

**MAHATMA GANDHI
UNIVERSITY**

B.TECH. DEGREE COURSE

4TH SEMESTER

**SCHEME
&
SYLLABUS**

2002

**COMPUTER SCIENCE
&
ENGINEERING BRANCH**

COMPUTER SCIENCE & ENGINEERING

SCHEME

4TH SEMESTER

Course Code	Course No.	Subject	Teaching Periods			Uty. Exam duration (hours)	Marks			
			L	T	P		Sessional	Theory	Practical	Total
A	CMEL RPTA 401	Engineering Mathematics III	3	1	-	3	50	100	-	150
B	R 402	Computer Organization	2	1	-	3	50	100	-	150
C	R 403	Object Oriented Programming	2	1	-	3	50	100	-	150
D	R 404	Integrated Circuits	3	1	-	3	50	100	-	150
E	R 405	Data Structures and Programming Methodologies	3	1	-	3	50	100	-	150
F	R406	Advanced Microprocessors and Peripherals	3	1	-	3	50	100	-	150
G	R 407	Integrated Circuits Lab	0	0	4	3	50	-	100	150
H	R 408	Data Structures Lab	0	0	4	3	50	-	100	150
		Total	16	6	8	-	400	600	200	1200

SYLLABUS

ENGINEERING MATHEMATICS - III

CMELRPTA 401

3+1+0

Module 1

Ordinary Differential Equations: Linear Differential equations with constant coefficients - Finding P.I. by the method of variation of parameters – Cauchy's equations- Linear Simultaneous eqns- simple applications in engineering problems.

Module 2

Partial Differential Equations - formation by eliminating arbitrary constants and arbitrary Functions - solution of Lagrange Linear Equations – Charpits Method – solution of homogeneous linear partial differential equation with constant coefficients – solution of one dimensional wave equation and heat equation using method of separation of variables – Fourier solution of one dimensional wave equation.

Module 3

Fourier Transforms: - Statement of Fourier Integral Theorems – Fourier Transforms – Fourier Sine & Cosine transforms - inverse transforms - transforms of derivatives – Convolution Theorem (no proof) – Parsevals Identity - simple problems.

Module 4

Probability and statistics: Binomial law of probability - The binomial distribution, its mean and variance - poisson distribution as a limiting case of binomial distribution - its mean and variance - fitting of binomial & poisson distributions - normal distribution - properties of normal curve - standard normal curve - simple problems in binomial, poisson and normal distributions.

Module 5

Population & Samples: Sampling distribution of mean (σ known) –Sampling distribution of variance, F and Chi square test – Level of significance - Type 1 and Type 2 errors – Test of hypothesis – Test of significance for large samples – Test of significance for single proportion, difference proportion, single mean and difference of mean (proof of theorems not expected)

References

1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers
2. Engineering Mathematics Vol. II -3rd year Part A & B - M.K. Venkataraman, National Publishing Company
3. Elements of Partial Differential Equations - Ian N.Sneddon.,McGrawhill International Edn.

4. Miller and Fread's Probability and statistics for engineers – Richard A Johnson, Pearson Education Asia / PHI
5. A text book of Engineering Mathematics (Volume II) – Bali and Iyengar, Laxmi Publications Ltd.
6. Advanced Engg. Mathematics - Erwin Kreyszig, Wiley Eastern Ltd.
7. Probability and statistical inferences – Hogg and Tanis, Pearson Education Asia

COMPUTER ORGANIZATION

R 402

2+1+0

Module 1

Introduction: Organization and Architecture – Review of basic operational concepts – CPU- single bus and two bus organization, Execution of a complete instruction – interconnection structures – layered view of a computer system.

Module 2

CPU - Arithmetic: Signed addition and subtraction – serial and parallel adder – BCD adder – Carry look ahead adder, Multiplication – Array multiplier – Booth's Algorithm, Division – Restoring and non-restoring division, floating point arithmetic - ALU Design.

Module 3

Control Unit Organization: Processor Logic Design – Processor Organization – Control Logic Design – Control Organization – Hardwired control – Microprogram control – PLA control – Microprogram sequencer, Horizontal and vertical micro instructions – Nano instructions.

Module 4

Memory: Memory hierarchy – RAM and ROM – Memory system considerations – Associative memory, Virtual memory – Cache memory – Memory interleaving.

Module 5

Input – Output: Printers, Plotters, Displays, Keyboard, Mouse, OMR and OCR, Device interface – I/O processor – Standard I/O interfaces – RS 232 C, IEEE 488.2 (GPIB).

References

1. Computer Organization - Hamacher, Vranesic and Zaky, Mc Graw Hill
2. Digital Logic and Computer Design - Morris Mano, PHI
3. Computer Organization and Architecture -William Stallings, Pearson Education Asia.
4. Computer Organization and Design - Pal Chaudhuri, PHI
5. Computer Organization and Architecture -M Morris Mano, PHI
6. Computer Architecture and Organization - John P Hayes, Mc Graw Hill

OBJECT ORIENTED PROGRAMMING

R403

2+1+0

Module 1

Introduction to OOP - Evolution of object oriented languages - Need of Objects - Definition of Object-Oriented Language – Classes and Objects – Creating and Using Classes and objects – Member functions and variables – Constructors and Destructors.

Module 2

Inheritance and Access Control - Member access control in classes – Friend functions and classes – Extending classes - Public Private and Protected Inheritance – Classification of Inheritance – Single – Multiple – Multilevel – Hierarchical – Hybrid.

Module 3

Polymorphism – Runtime and compile time polymorphism – overloading functions and operators – selecting friend member function for operator overloading - Virtual methods – pure virtual methods – Abstract classes - Defining and using of virtual methods, pure virtual methods and abstract classes – applications of abstract classes.

Module 4

Advanced Concepts- Virtual Destructors – Virtual Base Classes – Template classes – Creating and using templates – Namespaces

Module 5

Dynamic Objects - Dynamic object allocation - Inline functions.
Other Object oriented languages – Java – Object oriented features in Java – Comparison with C++

References

1. Object Oriented Programming in C ++ - Robert Lafore, Galgotia Pub.
2. Object Oriented Programming in C++ - Nabajyoti Barkakati, PHI
3. Structured and Object Oriented Problem Solving using C++ - Andrew C Staugaard Jr., PHI
4. Object oriented Programming with C++ - E. Balaguruswamy, TMH
5. Java 2 Complete Reference - Herbert, Schildt, TMH
6. The Java Programming Language 3rd Edition – Arnold, Gosling, Holmes, Pearson Education Asia
7. Object-oriented programming using C++ - Ira Pohl, Pearson Education Asia
8. C++ How to program - Dietel & Dietel, Pearson Education Asia
9. An Introduction to Object-oriented programming – Timothy Budd
10. Problem Solving with C++ - Walter Savitch, Pearson Education Asia
11. C++ Primer – Stanley B Lippman, Josee Zajoie, Pearson Education Asia

INTEGRATED CIRCUITS

R404

3+1+0

Module 1

Logic Families - DTL - TTL - ECL - I²L & CMOS. Comparison of circuits. Tristate logic - Propagation delay - power dissipation - Noise margin window profile - comparison - Fan in - Fan out.

Module 2

Storage elements - Flip flops - Latches - Registers, Decoders, Multiplexers- Buffers - Memory systems - ROM types - RAM - BJT RAM cells - MOS RAMs, RAM organization - flash memories - PLA - PAL - PGA - FPGA - PLD - CPLD - CDROM - Magneto optic storage.

Module 3

D/A Converters - Binary weighted resistor type - Ladder type A/D converters – counting type - Successive approximation type - Parallel comparator type dual slope type.

Module 4

Opamps: Characteristics - Basic principles - definitions - parameters - Input, Offset, Voltage, Input bias current, CMRR, slew rate - Ideal Opamp - inverting and non inverting opamps.

Module 5

Opamp Applications: Summing, Comparator, Differentiator - Integrator - Square wave generator - Triangular wave generator using opamps.

References

1. Digital Integrated Electronics - Taub & Shilling, McGraw Hill
2. Pulse Digital & Switching Wave forms - Millman & Taub. , McGraw Hill
3. Digital design with standard MSI & LSI by T.R. Blakesley & John Willey.
4. Integrated Circuits - Botkar, Khanna Publishers

DATA STRUCTURES & PROGRAMMING METHODOLOGIES

R 405

3+1+0

Module 1

Principles of programming – System Life Cycle - Algorithm Specification- Recursive Algorithms- Documentation- Performance Analysis and Measurements- Time and Space complexity-Complexity calculation of simple algorithms.

Module 2

Study of basic data structures – Arrays- Structures-Sparse matrix – Stacks – Queues- Circular queues- Priority queues - Dqueues. Evaluation of expressions – Polynomial representation using arrays.

Module 3

Linked Lists - Linked stacks and queues - Doubly linked lists - Polynomial representation using linked lists, Strings – Data representation – Pattern matching.

Module 4

Trees - Binary Trees – Tree Traversal – Inorder - Preorder and Postorder, Graphs – Depth first and breadth first search.

Module 5

Sorting methods: Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods (basic idea only).

References

1. Fundamentals of Data Structures in C++: Horowitz, Sahni & Mehta, Galgottia Pub.
2. Classic Data Structures: Samanta, PHI
3. Data Structures and program design in C: Robert Kruse, Pearson Education Asia
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum
5. Fundamental Algorithms: Knuth.
6. Algorithms + Data Structures = Programs: N.Wirth, PHI
7. An introduction to Data Structures with applications: Trembley & Sorenson, McGraw Hill
8. Data structures in Java: Thomas Standish, Pearson Education Asia

ADVANCED MICROPROCESSORS & PERIPHERALS

R 406

3+1+0

Module1

Study of Interfacing ICs - 8255, 8252, 8251, 8279 (functions and internal block diagram only)

Module 2

Interfacing with 8085 - Interfacing keyboard – Hardware and Software approach – Interfacing seven segment displays - Interfacing D/A and A/D converters - Micro controllers (brief idea only)

Module 3

8086/88 Architecture, Block diagram – Addressing modes – memory addressing modes – Program memory addressing modes – stack memory addressing modes.

Module 4

Instructions format of 8086 – data transfer- arithmetic –branch – loop- flag manipulation- shift & rotate – string- REP instruction – writing simple program in 8086 – Additional features of 80286 – protected mode memory addressing.

Module 5

Additional features of 80386 – Paging mechanism – Interfacing coprocessors in 80386 – Additional features of Pentium Processors. Brief study of latest processors of Intel & AMD (Architecture not required) – Introduction to RISC processors

References

1. Microprocessor Architecture, Programming and Applications with the 8085 - Gaonkar, New Age International
2. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro processors. Architecture, Programming and Interfacing – Barry B Bray, Pearson Education Asia
3. The 80X86 family - John Uffenbeck, PHI
4. Introduction to the Intel Family of Microprocessors - James L.Antonakos, Pearson Education Asia
5. Intel Microprocessors - A.K.Ray
6. Microprocessors and Interfacing - Douglas V. Hall, TMH
7. Advanced Microprocessors and Peripherals - A. K. Ray and K. M.Bhurchandi, TMH
8. The Intel 8086/88 Microprocessor Architecture, Programming Design and Interfacing – Bhupendra Singh Chhabra, Dhanpat Rai Publishing Company (P) Ltd
9. IBM PC and Clones - Govindarajalu, TMH

INTEGRATED CIRCUITS LAB

R407

0+0+4

1. OP-amp Characteristics
2. Inverting and Non-inverting amplifier using Op-amp - frequency response.
3. Differentiating and Integrating Circuits - frequency response.
4. Astable multivibrator using Op-amp.
5. A/D Converter.
6. D/A Converter.
7. Transfer Characteristics and specifications of TTL and MOS gates.
8. Study of flip flops
9. Synchronous and Asynchronous Counters
10. Astable and Monostable multivibrators using gates.
11. Study of shift registers and their applications.
12. Study of decoders and Multiplexers.

DATA STRUCTURES LAB

R408

0+0+4

Experiments based on the following:

1. Array and Linked list implementation of Stacks, Queues, Dqueues, Graphs, Binary Trees, Polynomials, Sparse matrix.
2. Infix, Postfix and Prefix conversions.
3. Sorting and Searching methods.
4. String representation and pattern matching

Any experiment according to the syllabus of R405 can be substituted.

