONET / SDH/ FDDI, Wavelength-Division Multiplexing (WDM), Solitons

MODULE 5: Optical Sensors **(6 Lectures)**

Optical fiber sensors, Classification of sensor types – Intensity modulated sensors- Phase modulated sensors-Fiber optic gyroscope- Distributed fiber optic sensors

Textbooks/Reference Books:

1. J. Senior, “Optical Fiber Communications”, Prentice Hall International
2. G. Keiser, “Optical Fiber Communication”, McGraw-Hill
3. R. P. Khare, “Fiber Optics and Optoelectronics”, Oxford University press

Course Code	Course Title	Hours per week L-T-P	Credit C
ECE1816PE13	Integrated Circuit Technology	3-0-0	3

Course outcomes:

On the completion of this laboratory course, the students will be able to:

CO1: Explain different issues and processes involved in IC fabrication techniques
CO2: Explain the fabrication steps involved in BJT and MOS fabrication
CO3: Design MOS based digital circuits
CO4: Design layout of integrated circuits

MODULE 1: Issues and Challenges in IC Design (3 Lectures)

General overview of design hierarchy, layers of abstraction, integration density and Moore's law, VLSI design styles

MODULE 2: IC Fabrication Processes (15 Lectures)

Introductory ideas about crystal growth and wafer preparation. Short description of the Czochralski process. The diffusion process. Simple diffusion theory and the evaluation of impurity diffused in silicon - determination of junction depth and sheet resistance. Oxidation and epitaxial growth of silicon. Pre-deposition and drive-in diffusions in junction devices. Fick's law, distribution of impurities and the calculation of emitter and base depths. Ion implantation, dry etching, sputtering, assembly and reliability related evaluation. Lithography. Optical lithography, minimum line-width consideration, layout fundamentals and mask making. Brief references to X-ray, electron beam and deep UV lithography. Interconnection. Aluminium metallization -- resistance heated evaporated and CVD methods. Brief mention about metallization failures -- step covering and electromigration. Other method of interconnection

MODULE 3: BJT, MOSFET Fabrication (5 Lectures)

Basic steps of BJT, p-MOS, n-MOS fabrication, CMOS p-well and n-well processes, Bi-CMOS fabrication process

MODULE 4: Design of MOSFFT Based Digital ICs (7 Lectures)

Basic Structure and operation of a MOSFET. Behavior of the gate to bulk capacitor. Threshold voltage and the derivation of the Ids – Vds equation. MOSFFT based digital circuits - the inverter with active pull-up, NAND and NOR gates, I/O characteristics and power delay product. Static and dynamic memory cells. Pass transistor circuits. The CMOS structure -fabrication processes, NAND and NOR gates, transfer characteristics

MODULE 5: IC Layout (5 Lectures)

Stick diagram and Layout of circuits using λ – based rules and colour schemes of various layers

MODULE 6: Tools for design and layout of ICs (5 Lectures)

CAD tools for simulation and for the design and layout of VLSI circuits. ASICs, FPGAs and CPLDs - their use and programming with CAD tools

Textbooks/Reference Books:

1. N. Weste and D. Harris, "CMOS VLSI Design: A Circuits and Systems Perspective", 3/e, Pearson Education India, 2007.
2. S.M. Sze," VLSI Technology", Mc Graw Hill
3. Pucknell,"_Basic VLSI design", PHI

Course Code	Course Title	Hours per week L-T-P	Credit C
HS181606	**Accountancy**	**2-0-0**	**2**

MODULE 1:
Concept and classification of Accounts, Transaction, Double Entry system of Book Keeping, Golden rules of Debit and Credit, Journal- Definition, advantages, Procedure of Journalising, Ledger, advantages, rules regarding Posting, Balancing of Ledger accounts, Trial Balance- Definition, objectives, procedure of preparation

MODULE 2:
Name of Subsidiary Books, Cash Book-definition, advantages, objectives, types of Cash Book, preparation of different types of cash books, Bank Reconciliation Statement, Regions of disagreement between Cash Book with Pass Book balance, preparation of Bank Reconciliation Statement

MODULE 3:
Final Account: Preparation of Trading Account, Profit and Loss Account with adjustments

MODULE 4:
Concept of Capital Expenditure and revenue Expenditure, Bad debts, Provision for Bad and Doubtful debts, Provision for discount on Debtors, Outstanding expenses, Prepaid expenses, Accrued Income

MODULE 5:
Introduction to Depreciation Accounting- Meaning, causes, factors, methods of charging depreciation etc.

Textbooks/Reference Books:

1. Theory and Practice of accountance- KR Das, KM Sinha, KS Pal Choudhury, Dr. A Rahman, PK Pujary
2. Book- Keeping & Accountancy- C Mohan Juneja, J R C Chawla, KK Sakseena
3. Double Entry Book- Keeping & Accountancy- JR Batliboi

Course Code	Course Title	Hours per week L-T-P	Credit C
ECE181612	**Advanced Programming Lab**	**0-0-2**	**1**

Course outcomes:

CO1: Write programs using the basic concepts viz. variable, operators, condition, loop, string, list, tuple, dictionaries, etc.

CO2: Design user defined functions; develop programs by importing modules; use of external files; handling exceptions. Use Object Oriented concepts while writing programs; design regular expressions

CO3: Write programs using thread and multi-thread; Write programs using sockets, basic introduction to database programming, CGI programming, GUI programming

1. Write a program in python to print a message. (e.g: Hello World!)
2. Write a program to input a string and display it.
3. Write a program to input a number and display it.
4. Write a program to add a number and a string. Observe the output. Is it running fine? If it is incorrect, correct it.
5. Write a program to input the value of a,b,c,a,g and k. Find the value of X. X=a4+b*c-a/4+(g%5-k//a)
6. Write a program to enter any two numbers now check the numbers using the following operators. (==, !=, >, <,>=, <=,)
7. Write a program to enter any two numbers and use the following operators. (+=, -=,*=,/=, %=, **=, //=)
8. Write a program to enter any two numbers and use the logical operation on them. (and, or, not)
9. Write a program to enter two numbers and test, is and is not identity operators.
10. Write a program to find the bigger between two numbers.
11. Write a program to find the largest of three numbers.
12. Write a program to print the days of the week using nested if. (eg. If 1, print Monday, 2, Tuesday……etc.)
13. Write a program using while loop find sum of the following series. 1+3+5+7+……+N
14. Create a list of 10 numbers, and display.
15. Create a heterogeneous list, and display it.
16. Create a list ‘L’ of 10 numbers. Observe the following.
    a. print L[0]
    b. print L[1:5]
    c. print L[:]
    d. print L[1:5:2]
    e. print L[-1]
    f. print L[-5:]
    g. print the length of the list
    h. Update the list ‘L’.
    i. Delete any two values from the list.
    j. Perform L+[234, 456,765]
    k. Perform L*4
    l. Check whether a number is present in the list ‘L’ or not. (hint: use in)
    m. Print all the elements of ‘L’ using a for loop.
    n. Print the maximum and minimum value of ‘L’.
    o. Apply append() function to insert a number to the list ‘L’.
    p. Apply count() function to count objects of the list ‘L’.

q. Apply extend() function to merge two lists.
r. Apply index() function to find index of elements.
s. Apply remove() function to remove an element from a list.
t. Apply reverse() to reverse a list.
u. Apply sort() to sort a list

17. Create a tuple ‘T’ of 10 numbers. Observe the following.
    a. Use len() to find the length of the tuple.
    b. Apply T+(100, 200, 300) on T.
    c. Apply T*4
    d. Check whether a number is present in the tuple ‘T’ or not. (hint: use in)
    e. Print all of ‘T’ using a for loop.
    f. Print the maximum and minimum value of ‘T’.
18. Design two complex objects c1 and c2, try to perform the following operations:
    a. addition of c1 and c2
    b. multiplication of c1 and c2
    c. division of c1 and c2
19. import math module and execute the following functions:
    a. abs(arg) ##(abs(arg) function does not need the import of math module)
    b. ceil(arg)
    c. exp(arg)
    d. fabs(arg)
    e. floor(arg)
    f. log(arg)
    g. log2(arg)
    h. modf(arg)
    i. pow(x, y)
    j. sqrt(arg)
20. import random module and execute the following functions:
    a. choice(arg) #arg can be list or tuple or string
    b. randrange(start, stop, step)
    c. random()
    d. shuffle(list)
    e. uniform(x, y) # output is a random number R, such that R is less than or equal to R and R is less than y.
    f. randint(x, y) # generate a random number within the given range
21. import math module print *pi* and *e*.
22. Apply the following trigonometric functions:
    a. sin(x) # *x* is in radian
    b. cos(x)
    c. tan(x)
    d. asin(x)
    e. acos(x)
    f. atan(x)
    g. atan2(y,x) # returns atan(y/x) in radians
    h. hypot(x, y) # returns sqrt(x*x + y*y)
    i. degrees(x) # converts x to degree
    j. radians(x) #converts x from degree to radians
23. Write a program to convert binary, hexadecimal and octal number in python.
24. Write a program to create dictionaries and its operations.
25. Write a function to display 'Welcome to Python Programming!'

26. Write a function to add all the numbers in a given range.
27. Write a function to find the bigger number between two numbers.
28. Write a function to find the largest of three numbers.
29. Write a function to find the factorial of a number.
30. Write a function to find the area of a circle.
31. Write a function to show the use of default parameter value.
32. Write a function to show the use of global variables.
33. Write a function calculate the distance between two points (x1, y1) and (x2, y2)
34. For a quadratic equation in the form ax^2 + bx + c, the discriminant D, is b^2-4ac. Write a function to compute the discriminant D, that returns the following output depending on the discriminant D.
    a. if D > 0: The equation has two real roots
    b. if D == 0: The equation has one real root.
    c. if D < 0: The equation has two complex roots
35. Write a function to calculate the absolute value of a given number.
36. Write a function to calculate factorial using recursion.
37. Write a recursive function to generate nth fibonacci number.
38. Write a lambda function or anonymous function to calculate the cube of a number.
39. Write a function to calculate GCD of two numbers.
40. Write a function to find the sum of the digits of a number.
41. Write a function to reverse a number.
42. Write the function countB(word) which takes a word as the argument and returns the number of 'b' in that word.
43. Write a function to eliminate all occurrences of a letter.
44. Write a function to eliminate the first occurence of a letter.
45. Write a function to check if a given string is palindrome or not.
46. Write a function to count the occurence each vowel in a string.
47. Write a function to read a string and display 'Total number of uppercase and lowercase letters'.
48. Write a function to extract the numbers present in a string.
49. Write a function to extract the special characters(!, #, $, %, etc.) from a string.
50. Write a function to duplicate all the elements of a list.
51. String operations
    a. s1 = '' # creating a empty string
    b. s2 ='HelloWorld' or s2 = str('HelloWorld')
    c. len(s2)
    d. min(s2)
    e. max(s2)
    f. s2[0]
    g. s2[5]
    h. s2[-1]
    i. s2[-2]
    j. s2[-4]
52. Write programs to show the use of upper(), lower, isalpha(), isdigit(), split(), isalnum(), etc.
53. Write programs to read, write, append, etc. operations on external files.
54. Write programs to demonstrate class and object in python.
55. Write programs to show the operator overloading and function overloading, function overriding in python.
56. Write programs demonstrate the inheritance in python.
57. Write programs using re module and use findall(), search(), split(), sub(), etc. related to regular expressions.

58. Write a program to show the use of try, except.
59. Write a program to show the use of try, except and finally.
60. Write a program to raise an exception.
61. Write a program to define user defined exceptions.
62. Write a program to demonstrate a multi threaded execution.
63. Write a program to synchronize thread.
64. Write a program to implement a multithreaded priority queue.
65. Demonstrate multiprocessing using multiprocessing module.
66. Write a client-server program to establish connection using socket.
67. Write a client-server program to implement echo server using socket.
68. Write a program to establish connection with the database.
69. Write a program to retrieve data from a database table.
70. Write a program to store and retrieve the stored data from a database table.
71. Write a program to demonstrate the GUI components (Button, Frame, Label, Menu, etc.)
72. Write a program to demonstrate a simple CGI program.
73. Write a CGI program to pass information using the GET and POST method.

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