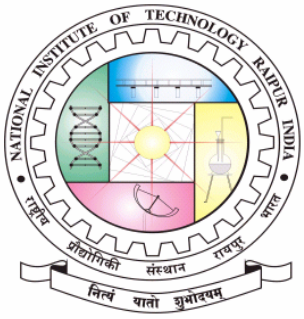
SCHEME AND DETAILED SYLLABUS

FOR

B.TECH FOUR YEAR DEGREE COURSE

IN

INFORMATION TECHNOLOGY



DEPARTMENT OF INFORMATION TECHNOLOGY

National Institute of Technology Raipur

Chhattisgarh – 492010

SCHEME AND DETAILED SYLLABUS

FOR

B.TECH FOUR YEAR DEGREE COURSE

IN

INFORMATION TECHNOLOGY

(To be applicable for batches admitted from July, 2010 onwards)

(Sudhakar Pandey)
Member, BoS
Dept. of IT

(Rakesh Tripathi)
Member, BoS
Dept. of IT

(Dr. S Verma)
Chairman, BoS
Dept. of IT

Table of Contents

NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

DEPARTMENT OF INFORMATION TECHNOLOGY

SEMESTER: III

S.No.	Board of Studies	Sub. Code	Subject Name	Periods/week			Examination Scheme					Total Marks	Credits L+(T+P)/2
				L	T	P	TA	FE	SE	T.C.A.	ESE		
1	Information Technology	IT 301	Computational Mathematics	3	1	-	20	15	15	50	70	120	4
2	Information Technology	IT 302	Basic Electronic	3	1	-	20	15	15	50	70	120	4
3	Information Technology	IT 303	Data Structures	4	1	-	20	15	15	50	70	120	5
4	Information Technology	IT 304	Maths - III	3	1	-	20	15	15	50	70	120	4
5	Information Technology	IT 305	Object Oriented Programming Methodologies	3	1	-	20	15	15	50	70	120	4
6	Information Technology	IT 306	Digital Electronics And Logic Design	3	1	-	20	15	15	50	70	120	4
7	Information Technology	IT 391	Data Structure Lab	-	-	3	30	-	-	30	20	50	2
8	Information Technology	IT 392	Basic Electronics Lab	-	-	3	30	-	-	30	20	50	2
9	Information Technology	IT 393	Computer Programming Lab (C++)	-	-	3	30	-	-	30	20	50	2
10	Humanities		Value Education	-	-	2	25	-	-	25	0	25	1
11			Discipline	-	-	-	25	-	-	25	0	25	1
			Total	19	6	11	260	90	90	440	480	920	33

Note : For attendance of a student in every theory and practical class, the teachers are supposed to keep records ultimately in the following format which will be included in the semester mark-sheets.

T.C.A. = Total of Continuous Assessment.

Format for attendance				
Attendance				Category
> 85			----->	High "H"
> 70 & < 85			----->	Medium "M"
> 60 & < 70			----->	Low "L"
< 60			----->	Poor "P"

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG 492 010
Department of Information Technology
SEMESTER – III

"Computational Mathematics"

Theory Periods: 30 Tutorials: "10"
Credits: 4 Code: IT 301

UNIT I: NUMERICAL SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection Method, Regula-Falsi Method, Newton-Raphson Method, Secant Method, Birge-Vieta Method, Bairstow's Method.

UNIT II: NUMERICAL SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Direct Methods - Gauss Elimination, Gauss-Jordan & Crout's Triangularisation Method, Iterative Methods - Jacobi's, Gauss- Siedal & Successive Over Relaxation Method.

UNIT III: INTERPOLATION WITH EQUAL AND UNEQUAL INTERVALS

Finite differences, Newton's Forward & Backward Difference Formulae, Central Difference Formula, Stirling's Formula, Bessel's Formula, Lagrange's Formula and Newton's Divided Difference Formula.

UNIT IV: NUMERICAL DIFFERENTIATION AND INTEGRATION

Derivatives using Forward, Backward and Central Difference Formulae. Newton-Cote's Quadrature Formula, Trapezoidal rule, Simpson's rules, Weddle's rule.

UNIT V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Runge-Kutta Methods, Predictor-corrector Methods- Milne's Method, Adams-Bashforth Method.

Name of Text Books:

1. Numerical Methods in Engineering and Science by Dr. B.S. Grewal, Khanna Publishers.
2. Numerical Methods for Scientific and Engineering Computation by M .K. Jain, S. R. K. Iyengar & R. K.
   Jain, Wiley Eastern Limited.

Name of Reference Books:

1. Numerical Methods for Scientists and Engineers by K. Shankar Rao, Prentice Hall of India.
2. Numerical Methods with C++ Programming, by Somasundaram & Chandrasekaran, Prentice Hall of India.
3. Numerical Methods, by S. S. Shastry, Prentice Hall Inc. India 1998.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG 492 010

Department of Information Technology

SEMESTER – III

"Basic Electronics"

Theory Periods: 30 Tutorials: "10"

Credits: 4 Code: IT 302

Unit – I

Introduction, Transport Phenomena in semiconductor, Formation of P-N Junction, Properties of P-N Junction, P-N Junction Diodes; Semiconductor Diodes, V-I Characteristics, Effect of Temperature on V-I Characteristics, Ideal Diode, Diode equation, Diode Resistance, Diode Capacitance: Transition and Diffusion Capacitance.

Unit – II

Rectifying circuits and DC Power Supplies: Load line analysis of diode circuit, Half wave rectifier: Voltage regulation,

Ripple factor, ratio of rectification, Transformer Utilization factor. Full wave rectifier, Bridge rectifier. Filter circuits for power supply: Inductor filter, Capacitor filter, LC filter, Multiple LC filter, CLC or p filter. Zener diode: Break down

mechanism, Characteristics, Specifications, Voltage regulator circuit using zener diode.

Unit - III

Transistor: Introduction, Construction, Types: npn and pnp, Current components. Transistor as an amplifier, Transistor Characteristics, Transistor Circuit Configuration: Common Base (CB) Configuration, Common Emitter (CE) Configuration, Common Collector Configuration (CC), Early Effect. Ebers-Moll Model, Maximum Voltage Ratings.

Unit – IV

Transistor Biasing and Thermal stabilization: The operating point, Bias stability, Stability factor, Emitter bias, Collector – to – base bias, Voltage divider bias with emitter bias, Emitter bypass capacitor. Bias compensation.

Unit – V

Field Effect Transistor (FET): Introduction, Construction, Operation, V-I Characteristics, Transfer Characteristics, Drain Characteristics, Small-Signal Model. Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Introduction, Construction, Operation and characteristics, Depletion MOSFET, Enhancement MOSFET.

Name of Text Books:

1. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, TMH.
2. Electronic Devices & Circuits – Allen Mottershead, PHI

Name of Reference Books:

1. Electronic Devices and Circuit Theory – Boylestad & Nashelsky, 8th Ed. PHI.
2. Electronic Devices & Circuit Analysis – K. Lal Kishore, BS Publications

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG 492 010

Department of Information Technology

SEMESTER – III

"Data Structures"

Theory Periods: 40 Tutorials: "10"

Credits: 5 Code: IT 303

UNIT - I

Introduction to Data Structure: Definition, Types, Basic Operations, ADT, Algorithm: complexity and time space trade-off. Array: representation and address calculation, sparse matrix representation, polynomial representation and operations. **Sorting:** Bubble, Insertion, Selection, Quick, Merge, Radix, Time complexity and Memory requirements.

UNIT - II

Stack: Definition, Static representation and implementation, Operations: push & pop, Notations: infix, prefix and postfix and conversions among them, Application of Stack: Conversion of Infix to prefix and postfix, evaluation of postfix expressions, recursion, etc.

Queue: Static representation and implementation of Linear queue, Operations on queue; add, delete, etc, Problem on linear queue, Circular queue, D-queue, Priority queue, Application of Queues.

UNIT - III

Linked List: Dynamic Representation and Implementation of Singly Linked Lists, Two way header list, Basic operations on linked list, Doubly, Circular, and Circular doubly linked list. Static representation and implementation of singly linked list.

Application of Linked list: Polynomial representation and operations on polynomials, Garbage Collection and compaction etc. Dynamic (linked) representation of stack and queue.

UNIT - IV

Tree: Basic Terminology, Binary tree and types; strictly, complete, skewed, binary expression tree, Representation of binary tree; static and dynamic, Traversals Algorithms; recursive and non-recursive, Threaded binary tree; representation and applications. Binary Search Tree; basic operations on it, AVL tree, basic operations in AVL tree, m-way tree, B-tree; basic operations, B+ tree. Applications of Tree. Heap sort. Max and Min Heap,

UNIT - V

Graph: Basic terminology, types of graphs, representation methods, traversal methods, minimum spanning tree, shortest path algorithms.

Searching Sequential search, Binary search, Hashing: methods, collision, collision resolution techniques; open addressing and chaining, clustering. Comparison of all searching method.

Name of Text Books :

1. Data Structure by Seymour Lipschutz & G. a. Vijayalaksmi Pai (Schaum's outlines).
2. Data Structures using C/C++ by Langsam, Augenstein & Tananbaum (PHI).
3. Data Structures & Program Design by Robert L Kruse (PHI).

Name of Reference books :

1. An Introduction to Data Structures with Application by Tremblay & Sorenson (TMH).
2. Data Structures using C by ISRD Group (TMH).
3. Classic Data Structure by D Samanata, Prentice-Hall of India.
4. Expert Data Structures with C (2nd Editin) by R.B. Patel , Khanna Publishing House.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG 492 010

Department of Information Technology

SEMESTER – III

"Maths - III"

Theory Periods: 30 Tutorials: "10"
Credits: 4 Code: IT 304

UNIT I: FOURIER SERIES

Expansion of function as Fourier series, Change of interval, Even and odd functions, Half-range Fourier series, Practical harmonic analysis.

UNIT II: LAPLACE TRANSFORM

Laplace transform of elementary functions, Properties of Laplace transform, Laplace transform of derivatives and
integrals, multiplication by tn and division by t, Laplace transform of periodic functions. Inverse Laplace transform,
Convolution theorem, Application of Laplace transform to solutions of ordinary differential equations.

UNIT III: THEORY OF COMPLEX VARIABLES

Limit, Derivative and Analytic functions; Cauchy-Riemann equations and its applications to flow problems; Complex Integration: Line and Contour integral, Cauchy integral theorem and Integral formula; Taylor series, Laurent series; singularities; Poles and their orders and residues; Evaluation of real definite integrals.

UNIT IV: PARTIAL DIFFERENTIAL EQUATION

Formation of partial differential equations, Equations solvable by direct integration, Lagrange's linear equations, Homogeneous linear differential equations with constant coefficients, Non-homogeneous linear equations, Solution
of partial differential equations by the method of separation of variables.

UNIT V: RANDOM VARIABLES

Discrete and continuous probability distributions, Mathematical expectation, Mean and Variance, Moments, Moment generating function, probability distribution, Binomial, Poisson and Normal distributions.

Name of Text Books :

1. Higher Engg. Mathematics by Dr. B.S. Grewal– Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

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SEMESTER – III

"Object Oriented Programming Methodologies"

Theory Periods: 30 Tutorials: "10"

Credits: 4 Code: IT 305

Unit – I

Introduction of OOPS and Object Modeling:

Basic concepts of OOP, Benefits of OOP, Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.

Unit – II

Dynamic Modeling and Functional Modeling:

Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model; Data flow diagram, specifying operations, constraints, a sample functional model.OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies, SA/SD, JSD.

UNIT III

Introduction to Object Oriented Languages and Class & Objects :

Object Oriented Languages overviews, Structure of C++ Program, Compiling & Linking, Operators & Expressions, Looping concepts, Arrays & Structures, functions, Specifying a class, Define member function, Scope of class and its member ,Nested Class, Data hiding & encapsulation, Friend function, Array within a class, array of object as function argument, function returning object, static member..

UNIT IV

Constructors & Destructors, Inheritance & Pointer

Constructor function, parameterized multiple constructor, default constructor, copy constructor, const and class, Data conversion between objects of different classes, Destructor function, Polymorphism, function overloading, Operator overloading, Define derived classes, single inheritance, multilevel inheritance, Hierarchical inheritance, Hybrid Inheritance, Pointers to objects, this pointer, Pointers to derived class.

UNIT V

Virtual function, **File I/O & Templates**:

Virtual function, Pure Virtual function, Abstract classes, Files streams, opening & closing a file, read () & write() functions, detecting end-of-file, seekp(), seekg(), tellg(), tellp()function. Introduction to Templates & Exception, Creating and handling Templates and Exception in OOP

Name of Text Books

1. James Rumbaugh etal, "Object Oriented Modeling and Design", PHI
2. OOPS with C++ : E. Balagurusamy
3. OOP with C++: Robort Laphore.

Name of Reference Books

1. Object Oriented Programming in C++ : StroutStrups.
2. Programming with C++ : Venugopal .
3. Programming with C++ : D Ravichandran
4. Let us C++ : Yashwant Kanetkar.

5. C++ and OOPs Paradigm by Debasish Jana (PHI)
6. OOP-P Sengupta & B.B. Choudhari (PHI)
7. OOP with C++ by M.P. Bhave & S. A. Patekar (Pearson Education)
8. OOP with C++ : Poonamchanda Sarang (PHI)

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG 492 010

Department of Information Technology

SEMESTER – III

"Digital Electronics and Logic Design"

Theory Periods: 30 Tutorials: "10"

Credits: 4 Code: IT306

UNIT I

CODES-Binary codes: Introduction & usefulness, Weighted & Non-weighted codes, Sequential codes, self complementing codes, Cyclic codes, 8-4-2-1 BCD code, Excess-3 code, Gray code: Binary to Gray and Gray to binary code conversion, Error detecting code, Error correcting code, 7-bit Hamming code, ASCII code, EBCDIC code. *Realization of Boolean Expressions:* Reduction of Boolean expressions using laws, theorems and axioms of Boolean Algebra, Boolean expressions and logic diagram, Converting AND/OR/Invert logic to NAND/NOR logic, SOP and POS Forms and their Realization.

UNIT II

MINIMIZATION TECHNIQUES**-**Expansion of a Boolean expression to SOP form, Expansion of a Boolean expression to POS form, Two, Three & Four variable K-Map: Mapping and minimization of SOP and POS expressions. Completely and Incompletely Specified Functions - Concept of Don't Care Terms; Quine – Mc Clusky Method.

UNIT III

COMBINATIONAL CIRCUITS**-***Adder & Subtractor:* Half adder, Full adder, half subtractor, Full subtractor, Parallel Binary adder, Look Ahead carry adder, Serial adder, BCD adder. Code converter, Parity bit generator/Checker, Comparator. *Decoder*: 3-line to 8-line decoder, 8-4-2-1 BCD to Decimal decoder, BCD to Seven segment decoder. *Encoder*: Octal to binary and Decimal to BCD encoder. *Multiplexer*: 2- input multiplexer, 4-input multiplexer, 16-input multiplexer *Demultiplexer:* 1-line to 4-line & 1-line to 8- line demultiplexer, Multiplexer as Universal Logic Function Generator, Programmed Array Logic (PAL). PLA and PLD.

UNIT IV

SEQUENTIAL CIRCUITS-*Flip-Flops & Timing Circuit*: S-R Latch; Gated S-R Latch; D Latch; J-K flip-Flop; T Flip-Flip: Edge Triggered S-R, D, J-K and T Flips-Flops; Master - Slave Flip-Flops; Direct Preset and Clear Inputs. *Shift Registers:* PIPO, SIPO, PISO, SISO, Bi-Directional Shift Registers; Universal Shift register. *Counter:* Asynchronous Counter: Ripple Counters; Design of asynchronous counters, Effects of propagation delay in Ripple counters, Synchronous Counters: 4-bit synchronous up counter, 4-bit synchronous down counter, Design of synchronous counters, Ring counter, Jhonson counter, Pulse train generators using counter, Design of Sequence Generators; Digital Clock using Counters.

UNIT V

DIGITAL LOGIC FAMILIES-Introduction; Simple Diode Gating and Transistor Inverter; Basic Concepts of RTL and DTL; *TTL*: Open collector gates, TTL subfamilies, IIL, ECL; MOS Logic: CMOS Logic, Dynamic MOS Logic, Interfacing: TTL to ECL, ECL to TTL, TTL to CMOS, CMOS to TTL, Comparison among various logic families, Manufacturer's specification.

Name of Text Books :

1. Fundamentals of Digital Circuits: A. Anand Kumar, PHI
2. Digital Integrated Electronics: H. Taub and D. Schilling: TMH

Name of Reference Books :

1. Digital Fundamentals: Floyd & Jain: Pearson Education
2. Digital Electronics: A.P. Malvino: TMH.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG 492 010

Department of Information Technology

SEMESTER – III

Semester: III	**Code: IT 391**
Subject: Data Structure Lab	
Credits: 2	

List of 10 -15 Assignment/Practical will be allotted by the Instructor in the respective Lab.

Semester: III	**Code: IT 392**
Subject: Basic Electronics Lab	
Credits: 2	

List of 10 -15 Assignment/Practical will be allotted by the Instructor in the respective Lab.

Semester: III	**Code: IT 393**
Subject: Computer Programming Lab	
Credits: 2	

List of 10 -15 Assignment/Practical will be allotted by the Instructor in the respective Lab.

Semester: III	
Subject: Value Education	
Credits: 1	

List of 10 -15 Assignment/Practical will be allotted by the Instructor in the respective Lab.

Semester: III	
Subject: Discipline	
Credits: 1	