Syllabus for B.Tech(Information Technology) Second Year

Revised Syllabus of B.Tech IT (To be followed from the academic session, July 2011, i.e. for the students who were admitted in Academic Session 2010-2011)
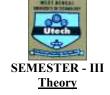
IT

Sl.No.	Field	Theory	L	T	P	Total	Cr. Points
A. THEORY			**Contact Hours/Week**				**Cr. Points**
1	HU301	Values & Ethics in Profession	3	0	0	3	3
2	PH301	Physics-2	3	1	0	4	4
3	CH301	Basic Environmental Engineering & Elementary Biology;	3	0	0	3	3
4	CS301	Analog & Digital Electronics	3	0	0	3	3
5	CS302	Data Structure & Algorithm	3	1	0	4	4
6	CS303	Computer Organisation	3	1	0	4	4
		Total of Theory				**21**	**21**
B. PRACTICAL							
7	PH391	Physics-2	0	0	3	3	2
8	CS391	Analog & Digital Electronics	0	0	3	3	2
9	CS392	Data Structure & Algorithm	0	0	3	3	2
10	CS393	Computer Organisation	0	0	3	3	2
		Total of Practical				**12**	**8**
		Total of Semester				**33**	**29**

Second Year - Fourth Semester

Sl.No.	Field	Theory	L	T	P	Total	Cr. Points
A. THEORY			**Contact Hours/Week**				**Cr. Points**
1	M(CS)401	Numerical Methods	2	1	0	3	2
2	M401	Mathematics-3	3	1	0	4	4
3	CS401	Communication Engg & Coding Theory	2	0	0	3	3
4	CS402	Formal Language & Automata Theory	3	1	0	4	4
5	IT401	Object Oriented Programming & UML	3	1	0	4	4
		Total of Theory				**18**	**17**
B. PRACTICAL							
6	HU481	Technical Report Writing & Language Lab Practice	0	0	3	3	2
7	M(CS)491	Numerical Methods	0	0	2	2	1
8	CS491	Communication Engg & Coding Theory	0	0	3	3	2
9	CS492	Software Tools	0	0	3	3	2
10	IT491	Object Oriented Programming & UML (IT)	0	0	3	3	2
		Total of Practical				**14**	**9**
		Total of Semester				**32**	**26**

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SEMESTER - III
Theory

VALUES & ETHICS IN PROFESSION

HU-301
Contracts:3L
Credits- 3

Science, Technology and Engineering as knowledge and as Social and Professional Activities

Effects of Technological Growth:

Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development
Energy Crisis: Renewable Energy Resources
Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics
Appropriate Technology Movement of Schumacher; later developments
Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis.
Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.

Ethics of Profession:

Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.

Profession and Human Values:

Values Crisis in contemporary society
Nature of values: Value Spectrum of a good life
Psychological values: Integrated personality; mental health
Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution.
Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity
Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.
Books:

1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994 (2nd Ed)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.

Physics-2
Code: PH-301
Contacts: 4L
Credit: 3+1

Module 1:

Vector Calculus:

1.1 Physical significances of grad, div, curl. Line integral, surface integral, volume integral- physical examples

in the context of electricity and magnetism and statements of Stokes theorem and Gauss theorem [No Proof].

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Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates.

2L

Module 2 :

Electricity

2.1 Coulumbs law in vector form. Electrostatic field and its curl. Gauss's law in integral form and conversion to differential form . Electrostatic potential and field, Poisson's Eqn. Laplace's eqn (Application to Cartesian, Spherically and Cylindrically symmetric systems – effective 1D problems) Electric current, drift velocity, current density, continuity equation, steady current.   5L

2.2 Dielectrics-concept of polarization, the relation $D=\varepsilon_0 E+P$, Polarizability. Electronic polarization and polarization in monoatomic and polyatomic gases.   3L

Module 3:

Magnetostatics & Time Varying Field:

3. Lorentz force, force on a small current element placed in a magnetic field. Biot-Savart law and its applications, divergence of magnetic field, vector potential, Ampere's law in integral form and conversion to differential form. Faraday's law of electro-magnetic induction in integral form and conversion to differential form.   3L

Module 4:

Electromagnetic Theory:

4.1 Concept of displacement current Maxwell's field equations, Maxwell's wave equation and its solution for free space. E.M. wave in a charge free conducting media, Skin depth, physical significance of Skin Depth, E.M. energy flow, & Poynting Vector.

6L

Module 5:

Quantum Mechanics:

5.1 Generalised coordinates, Lagrange's Equation of motion and Lagrangian, generalised force potential, momenta and energy. Hamilton's Equation of motion and Hamiltonian. Properties of Hamilton and Hamilton's equation of motion.   4L

Course should be discussed along with physical problems of 1-D motion

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5.2 Concept of probability and probability density, operators, commutator. Formulation of quantum mechanics and Basic postulates, Operator correspondence, Time dependent Schrödinger's equation, formulation of time independent Schrödinger's equation by method of separation of variables, Physical interpretation of wave function ψ (normalization and probability interpretation), Expectation values, Application of Schrödinger equation – Particle in an infinite square well potential (1-D and 3-D potential well), Discussion on degenerate levels.   9L

Module 6:

Statistical Mechanics:

3.1 Concept of energy levels and energy states. Microstates, macrostates and thermodynamic probability, equilibrium macrostate. MB, FD, BE statistics (No deduction necessary), fermions, bosons (definitions in terms of spin, examples), physical significance and application, classical limits of quantum statistics Fermi distribution at zero & non-zero temperature, Calculation of Fermi level in metals, also total energy at absolute zero of temperature and total number of particles, Bose-Einstein statistics – Planck's law of blackbody radiation..

                                                         7L

Basic Environmental Engineering & Elementary Biology
Code: CH301
Contacts: 3L = 3
Credits: 3

General

Basic ideas of environment, basic concepts, man, society & environment, their interrelationship.

                                                         1L

Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development.

                                                         2L

Materials balance: Steady state conservation system, steady state system with non conservative pollutants, step function.   1L

Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management; Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering.

                                                         2L

Ecology

Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function.   1L

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Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web. 2L

Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. 1L

Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity. 2L

Air pollution and control

Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere, Tropopause and Mesopause. 1L

Energy balance: Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems. 1L

Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food.Global warming and its consequence, Control of Global warming. Earth's heat budget. 1L

Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). 2L

Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. 2L

Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant.

Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. 2L

Smog, Photochemical smog and London smog.

Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green house gases, effect of ozone modification. 1L

Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference). 1L

Water Pollution and Control

Hydrosphere, Hydrological cycle and Natural water.

Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. 2L

River/Lake/ground water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH.

<div align="center">2L</div>

Lake: Eutrophication [Definition, source and effect].   1L

Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only)   1L

Standard and control: Waste water standard [BOD, COD, Oil, Grease],

Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening]

Waste water treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition.

<div align="center">2L</div>

Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic

<div align="center">1L</div>

Land Pollution

Lithosphere; Internal structure of earth, rock and soil   1L

Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling.

Solid waste management and control (hazardous and biomedical waste).   2L

Noise Pollution

Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise]   1L

Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, L_{10} (18 hr Index), Ld_n.

Noise pollution control.   1L

Environmental Management:

Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.   2L

References/Books

1. Masters, G. M., "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd., 1991.
2. De, A. K., "Environmental Chemistry", New Age International.

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Analog & Digital Electronics
Code: CS301
Contact: 3L
Cr: 3

Pre-requisite of Analog Electronics: Basic Electronics Parts I & II learned in the First year, semesters 1 & 2. Basic concept of the working of P-N diodes, Schottky diodes, Basic BJTs, Basic FETs and OPAMP as a basic circuit component. Concept of Feedback.

Module -1: [9L]
3. Different Classes of Amplifiers - (Class-A, B, AB and C - basic concepts, power, efficiency [2L]; Recapitulation of basic concepts of Feedback and Oscillation [1L], Phase Shift, Wein Bridge oscillators [2L].   (5L)
4. Astable & Monostable Multivibrators [1L]; Schimtt Trigger circuits [1L], 555 Timer [2L].
(4L)

[*Learning Outcome*: The learner will be trained to compare the merits and demerits of the different amplifiers and must be able to bias the transistors accordingly; the student must be able to design multivibrator circuits using 555 timers]

Pre-requisite of Digital Electronics: Binary numbers & Basic Boolean algebra – already covered in First year; Logic gates, Truth Tables and function realization – already covered in First year upto minimisation of Logic expressions by algebraic method, K-map,

Module – 2:   [11 L]
1. Binary Number System & Boolean Algebra (recapitulation) [1L]; BCD, ASCII, EBDIC, Gray codes and their conversions [1L]; Signed binary number representation with 1's and 2's complement methods [1L], Binary arithmetic, Venn diagram, Boolean algebra (recapitulation) [1L]; Representation in SOP and POS forms [1L]; Minimization of logic expressions by algebraic method. [2L]
   (7L)
2. Combinational circuits - Adder and Subtractor circuits (half & full adder & subtractor) [2L]; Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator [2L].
   (4L)

   Module - 3:   [10L]
a) Sequential Circuits - Basic Flip-flop & Latch [1L], Flip-flops -SR, JK, D, T and JK Master-slave Flip Flops [3L],   (4L)
b) Registers (SISO,SIPO,PIPO,PISO) [2L], Ring counter, Johnson counter [1L], Basic concept of Synchronous and Asynchronous counters (detail design of circuits excluded), [2L], Design of Mod N Counter [2L]   (6L)

   Module – 4:   [6L]
1. A/D and D/A conversion techniques – Basic concepts (D/A :R-2-R only [2L]
   A/D: successive approximation [2L])   (4L)
2. Logic families- TTL, ECL, MOS and CMOS - basic concepts.   (2L)

[*Learning Outcome*: The student must be able to convert from one number system to another, work out problems related to Boolean algebra, minimisation problems etc. The student must also learn to differentiate between the combinational and sequential circuits and design simple circuits)
Total: 36 hours

Textbooks:
Microelectronics Engineering - Sedra & Smith-Oxford.
Principles of Electronic Devices & circuits—B L Thereja & Sedha—S Chand
Digital Electronics – Kharate – Oxford
Digital Electronics – Logic & Systems by J.Bigmell & R.Donovan; Cambridge Learning.

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Digital Logic and State Machine Design (3rd Edition) – D.J.Comer, OUP
Reference:
Electronic Devices & Circuit Theory – Boyelstad & Nashelsky - PHI
Bell-Linear IC & OP AMP—Oxford
P.Raja- Digital Electronics- Scitech Publications
Morries Mano- Digital Logic Design- PHI
R.P.Jain—Modern Digital Electronics, 2/e , Mc Graw Hill
H.Taub & D.Shilling, Digital Integrated Electronics- Mc Graw Hill.
D.Ray Chaudhuri- Digital Circuits-Vol-I & II, 2/e- Platinum Publishers
Tocci, Widmer, Moss- Digital Systems,9/e- Pearson
J.Bignell & R.Donovan-Digital Electronics-5/e- Cenage Learning.
Leach & Malvino—Digital Principles & Application, 5/e, Mc Graw Hill
Floyed & Jain- Digital Fundamentals-Pearson.

Data Structure & Algorithm
Code: CS302
Contacts: 3L +1T
Credits: 4

Pre-requisites: CS 201 (Basic Computation and Principles of C), M101 & M201 (Mathematics), basics of set theory

Module -I. [8L] Linear Data Structure
Introduction (2L):
Why we need data structure?
Concepts of data structures: a) Data and data structure b) Abstract Data Type and Data Type.
Algorithms and programs, basic idea of pseudo-code.
Algorithm efficiency and analysis, time and space analysis of algorithms – order notations.
Array (2L):
Different representations – row major, column major.
Sparse matrix - its implementation and usage. Array representation of polynomials.
Linked List (4L):
Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.

Module -II: [7L] Linear Data Structure
[Stack and Queue (5L):
Stack and its implementations (using array, using linked list), applications.
Queue, circular queue, dequeue. Implementation of queue- both linear and circular (using array, using linked list), applications.
Recursion (2L):
Principles of recursion – use of stack, differences between recursion and iteration, tail recursion.
Applications - The Tower of Hanoi, Eight Queens Puzzle.

Module -III. [15L] Nonlinear Data structures
Trees (9L):
Basic terminologies, forest, tree representation (using array, using linked list).
Binary trees - binary tree traversal (pre-, in-, post- order), threaded binary tree (left, right, full) - non-recursive traversal algorithms using threaded binary tree, expression tree.
Binary search tree- operations (creation, insertion, deletion, searching).
Height balanced binary tree – AVL tree (insertion, deletion with examples only).
B- Trees – operations (insertion, deletion with examples only).
Graphs (6L):

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Graph definitions and concepts (directed/undirected graph, weighted/un-weighted edges, sub-graph, degree, cut-vertex/articulation point, pendant node, clique, complete graph, connected components – strongly connected component, weakly connected component, path, shortest path, isomorphism).

Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list.

Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, forward-edge), applications.

Minimal spanning tree – Prim's algorithm (basic idea of greedy methods).

Module - IV. Searching, Sorting (10L):
Sorting Algorithms (5L): Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap, application – priority queue), radix sort.
Searching (2L): Sequential search, binary search, interpolation search.
Hashing (3L): Hashing functions, collision resolution techniques.

Recommended books:
1. "Data Structures And Program Design In C", 2/E by Robert L. Kruse, Bruce P. Leung.
2. "Fundamentals of Data Structures of C" by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.
3. "Data Structures in C" by Aaron M. Tenenbaum.
4. "Data Structures" by S. Lipschutz.
5. "Data Structures Using C" by Reema Thareja.
6. "Data Structure Using C", 2/e by A.K. Rath, A. K. Jagadev.
7. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.

Learning outcome:

Ideally this course should act as a primer/pre-requisite for CS 503 (Design and Analysis of Algorithms). On completion of this course, students are expected to be capable of understanding the data structures, their advantages and drawbacks, **how to implement them in C**, how their drawbacks can be overcome and **what the applications are** and **where they can be used**. Students should be able to learn about the data structures/ methods/algorithms mentioned in the course with a comparative perspective so as to make use of the most appropriate data structure/ method/algorithm in a program to enhance the efficiency (i.e. reduce the run-time) or for better memory utilization, based on the priority of the implementation. Detailed time analysis of the graph algorithms and sorting methods are expected to be covered in CS 503 but it is expected that the students will be able to understand at least the efficiency aspects of the graph and sorting algorithms covered in this course. The students should be able to convert an inefficient program into an efficient one using the knowledge gathered from this course.

Computer organization
Code: CS303
Contacts: 3L +1T
Credits: 4

Pre-requisite: Concept of basic components of a digital computer, Basic concept of Fundamentals & Programme structures. Basic number systems, Binary numbers, representation of signed and unsigned numbers, Binary Arithmetic as covered in Basic Computation & Principles of Computer Programming Second semester, first year. Boolean Algebra, Karnaugh Maps, Logic Gates – covered in Basic Electronics in First year

Module – 1: [8L]
Basic organization of the stored program computer and operation sequence for execution of a program.
Role of operating systems and compiler/assembler.
Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format.
Instruction sets and addressing modes.   [7L]

Commonly used number systems. Fixed and floating point representation of numbers.   [1L]

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Module – 2: [8L]
Overflow and underflow.
Design of adders - ripple carry and carry look ahead principles. [3L]

Design of ALU. [1L]
Fixed point multiplication -Booth's algorithm. [1L]
Fixed point division - Restoring and non-restoring algorithms. [2L]
Floating point - IEEE 754 standard.   [1L]

Module – 3: [10L]
Memory unit design with special emphasis on implementation of CPU-memory interfacing. [2L]
Memory organization, static and dynamic memory, memory hierarchy, associative memory. [3L]
Cache memory, Virtual memory. Data path design for read/write access.   [5L]

Module – 4: [10L]
Design of control unit - hardwired and microprogrammed control. [3L]
Introduction to instruction pipelining.   [2L]
Introduction to RISC architectures. RISC vs CISC architectures. [2L]
I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA. [3L]

Learning Outcome:

Additional Tutorial Hours will be planned to meet the following learning outcome.

Through this course, the students will be exposed to extensive development and use of computer organization based concepts for the future knowledge outcome of Advanced Computer Architecture offered in subsequent semester. The students will be able to understand different instruction formats, instruction sets, I/O mechanism. Hardware details, memory technology, interfacing between the CPU and peripherals will be transparent to the students. Students will be able to design hypothetical arithmetic logic unit.

Text Book:
1. Mano, M.M., "Computer System Architecture", PHI.
2. Behrooz Parhami " Computer Architecture", Oxford University Press

Reference Book:
1. Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
2. Hamacher, "Computer Organisation", McGraw Hill,
3. N. senthil Kumar, M. Saravanan, S. Jeevananthan, "Microprocessors and Microcontrollers"   OUP
4. Chaudhuri P. Pal, "Computer Organisation & Design", PHI,
5. P N Basu- "Computer Organization & Architecture" , Vikas Pub

Practical

Physics Lab-2
Code: PH-391
Contacts: (3P)
Credit: (2)

Group 1: Experiments on Electricity and Mangentism

1. Determination of dielectric constant of a given dielectric material.
3. Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance.
4. Determination of the thermo-electric power at a certain temperature of the given thermocouple.

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5. Determination of specific charge (e/m) of electron by J.J. Thomson's method.

Group 2: Quantum Physics

6. Determination of Planck's constant using photocell.
7. Determination of Lande'g factor using Electron spin resonance spetrometer.
8. Determination of Stefan's radiation constant
9. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
10. Determination of Rydberg constant by studying Hydrogen/ Helium spectrum

Group 3: Modern Physics

11. Determination of Hall co-efficient of semiconductors.
12. Determination of band gap of semiconductors.

13. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells.

a) A candidate is required to perform 3 experiments taking one from each group. Initiative should be taken so that most of the Experiments are covered in a college in the distribution mentioned above. Emphasis should be given on the estimation of error in the data taken.

b) In addition a student should perform one more experiments where he/she will have to transduce the output of any of the above experiments or the experiment mentioned in c] into electrical voltage and collect the data in a computer using phoenix or similar interface.

c) Innovative experiment: One more experiment designed by the student or the concerned teacher or both.

Note:

i. Failure to perform each experiment mentioned in b] and c] should be compensated by two experiments mentioned in the above list.
ii. At the end of the semester report should sent to the board of studies regarding experiments, actually performed by the college, mentioned in b] and c]
iii. Experiment in b] and c] can be coupled and parts of a single experiment.

Recommended Text Books and Reference Books:
For Both Physics I and II
1. B. Dutta Roy (Basic Physics)
2. R.K. Kar (Engineering Physics)
3. Mani and Meheta (Modern Physics)
4.. Arthur Baiser (Perspective & Concept of Modern Physics)

Physics I (PH101/201)
Vibration and Waves
5. Kingsler and Frey
6. D.P. Roychaudhury
7. N.K. Bajaj (Waves and Oscillations)
8. K. Bhattacharya
9. R.P. Singh (Physics of Oscillations and Waves)
10. A.B. Gupta (College Physics Vol.II)
11. Chattopadhya and Rakshit (Vibration, Waves and Acoustics)
Optics
1. Möler (Physical Optics)
2. A.K. Ghatak
3. E. Hecht (Optics)
4. E. Hecht (Schaum Series)

5.   F.A. Jenkins and H.E. White
6.   6. Chita Ranjan Dasgupta (Degree Physics Vol 3)

Quantum Physics
1.   Eisberg and Resnick
2.   A.K. Ghatak and S. Lokenathan
3.   S.N. Ghoshal (Introductory Quantum Mechanics)
4.   E.E. Anderson (Modern Physics)
5.   Haliday, Resnick and Crane (Physics vol.III)
6.   Binayak Dutta Roy [Elements of Quantum Mechanics]

Crystallography
1.   S.O. Pillai (a. Solid state physics b. Problem in Solid state physics)
2.   A.J. Dekker
3.   Aschroft and Mermin
4.   Ali Omar
5.   R.L. Singhal
6.   Jak Tareen and Trn Kutty (Basic course in Crystallography

Laser and Holography
1.   A.K. Ghatak and Thyagarajan (Laser)
2.   Tarasov (Laser)
3.   P.K. Chakraborty (Optics)
4.   B. Ghosh and K.G. Majumder (Optics)
5.   B.B. Laud (Laser and Non-linear Optics)
6.   Bhattacharyya [Engineering Physics] Oxford

Physics II(PH 301)

Classical Mechanics (For Module 5.1 in PH 301)
H. Goldstein
A.K. Roychaudhuri
R.G. Takwal and P.S. Puranik
Rana and Joag
M. Speigel (Schaum Series)
J.C. Upadhya (Mechanics)

Electricity and Magnetism
2.   Reitz, Milford and Christy
3.   David J. Griffith
4.   D. Chattopadhyay and P.C. Rakshit
5.   Shadowitz (The Electromagnetic Field)

Quantum Mechanics
7.   Eisberg and Resnick
8.   A.K. Ghatak and S. Lokenathan
9.   S.N. Ghoshal (Introductory Quantum Mechanics)
10.   E.E. Anderson (Modern Physics)
11.   Haliday, Resnick and Crane (Physics vol.III)
12.   Binayak Dutta Roy [Elements of Quantum Mechanics]

Statistical Mechanics
8.   Sears and Sallinger (Kinetic Theory, Thermodynamics and   Statistical Thermodynamics)
9.   Mondal (Statistical Physics)
10.   S.N. Ghoshal (Atomic and Nuclear Physics)
11.   Singh and Singh

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12.	B.B. Laud (Statistical Mechanics)
13.	F. Reif (Statistical Mechanics)

Dilectrics
7.	Bhattacharyya [Engineering Physics] Oxford

Analog & Digital Electronics
Code: CS391
Contact: 3
Cr: 2

ANALOG: At least any two of the following

1. Design a Class A amplifier
2. Design a Phase-Shift Oscillator
3. Design of a Schmitt Trigger using 555 timer.

DIGITAL : At least any five of the following

3.	Design a Full Adder using basic gates and verify its output / Design a Full Subtractor circuit using basic gates and verify its output.
    4.	Construction of simple Decoder & Multiplexer circuits using logic gates.
    5.	Realization of RS / JK / D flip flops using logic gates.
    6.	Design of Shift Register using J-K / D Flip Flop.
    7.	Realization of Synchronous Up/Down counter.
    8.	Design of MOD- N Counter
    9.	Study of DAC .

Any one experiment specially designed by the college.

(Detailed instructions for Laboratory Manual to follow for further guidance. The details will be uploaded in the website from time to time)

Data Structure & Algorithm
Code: CS392
Contacts: 3
**Credits:	2**

Experiments should include but not limited to :
Implementation of array operations:
Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem :
Evaluation of expressions operations on Multiple stacks & queues :
Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists:
Polynomial addition, Polynomial multiplication
Sparse Matrices : Multiplication, addition.
Recursive and Nonrecursive traversal of Trees
Threaded binary tree traversal. AVL tree implementation
Application of Trees. Application of sorting and searching algorithms
Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

(Detailed instructions for Laboratory Manual to follow for further guidance. The details will be uploaded in the website from time to time)

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Computer organization
Code: CS393
Contacts: 3
Credits: 2

1. Familiarity with IC-chips, e.g.
a) Multiplexer , b) Decoder, c) Encoder b) Comparator
   Truth Table verification and clarification from Data-book.
2. Design an Adder/Subtractor composite unit .
3. Design a BCD adder.
4. Design of a 'Carry-Look-Ahead' Adder circuit.
5. Use a multiplexer unit to design a composite ALU .
6. Use ALU chip for multibit arithmetic operation.
7. Implement read write operation using RAM IC.
8. (a) & (b) Cascade two RAM ICs for vertical and horizontal expansion.

(Detailed instructions for Laboratory Manual to follow for further guidance. The details will be uploaded in the website from time to time)

SEMESTER - IV

Theory

NUMERICAL METHODS
Code: M (CS) 401
Contacts: 2L+1T
Credits: 2

Approximation in numerical computation: Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors. (4)

Interpolation: Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation.
(5)
Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms.
(3)

Numerical solution of a system of linear equations:
Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method.
(6)
Numerical solution of Algebraic equation:
 Bisection method, Regula-Falsi method, Newton-Raphson method.   (4)

Numerical solution of ordinary differential equation: Euler's method, Runge-Kutta methods, Predictor-Corrector methods and Finite Difference method.   (6)

Text Books:
1. C.Xavier: C Language and Numerical Methods.
2. Dutta & Jana: Introductory Numerical Analysis.
3. J.B.Scarborough: Numerical Mathematical Analysis.
4. Jain, Iyengar , & Jain: Numerical Methods (Problems and Solution).

References:
 1. Balagurusamy: Numerical Methods, Scitech.

2. Baburam: Numerical Methods, Pearson Education.
3. N. Dutta: Computer Programming & Numerical Analysis, Universities Press.
4. Soumen Guha & Rajesh Srivastava: Numerical Methods, OUP.

Srimanta Pal: Numerical Methods, OUP

Subject Name: MATHEMATICS

Code: M 401

Contacts: 3L +1T = 4

Credits: 4

Note 1: The whole syllabus has been divided into five modules.

Note 2: Structure of the question paper

There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the five modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have two or three parts covering not more than two modules. Sufficient questions should to be set covering the whole syllabus for alternatives.

Module I

Theory of Probability: Axiomatic definition of probability. Conditional probability. Independent events and related problems. Bayes theorem (Statement only) & its application. One dimensional random variable. Probability distributions-discrete and continuous. Expectation. Binomial, Poisson, Uniform, Exponential, Normal distributions and related problems. t, χ^2 and F-distribution (Definition only). Transformation of random variables. Central Limit Theorem, Law of large numbers (statement only) and their applications. Tchebychev inequalities (statement only) and its application. **(14L)**

Module II

Sampling theory: Random sampling. Parameter, Statistic and its Sampling distribution. Standard error of statistic. Sampling distribution of sample mean and variance in random sampling from a normal distribution (statement only) and related problems.

Estimation of parameters: Unbiased and consistent estimators. Point estimation. Interval estimation. Maximum likelihood estimation of parameters (Binomial, Poisson and Normal). Confidence intervals and related problems. **(7L)**

Module III

Testing of Hypothesis: Simple and Composite hypothesis. Critical region. Level of significance. Type I and Type II errors. One sample and two sample tests for means and proportions. χ^2 - test for goodness of fit. **(5L)**

Module IV

Advanced Graph Theory: Planar and Dual Graphs. Kuratowski's graphs. Homeomorphic graphs. Eulers formula (n - e + r = 2) for connected planar graph and its generalisation for graphs with connected components. Detection of planarity. Graph colouring. Chromatic numbers of C_n, K_n, $K_{m,n}$ and other simple graphs. Simple

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applications of chromatic numbers. Upper bounds of chromatic numbers (Statements only). Chromatic polynomial. Statement of four and five colour theorems. **(10L)**

Module V

Algebraic Structures**:** Group, Subgroup, Cyclic group, Permutation group, Symmetric group (S_3), Coset,

Normal subgroup, Quotient group, Homomorphism & Isomorphism

(Elementary properties only).

Definition of Ring, Field, Integral Domain and simple related problems. **(12L)**

Text Books:
1. Banerjee A., De S.K. and Sen S.: Mathematical Probability, U.N. Dhur & Sons.
2. Gupta S. C and Kapoor V K: Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
3. Mapa S.K. :Higher Algebra (Abstract & Linear), Sarat Book Distributors.
4. Sen M.K., Ghosh S. and Mukhopadhyay P.: Topics in Abstract Algebra, University Press.
5. West D.B.: Introduction to Graph Theory, Prentice Hall.

References:
1. Babu Ram: Discrete Mathematics, Pearson Education.
2. Balakrishnan: Graph Theory (Schaum's Outline Series), TMH.
3. Chakraborty S.K and Sarkar B.K.: Discrete Mathematics, OUP.
4. Das N.G.: Statistical Methods, TMH.
5. Deo N: Graph Theory with Applications to Engineering and Computer Science, Prentice Hall.
6. Khanna V.K and Bhambri S.K. : A Course in Abstract Algebra, Vikas Publishing House.
7. Spiegel M R., Schiller J.J. and Srinivasan R.A. : Probability and Statistics (Schaum's Outline Series), TMH.
8. Wilson: Introduction to graph theory, Pearson Edication.

Communication Engineering & Coding Theory
Code: CS401
Contacts: 2L
Credits: 3

Module - 1**:** ***Elements of Communication system, Analog Modulation & Demodulation, Noise, SNR* Analog-to-Digital Conversion**. (Basic ideas in brief) [8]
[Details: Introduction to Base Band transmission & Modulation (basic concept) *(1L);* Elements of Communication systems (mention of transmitter, receiver and channel); origin of noise and its effect, Importance of SNR in system design *(1L);* Basic principles of Linear Modulation (Amplitude Modulation) *(1L);* Basic principles of Non-linear modulation (Angle Modulation - FM, PM) *(1L);* Sampling theorem, Sampling rate, Impulse sampling, Reconstruction from samples, Aliasing *(1L);* Analog Pulse Modulation - PAM (Natural & flat topped sampling), PWM, PPM *(1L);* Basic concept of Pulse Code Modulation, Block diagram of PCM *(1L);* Multiplexing - TDM, FDM *(1L);*

Module - 2**: Digital Transmission:** [8]
[Details: Concept of Quantisation & Quantisation error, Uniform Quantiser *(1L);* Non-uniform Quantiser, A-law & ☐law companding (mention only) *(1L);* Encoding, Coding efficiency *(1L);* Line coding & properties, NRZ & RZ, AMI, Manchester coding PCM, DPCM *(1L);* Baseband Pulse Transmission, Matched filter (mention of its importance and basic concept only), Error rate due to noise *(2L);* ISI, Raised cosine function, Nyquist criterion for distortion-less base-band binary transmission, Eye pattern, Signal power in binary digital signals *(2L);*

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Module - 3: Digital Carrier Modulation & Demodulation Techniques: [8]
[Details: Bit rate, Baud rate *(1L);* Information capacity, Shanon's limit *(1L);* M-ary encoding, Introduction to the different digital modulation techniques - ASK, FSK, PSK, BPSK, QPSK, mention of 8 BPSK, 16 BPSK *(2L);* Introduction to QAM, mention of 8QAM, 16 QAM without elaboration *(1L);* Delta modulation, Adaptive delta modulation (basic concept and importance only, no details *(1L);* introduction to the concept of DPCM, Delta Modulation, Adaptive Delta modulation and their relevance *(1L);* Spread Spectrum Modulation - concept only. *(1L)*.

Module - 4: Information Theory & Coding: [8]
[Details: Introduction, News value & Information content *(1L);*, Entropy *(1L);*, Mutual information *(1L);*, Information rate *(1L);*, Shanon-Fano algorithm for encoding *(1L);*, Shannon's Theorem - Source Coding Theorem *(1L);*, Channel Coding Theorem, Information Capacity Theorem (basic understanding only) *(1L);*; Error Control & Coding - basic principle only. *(1L);*

Text Books:
11.2   An Introduction to Analog and Digital Communications by Simon Haykin; Published by Wiley India.
11.3   Data Communication and Networking by Behrouz A. Forouzan, Published by Tata McGraw-Hill

References:
7.   Communication Systems 4th Edition by Simon Haykin; Published by Wiley India (Student Edition)
8.   Principles and Analog and Digital Communication by Jerry D Gibson, Published by MacMillan.
9.   Communication Systems by A. B. Carlson, Published by McGraw-Hill.
10.   Understanding Signals and Systems by Jack Golten, Published by McGraw Hill.

Learning Outcome: [These are the minimum competence to be developed; the students will be encouraged to learn more and acquire better understanding.]
Module -1: The student will be able to differentiate between base-band transmission and modulation and **compute antenna size** from knowledge of carrier frequency; (Tutorial: To identify different communication processes based on these two methods and appreciate their relative merit and demerit); The learner will be able to **determine the carrier and message frequencies** from the expression for AM signals and Angle modulated signals. Given an expression for a modulated signal, the student must be able to **recognize the type of modulation**. The ability to explain each and every block of the PCM system must be acquired.

Module -2: The student must be able to appreciate the importance of digital modulation over analog modulation in respect of noise immunity (concept); The student will be able to compute the coding efficiency of binary and decimal coding systems; The relative merits and demerits of the different digital modulation techniques to be understood clearly; (Tutorial: Students should be encouraged to find out where these different modulation techniques are used in everyday life); Capability to calculate signal power in digital systems to be mastered.

Module -3: Ability to compute bit rate and baud rate for different signals to be developed; the student must be able to compare between the channel capacity in case of channels of varying band-width and SNR value and predict the maximum data rate possible; The learner must be able to compare the merits and short comings of the basic digital modulation techniques. (Tutorial: Find out the area of application for each with reason for such application)

Module -4: Student will be able to calculate the information content, entropy and information rate for given situations; He/she will be able to appreciate the importance of the different line coding and error coding techniques. (Tutorial: Find out the range of applicability).

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Formal Language & Automata Theory
Code: CS402
Contacts: 3L +1T
Credits: 4

Prerequisites of Formal Language & Automata Theory:

Elementary discrete mathematics including the notion of set,function,relation,product,partial order,equivalence relation,graph& tree. They should have a thorough understanding of the principle of mathematical induction.

Module-1: [13 L]

Fundamentals: Basic definition of sequential circuit, block diagram, mathematical representation, concept of transition table and transition diagram (Relating of Automata concept to sequential circuit concept) Design of sequence detector, Introduction to finite state model [2L]
Finite state machine: Definitions, capability & state equivalent, kth- equivalent concept [1L]
Merger graph, Merger table, Compatibility graph [1L]
Finite memory definiteness, testing table & testing graph. [1L]
Deterministic finite automaton and non deterministic finite automaton. [1L] Transition diagrams and Language recognizers. [1L]
Finite Automata: NFA with Î transitions - Significance, acceptance of languages. [1L]
Conversions and Equivalence: Equivalence between NFA with and without Î transitions. NFA to DFA conversion. [2L]
Minimization of FSM, Equivalence between two FSM's , Limitations of FSM [1L]
Application of finite automata, Finite Automata with output- Moore & Melay machine. [2L]

Learning outcome of Finite Automata:

The student will be able to define a system and recognize the behavior of a system. They will be able to minimize a system and compare different systems.

Module-2: [8 L]

Regular Languages : Regular sets. [1L]
Regular expressions, identity rules. Arden's theorem state and prove [1L]
Constructing finite Automata for a given regular expressions, Regular string accepted by NFA/DFA [1L]
Pumping lemma of regular sets. Closure properties of regular sets (proofs not required). [1L]
Grammar Formalism: Regular grammars-right linear and left linear grammars. [1L]
Equivalence between regular linear grammar and FA. [1L]
Inter conversion, Context free grammar. [1L]
Derivation trees, sentential forms. Right most and leftmost derivation of strings. (Concept only) [1L]

Learning outcome of Regular Languages and Grammar:

Student will convert Finite Automata to regular expression. Students will be able to check equivalence between regular linear grammar and FA.

Module-3: [9L]

Context Free Grammars, Ambiguity in context free grammars. [1L]
Minimization of Context Free Grammars. [1L]
Chomsky normal form and Greibach normal form. [1L]
Pumping Lemma for Context Free Languages. [1L]
Enumeration of properties of CFL (proofs omitted). Closure property of CFL, Ogden's lemma & its applications [1L]
Push Down Automata: Push down automata, definition. [1L]
Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. [1L]
Equivalence of CFL and PDA, interconversion. (Proofs not required). [1L]
Introduction to DCFL and DPDA. [1L]

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Learning outcome of PDA and context free grammar:

Students will be able to minimize context free grammar. Student will be able to check equivalence of CFL and PDA. They will be able to design Turing Machine.

Module-4:   [6L]
Turing Machine : Turing Machine, definition, model [1L]
Design of TM, Computable functions   [1L]
Church's hypothesis, counter machine   [1L]
Types of Turing machines (proofs not required)   [1 L]
Universal Turing Machine, Halting problem [2L]

Learning outcome of Turing Machine :
Students will be able to design Turing machine.

TEXT BOOKS:
   "Introduction to Automata Theory Language and Computation", Hopcroft H.E. and Ullman J. D., Pearson education.
   "Theory of Computer Science ", Automata Languages and computation", Mishra and Chandrashekaran, 2nd edition, PHI.
   "Formal Languages and Automata Theory", C.K.Nagpal, Oxford
REFERENCES:
      5.1 "Switching & Finite Automata", ZVI Kohavi, 2nd Edn., Tata McGraw Hill
      5.2 "Introduction to Computer Theory", Daniel I.A. Cohen, John Wiley
      5.3 "Introduction to languages and the Theory of Computation", John C Martin, TMH
      5.4 "Elements of Theory of Computation", Lewis H.P. & Papadimitrou C.H. Pearson, PHI.

Object Oriented Programming & UML
Code: IT401
Contacts: 3L+1T
Credits: 4

Prerequisites of Object Oriented Programming & UML:

The fundamental point in learning programming is to develop the critical skills of formulating programmatic solutions for real problems. It will be based on basic knowledge of algorithms and procedural programming language. Once the basic skill of writing programs using loop, methods and arrays will be clear then the student can develop object oriented software using class encapsulation and inheritance.

Module-1:   [10L]
Introduction:
Why object orientation, History and development of object oriented programming language, concepts of object oriented programming language.   [1L] Difference between OOP and other conventional programming – advantages and disadvantages.   [1L] Data types, variables.   Array, operators. [1L] String, I/O. [1L] Control statements.   [1L]
Object oriented design:
Major and minor elements, class fundamentals. [1L]; Declaring objects, instantiation of class, introducing methods. [1L]; Constructing objects using constructor. [1L]; Static variable, constants. [1L]; Visibility modifiers.   [1L]

Learning outcome of Introduction of OOP:

Students will be able to implement basic data structure and control statements in object oriented programming. They can write programs around its data i.e, objects and a set of well-defined interfaces to that data. Student will be able to design class with its basic features.

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Module-2: [8L]
Object Properties: Introduction to basic features of a class (encapsulation, polymorphism etc) [1L]; Data field encapsulation. [1L]; Passing objects to methods. [1L]; Array of objects, 'This' keyword [1L]; Relationships among objects: aggregation, composition, dependency, links. [1L]; Relationship among classes: association, aggregation. [1L]
Meta class, meta object. [1L]; Grouping constructs. [1L]

Learning outcome of Object oriented design:

Student will be able to design object oriented programs with the concept of object, class, abstraction, encapsulation, inheritance etc. to provide flexibility, modularity and re-usability in programming. They can also be able to design Meta classes and grouping construct.

Module-3: [11L]
Basic concepts of object oriented programming using Java:
Using objects as parameters, closure look at argument passing, returning objects. [1L]; Introducing access control, Final keyword, garbage collection, Nested and inner classes. [1L]; Class abstraction and encapsulation, Overloading of methods (overloading of constructor). [1L]; Super class, subclasses, super keyword, inheritance, types, member access.[1L]; Multilevel hierarchy, process of constructor calling in inheritance. [1L]; Overriding methods, overriding vs. overloading, polymorphism. [1L]; Abstract class, interface & comparison between abstract class and interface [1L]; Packages, importing packages. [1L]; Exception handling basics, types, using try &catch, throw, throws & finally. [1L];
Threading, synchronization & priorities, thread class, creating thread. [1L]; Basic applet programming. Life cycle. [1L];

Learning outcome of OOP using Java:

Students can write programs using Java to implement OOP i.e, encapsulation, polymorphism, aggregation etc., by which they will be able to compare the difference between OOP and other conventional programming languages. They will write programs by using the built-in support for multithreaded programming in java. They will also implement the GUI based event-driven application using Java applets.

Module-4: [8L]
Fundamentals of Object Oriented design in UML:
Introduction to UML: Why Modeling, Overview of UML, Conceptual Model, Architecture of UML [1L]; UML Modeling Types: Structural Modeling, Behavioral Modeling, Architectural Modeling [1L]; Basic Notations in UML [1L]; Class Diagram [1L]; Interaction and Collaboration Diagrams. [1L]; Sequence Diagram. [1L]; State chart Diagram and Activity Diagram. [1L]; Implementation Diagram and UML extensibility- model constraints.[1L]

Learning outcome of Object oriented design in UML:
Student will be able to design software through UML diagrams and identify the components of object oriented design and develop the relationship among them. They can also able to use UML to design software like Payroll Management System, Library Management System etc.

Textbooks/References:
1. Rambaugh, James Michael, Blaha-"Object Oriented Modelling and Design"-Prentice Hall, India
2. Ali Bahrami,-"Object Oriented System Development"-Mc Graw Hill
3. Patrick Naughton, Herbert Schildt-"The complete reference-Java2"-TMH
4. Sourav Sahay-"Object-Oriented Programming with C++"-Oxford
5. Jason T. Roff, UML: A Beginner's Guide, TMH
6. Grady Booch, Ivar Jacobson, James Rumbaugh, , "The Unified Modeling Language Reference Manual", Pearson Ed.
7. Blaha, Rumbaugh, "Object-Oriented Modeling and Design with UML", Pearson Ed.

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Practical

Communication Skill & Report Writing
Code: HU481
Cr-2
Guidelines for Course Execution:

Objectives of this Course: This course has been designed:
1. **To inculcate a sense of confidence in the students.**
2. **To help them become good communicators both socially and   professionally.**
3. **To assist them to enhance their power of Technical Communication.**

Detailed Course Outlines:
 A. *Technical Report Writing* :   2L+6P

1. Report Types (Organizational / Commercial / Business / Project)
2. Report Format & Organization of Writing Materials
3. Report Writing (Practice Sessions & Workshops)

B. *Language Laboratory Practice*

I. Introductory Lecture to help the students get a clear idea of   Technical Communication & the need of Language Laboratory
Practice Sessions   2L
   2. Conversation Practice Sessions: (To be done as real life interactions)
2L+4P
   a) Training the students by using Language Lab Device/Recommended Texts/cassettes /cd's to get their Listening Skill & Speaking Skill honed
   b) Introducing Role Play & honing over all Communicative   Competence
 3. Group Discussion Sessions: 2L+6P
  a) Teaching Strategies of Group Discussion
  b) Introducing Different Models & Topics of Group Discussion
 c) Exploring Live /Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure
Interview Sessions;   2L+6P
   a) *Training students to face Job Interviews confidently and successfully*
   b) *Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication*

   4. *Presentation: 2L+6P*
   a) *Teaching Presentation as a skill*
   b) *Strategies and Standard Practices of Individual /Group Presentation*
   c) *Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids*

   5. *Competitive Examination: 2L+2P*
   a) *Making the students aware of Provincial /National/International Competitive Examinations*
   b) *Strategies/Tactics for success in Competitive Examinations*
   c) *SWOT Analysis and its Application in fixing Target*

   Books – Recommended:
 Nira Konar: English Language Laboratory: A Comprehensive Manual
                                                              PHI Learning, 2011
 D. Sudharani: Advanced Manual for Communication Laboratories &
                          Technical Report Writing
                     Pearson Education (W.B. edition), 2011
   References:

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Adrian Duff et. al. (ed.):   *Cambridge Skills for Fluency*
   A) Speaking (Levels 1-4 Audio Cassettes/Handbooks)
   B) Listening (Levels 1-4 Audio Cassettes/Handbooks)
                  Cambridge University Press 1998
Mark Hancock: English Pronunciation in Use
                  4 Audio Cassettes/CD'S   OUP 2004

NUMERICAL METHODS
Code : M(CS) 491
Contacts : 2L
Credits :1

1. Assignments on Newton forward /backward, Lagrange's interpolation.

2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule.

3. Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.

4. Assignments on numerical solution of Algebraic Equation by Regular-falsi and Newton Raphson methods.

5. Assignments on ordinary differential equation: Euler's and Runga-Kutta methods.

6. Introduction to Software Packages: Matlab / Scilab / Labview / Mathematica.

Communication Engineering & Coding Theory
Code : CS 491
Contacts : 3L
Credits :2

Practical Designs & Experiments:
Module - 1: Generation of Amplitude Modulation (Design using transistor or Balanced Modulator Chip (to view the wave shapes)
Module - 2: Generation of FM using VCO chip (to view the wave shapes)
Module - 3: Generation of PAM
Module - 4: Generation of PWM & PPM (using IC 555 Timer)

Software Tools
Code : CS 492
Contacts : 3L
Credits :2

8.   Introduction to Visual Basic & difference with BASIC. Concept about form Project, Application, Tools, Toolbox,
   i.   Controls & Properties. Idea about Labels, Buttons, Text Boxes.
   ii.   Data basics, Different type variables & their use in VB,
   iii.   Sub-functions & Procedure details, Input box () & Msgbox ().
   iv.   Making decisions, looping
   v.   List boxes & Data lists, List Box control, Combo Boxes, data Arrays.
   vi.   Frames, buttons, check boxes, timer control,
   vii.   Programming with data, ODBC data base connectivity.
   viii. Data form Wizard, query, and menus in VB Applications,
   ix.   Graphics.
9. Case studies using any of the following items including relevant form design with the help of visual programming aids.

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a) Payroll accounting system.
b) Library circulation management system.
c) Inventory control system.
d) University examination & grading system.
e) Patient information system.
f) Tourist information system.
g) Judiciary information system.
h) Flight reservation system.
i) Bookshop automation software.
j) Time management software.

Object Oriented Programming & UML
Code: IT491
Contacts: 3
Credits: 2

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, vectors, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on multithreaded programming, handling errors and exceptions, applet programming and graphics programming

Note: Use Java for programming.

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Proposed UG IT Syllabus Structure for remaining Semesters

* Minor modification has been made. Seminar has been shifted from 8th semester to 6th semester and the Free Elective Laboratory has been dropped.

Third Year - Fifth Semester

Sl.No	Field	Theory	Contact Hours/Week				Cr. Pts
A. THEORY							
			L	T	P	Total	
1	HU	Economics for Engineers	3	0	0	3	3
2	P.C.	5. Design & Analysis of Algorithm	3	1	0	4	4
3		6. Computer Architecture	3	1	0	4	4
4	P.C.	7. Operating System	3	0	0	3	3
5	F. E.	Operation Research / Other choices	3	0/1	0	3/4	3/4
		Total of Theory				17/18	17-18
B. PRACTICAL							
6	P.C.	5. Algorithm Lab	0	0	3	3	2
7		6. Computer Architecture	0	0	3	3	2
8	P.C.	2. UNIX & Shell Programming	0	0	3	3	2
9	F.E.	One Lab	0	0	3	3	2
		Total of Practical				12	8
		Total of Semester				29/30	25-26

@ The Professional core of one discipline may be taken as Free Elective of the other. For this a scope for including the tutorial as in the Professional core has been included. This will make the credit points earned a little in excess. This gives a variation in the credit points earned.

Third Year - Sixth Semester

Sl.No.	Field	Theory	Contact Hours/Week				Cr. Pts
A. THEORY							
			L	T	P	Total	
1	HU	Principles of Management	2	0	0	3	2
2	P.C.	8. Data Base Management System	3	0	0	3	3
3		9. Software Engg	3	0	0	3	3
4	P.C.*	10. Computer Architechture	3	0	0	3	3
5	P.E.	DSP / Computer Graphics / Object Oriented Programming etc	3	0	0	3	3
6	F. E.	One paper	3/3	0/1	0/0	3/4	3/4
		Total of Theory				18/19	18-19
B. PRACTICAL							
8	P.C.	8. Data Base Management System Lab	0	0	3	3	2
		9. Computer Architecture	0	0	3	3	2
9	P.C.	10. UNIX & Shell Programmimg	0	0	3	3	2
10	Seminar		0	0	3	3	2
		Total of Practical				12	8
		Total of Semester				30/31	26-27

Syllabus for B.Tech(Information Technology) Second Year

Revised Syllabus of B.Tech IT (To be followed from the academic session, July 2011, i.e. for the students who were admitted in Academic Session 2010-2011)

Fourth Year - Seventh Semester

Sl. No.	Field	Theory	L	T	P	Total	Cr. Pts
		A. THEORY		**Contact Hours/Week**			
1	P.C.	11. Internet Technology	3	0	0	3	3
2		12. Multimedia	3	0	0	3	3
3	P. E.	Choices to be given for two papers	3	0/1	0	3/4	3/4
4			3	0	0	3	3
5	F. E.	Choice to be given for One paper	3	0/1	0	3/4	3/4
		Total of Theory				**15/17**	**15 -17**
B. PRACTICAL							
6	HU	Group Discussion	0	0	0	3	2
7	P.C.	Internet Technology	0	0	3	3	2
8	P.C	Multimedia	0	0	3	3	2
9	F.E.	One Lab	0	0	3	3	2
10		**Industrial training**	**4 wks during 6th -7th Sem-break**				2
11		**Project part 1**				6	2
		Total of Practical				**18**	**12**
		Total of Semester				**33/34**	**27-29**

* One may be the P.C. of a different discipline.

Fourth Year - Eighth Semester

Sl. No.	Field	Theory	L	T	P	Total	Cr. Pts
		A. THEORY		**Contact Hours/Week**			
1	HU	Organisational Behaviour / Project Management	2	0	0	2	2
2	P. E.	One paper – choice to b given	3	0/1	0	3/4	3/4
3	F. E.	One paper – choice to be given	3	0/1	0	3/4	3/4
		Total of Theory				**8/10**	**8-10**
B. PRACTICAL							
3	Design	Design Lab / Industrial problem related practical training	0	0	6	6	4
4	Project.	Project-2	0	0	12	12	6
10		**Grand Viva**					3
		Total of Practical				**18**	**13**
		Total of Semester				**26/28**	**21-23**

Depending on the type of electives chosen, total credit points may vary from 210 to 216. Average credits earned is 213.

$ If the total credit points earned is to be reduced below the minimum credit points of 210, then the Professional & Free Electives that are be taken in the final semester may be termed as Audit point papers. This will bring down the range of credit points earned from the range 210-216 to 204-214. But this will be a marginal reduction.
Please send yours feed-backs, if any to:
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