SEMESTER III

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

Code No.	Course Title	L	T	P	C
THEORY					
MA 2211	Transforms and Partial Differential Equations	3	1	0	4
CS 2201	Data Structures	3	0	0	3
CS 2202	Digital Principles and Systems Design	3	1	0	4
CS 2203	Object Oriented Programming	3	0	0	3
CS 2204	Analog and Digital Communication	3	1	0	4
GE 2021	Environmental Science and Engineering	3	0	0	3
PRACTICAL					
CS 2207	Digital Lab	0	0	3	2
CS 2208	Data Structures Lab	0	0	3	2
CS 2209	Object Oriented Programming Lab	0	0	3	2
	Total	18	3	9	27

MA2211 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
(Common to all branches) **3 1 0 4**

OBJECTIVES

The course objective is to develop the skills of the students in the areas of Transforms and Partial Differtial Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES 9 + 3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.

UNIT II FOURIER TRANSFORMS 9 + 3

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9 + 3

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 3

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V Z -TRANSFORMS AND DIFFERENCE EQUATIONS 9 + 3

Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z-transform.

Lectures : 45 Tutorials : 15 TOTAL : 60 PERIODS

TEXT BOOK:

1. Grewal, B.S, 'Higher Engineering Mathematics' 40th Edition, Khanna publishers, Delhi, (2007)

REFERENCES:

1. Bali.N.P and Manish Goyal 'A Textbook of Engineering Mathematics', Seventh Edition, Laxmi Publications(P) Ltd. (2007)
2. Ramana.B.V. 'Higher Engineering Mathematics' Tata Mc-GrawHill Publishing Company limited, New Delhi (2007).
3. Glyn James, 'Advanced Modern Engineering Mathematics', Third edition-Pearson Education (2007).
4. Erwin Kreyszig 'Advanced Engineering Mathematics', Eighth edition-Wiley India (2007).

CS 2201 DATA STRUCTURES L T P C
3 1 0 4

AIM:

To master the design and applications of linear, tree, balanced tree, hashing, set, and graph structures.

UNIT I LINEAR STRUCTURES 9

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists –

Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues

UNIT II TREE STRUCTURES 9

Tree ADT – tree traversals – left child right sibling data structures for general trees – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – Threaded Binary Trees.

UNIT III BALANCED TREES 9

AVL Trees – Splay Trees – B-Tree - heaps – binary heaps – applications of binary heaps

UNIT IV HASHING AND SET 9

Hashing – Separate chaining – open addressing – rehashing – extendible hashing - Disjoint Set ADT – dynamic equivalence problem – smart union algorithms – path compression – applications of Set

UNIT V GRAPHS 9

Definitions – Topological sort – breadth-first traversal - shortest-path algorithms – minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal – biconnectivity – Euler circuits – applications of graphs

TOTAL: 45 PERIODS

TEXT BOOK:

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition , Pearson Education, 2005.

REFERENCES:

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, First Edition Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, “Data Structures”, Second Edition, Thomson India Edition, 2005.

CS 2202 DIGITAL PRINCIPLES AND SYSTEM DESIGN L T P C

(Common to CSE & IT) **3 1 0 4**

AIM:

To provide an in-depth knowledge of the design of digital circuits and the use of Hardware Description Language in digital system design.

OBJECTIVES:

- To understand different methods used for the simplification of Boolean functions
- To design and implement combinational circuits
- To design and implement synchronous sequential circuits
- To design and implement asynchronous sequential circuits
- To study the fundamentals of VHDL / Verilog HDL

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 8

Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Implementation of Boolean functions using logic gates.

UNIT II COMBINATIONAL LOGIC 9

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations - Code conversion – Introduction to Hardware Description Language (HDL)

UNIT III DESIGN WITH MSI DEVICES 8

Decoders and encoders - Multiplexers and demultiplexers - Memory and programmable logic - HDL for combinational circuits

UNIT IV SYNCHRONOUS SEQUENTIAL LOGIC 10

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters – HDL for Sequential Circuits.

UNIT V ASYNCHRONOUS SEQUENTIAL LOGIC 10

Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Race-free state assignment – Hazards. ASM Chart.

TUTORIAL= 15 TOTAL : 60 PERIODS

TEXT BOOKS

1. M.Morris Mano, “Digital Design”, 3rd edition, Pearson Education, 2007.

REFERENCES

1. Charles H.Roth, Jr. “Fundamentals of Logic Design”, 4th Edition, Jaico Publishing House, Cengage Earning, 5th ed, 2005.
2. Donald D.Givone, “Digital Principles and Design”, Tata McGraw-Hill, 2007.

CS 2203 OBJECT-ORIENTED PROGRAMMING L T P C

(Common to CSE & IT) **3 0 0 3**

AIM:

To understand the concepts of object-oriented programming and master OOP using C++.

UNIT I 9

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism.

Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions - static members – Objects – pointers and objects – constant objects – nested classes – local classes

UNIT II 9

Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion – explicit constructor

UNIT III **9**

Function and class templates - Exception handling – try-catch-throw paradigm – exception specification – terminate and Unexpected functions – Uncaught exception.

UNIT IV **9**

Inheritance – public, private, and protected derivations – multiple inheritance - virtual base class – abstract class – composite objects Runtime polymorphism – virtual functions – pure virtual functions – RTTI – typeid – dynamic casting – RTTI and templates – cross casting – down casting .

UNIT V **9**

Streams and formatted I/O – I/O manipulators - file handling – random access – object serialization – namespaces - std namespace – ANSI String Objects – standard template library.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.

REFERENCES:

1. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004..
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, “C++ Primer”, Fourth Edition, Pearson Education, 2005.
3. B. Stroustrup, “The C++ Programming language”, Third edition, Pearson Education, 2004.

CS2204 ANALOG AND DIGITAL COMMUNICATION **L T P C**
3 1 0 4

UNIT I FUNDAMENTALS OF ANALOG COMMUNICATION **9**

Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

UNIT II DIGITAL COMMUNICATION **9**

Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costas loop, DPSK.

UNIT III DIGITAL TRANSMISSION 9

Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise rate, companding – analog and digital – percentage error, delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – Intersymbol interference, eye patterns.

UNIT IV DATA COMMUNICATIONS 9

Introduction, History of Data communications, Standards Organizations for data communication, data communication circuits, data communication codes, Error control, Error Detection, Error correction, Data communication Hardware, serial and parallel interfaces, data modems, Asynchronous modem, Synchronous modem, low-speed modem, medium and high speed modem, modem control.

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques – wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Wayne Tomasi, “Advanced Electronic Communication Systems”, 6/e, Pearson Education, 2007.
2. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley & Sons. 2001.

REFERENCES:

1. H.Taub,D L Schilling ,G Saha ,”Principles of Communication”3/e,2007.
2. B.P.Lathi,”Modern Analog And Digital Communication systems”, 3/e, Oxford University Press, 2007
3. Blake, “Electronic Communication Systems”, Thomson Delmar Publications, 2002.
4. Martin S.Roden, “Analog and Digital Communication System”, 3rd Edition, PHI, 2002.
5. B.Sklar,”Digital Communication Fundamentals and Applications”2/e Pearson Education 2007.

GE 2021 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C

(Common to Civil, CSE, IT & Biomedical Degree Programmes) **3 0 0 3**

AIM

The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates.

OBJECTIVE

At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these

resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-

governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill,NewDelhi, (2006).

REFERENCES BOOKS

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University
5. Press (2005)

CS 2207	DIGITAL LABORATORY (Common to CSE & IT)	L T P C 0 0 3 2

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices
4. Design and implementation of parity generator / checker using basic gates and MSI devices
5. Design and implementation of magnitude comparator
6. Design and implementation of application using multiplexers/ Demultiplexers

7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters
9. Simulation of combinational circuits using Hardware Description Language (VHDL/ Verilog HDL software required)
10. Simulation of sequential circuits using HDL (VHDL/ Verilog HDL software required)

(Common to Information Technology & Computer Science Engineering)

List of equipments and components for a batch of 30 students (2 per batch)

S.NO	Name of equipment/ component	Quantity Reqd	Remarks
1	Dual power supply/ single mode powersupply	15/30	+12/-12V
2	IC Trainer	15	10 bit
3	Bread Boards	15	
4	Multimeter	5	
6	IC 7400	60	
7	IC7402	60	
8	IC 7404	60	
9	IC 7486	60	
10	IC 7408	60	
11	IC 7432	60	
12	IC 7483	60	
13	IC74150	60	
14	IC74151	40	
15	IC74147	40	
16	IC7445	40	
17	IC7476	40	
18	IC7491	40	
19	IC555	40	
20	IC7494	40	
21	IC7447	40	
22	IC74180	40	
23	IC7485	40	
24	IC7473	40	
25	IC74138	40	
26	IC7411	40	
27	IC7474	40	

28	Computer with HDL software	30	
29	Seven segment display	40	
30	Assembled LED board/LEDs	40/200	
31	Wires		Single strand

CS 2208 DATA STRUCTURES LAB L T P C
0 0 3 2

AIM:

To develop programming skills in design and implementation of data structures and their applications.

1. Implement singly and doubly linked lists.
2. Represent a polynomial as a linked list and write functions for polynomial addition.
3. Implement stack and use it to convert infix to postfix expression
4. Implement a double-ended queue (dequeue) where insertion and deletion operations are possible at both the ends.
5. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
6. Implement binary search tree.
7. Implement insertion in AVL trees.
8. Implement priority queue using binary heaps
9. Implement hashing with open addressing.
10. Implement Prim's algorithm using priority queues to find MST of an undirected graph.

TOTAL: 45 PERIODS

List of Equipments and components for A Batch of 30 students (1 per batch)

1. SOFTWARE REQUIRED – **TURBOC version 3 or GCC version 3.3.4**.
2. OPERATING SYSTEM – **WINDOWS 2000 / XP / NT OR LINUX**
3. COMPUTERS REQUIRED – **30 Nos**. (Minimum Requirement : Pentium III or Pentium IV with 256 RAM and 40 GB harddisk)

CS 2209 OBJECT ORIENTED PROGRAMMING LAB L T P C
(Common to CSE & IT**)** **0 0 3 2**

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication)
2. Implement complex number class with necessary operator overloadings and type conversions such as integer to complex, double to complex, complex to double etc.

3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.
4. Overload the new and delete operators to provide custom dynamic allocation of memory.
5. Develop a template of linked-list class and its methods.
6. Develop templates of standard sorting algorithms such as bubble sort, insertion sort, merge sort, and quick sort.
7. Design stack and queue classes with necessary exception handling.
8. Define Point class and an Arc class. Define a Graph class which represents graph as a collection of Point objects and Arc objects. Write a method to find a minimum cost spanning tree in a graph.
9. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism and RTTI.
10. Write a C++ program that randomly generates complex numbers (use previously designed Complex class) and writes them two per line in a file along with an operator (+, -, *, or /). The numbers are written to file in the format (a + ib). Write another program to read one line at a time from this file, perform the corresponding operation on the two complex numbers read, and write the result to another file (one per line).

(Common to Information Technology & Computer Science Engineering)

List of Equipments and software for a batch of 30 students

1. PC – 30 nos.
    - Processor – 2.0 GHz or higher
    - RAM – 256 MB or higher
    - Hard disk – 20 GB or higher
    - OS- Windows 2000/ Windows XP/ NT
2. Software – Turbo C (freeware) – to be installed in all PC's.