CURRICULUM FOR 2017 BATCH STUDENTS

COMPUTER SCIENCE & ENGINEERING

SEMESTER I

Course Code	Course Name	L	T	P	Total Credits
MA 105	Calculus	3	1	0	8
PH 107	Quantum physics	2	1	0	6
CH 105	Organic chemistry and Inorganic chemistry	2	0	0	4
CH 107	Physical chemistry	2	0	0	4
CH 117	Chemistry laboratory	0	0	3	3
CS 101	Computer programming	3	0	2	8
NO 101	National Sports Organisation	0	0	0	P/NP
				Total Credits	**33**

SEMESTER II

Course Code	Course Name	L	T	P	Total Credits
MA 106	Linear Algebra	2	0	0	4
MA 108	Differential equations	2	0	0	4
PH 108	Electricity and Magnetism	2	1	0	6
EE 101	Introduction to Electrical Systems and Electronic Circuits	3	0	1	7
ME 119	Engineering Graphics	5	0	5	8
PH 117	Physics Laboratory	0	0	3	3
BB 101	Biology	2	1	0	6
NO 102	National Sports Organisation	0	0	0	P/NP
				Total Credits	**38**

SEMESTER III

Course Code	Course Name	L	T	P	Total Credits
CS 201	Data Structures and Algorithms	3	0	0	6
CS 203	Discrete Structures	3	0	0	6
EE 201	Data Analysis	3	0	0	6
HS 201	Economics	3	0	0	6
CS 211	Data Structures and Algorithms Laboratory	0	0	3	3
CS 213	Software Systems Laboratory	1	3	0	8
				Total Credits	**35**

SEMESTER IV

Course Code	Course Name	L	T	P	Total Credits
CS 202	Automata Theory	3	1	0	8
CS 204	Computer Networks	3	0	0	6
CS 205	Design and Analysis of Algorithms	3	0	0	6
EE 204	Digital Systems	3	0	0	6
MA 204	Numerical Analysis	3	1	0	8
CS 212	Computer Networks Laboratory	0	0	3	3
				Total Credits	**37**

COMPUTER SCIENCE AND ENGINEERING (2017 BATCH) - SEMESTER V					
Course Code	**Course Name**	**Course Structure**			
		L	**T**	**P**	**C**
CS 301	Computer Architecture	3	0	0	6
CS 303	Data Bases and Information Systems	3	0	0	6
	Elective I	3	0	0	6
	Elective II	3	0	0	6
	HSS Elective – I (Phil/Lit)	3	0	0	6
CS 311	Computer Architecture Laboratory	0	0	3	3
CS 313	Data Bases and Information Systems Laboratory	0	0	3	3
EE 214	Digital systems laboratory	0	0	3	3
				Total Credits	**39**

Electives (I & II)					
Course Code	**Course Name**	**L**	**T**	**P**	**Total Credits**
CS 305	Graph Theory and Combinatorics	3	0	0	6
EE 305	Digital Signal Processing	3	0	0	6
EE 307	Probability and Random Processes	3	0	0	6
MA 301	Elementary Algebra and Number Theory	3	0	0	6
HS 301	Philosophy	3	0	0	6
HS 303	Introduction to Literature	3	0	0	6

2017 Batch (I SEMESTER)

Academic Unit: Mathematics

Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	MA 105 Calculus
ii	**Credit Structure (L-T-P-C)**	(3-1-0-8)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – specify course number(s)**	--
vii	**Course Content**	Review of limits, continuity, differentiability. Mean value theorem, Taylors Theorem, Maxima and Minima. Riemann integrals, Fundamental theorem of Calculus, Improper integrals, applications to area, volume. Convergence of sequences and series, power series. Partial Derivatives, gradient and directional derivatives, chain rule, maxima and minima, Lagrange multipliers. Double and Triple integration, Jacobians and change of variables formula. Parametrization of curves and surfaces, vector fields, line and surface integrals. Divergence and curl, Theorems of Green, Gauss, and Stokes.
viii	**Texts/References**	1. B.V. Limaye and S. Ghorpade, A Course in Calculus and Real Analysis, Springer UTM (2004) 2. B.V. Limaye and S. Ghorpade, A Course in Multivariable Calculus and Analysis, Springer UTM (2010) 3. James Stewart, Calculus (5th Edition), Thomson (2003). 4. T. M. Apostol, Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern (1980). 5. Marsden and Tromba, Vector calculus (First Indian Edition), Springer (2012)
ix	**Name(s) of Instructor(s)**	BVL
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This is a fundamental mathematics course which is essential for any branch of engineering

Name of Academic Unit: Physics
Level: B.Tech.
Programme: B.Tech.

i	**Title of the Course**	PH 107: Quantum Physics
ii	**Credit Structure (L-T-P-C)**	(2-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	• Quantum nature of light: Photoelectric Effect and Compton Effect. • Stability of atoms and Bohr`s rules. • Wave particle duality: De Broglie wavelength, Group and Phase velocity, Uncertainty Principle, Double Slit Experiment. • Schrödinger Equation. • Physical interpretation of Wave Function, Elementary Idea of Operators, Eigen-value Problem. • Solution of Schrödinger equation for simple boundary value problems. • Reflection and Transmission Coefficients. Tunneling. • Particle in a three dimensional box, Degenerate states. • Exposure to Harmonic Oscillator and Hydrogen Atom without deriving the general solution. • Quantum Statistics: Maxwell Boltzmann, Bose Einstein and Fermi Dirac Statistics by detailed balance arguments. • Density of states. • Applications of B-E statistics: Lasers. Bose-Einstein Condensation. • Applications of F-D statistics: Free electron model of electrons in metals. Concept of Fermi Energy. • Elementary Ideas of Band Theory of Solids. • Exposure to Semiconductors, Superconductors, Quantum Communication and Quantum Computing.
viii	**Texts/References (separate sheet may be used, if necessary)**	1. Quantum Physics: R. Eisberg and R. Resnick, John Wiley 2002, 2nd Edition. 2. Introduction to Modern Physics: F. K. Richtmyer, E. H. Kennard and J.N. Cooper, Tata Mac Graw Hill 1976, 6th Edition. 3. Modern Physics: K. S. Krane, John Wiley 1998, 2nd Edition. 4. Introduction to Modern Physics: Mani and Mehta, East-West Press Pvt. Ltd. New Delhi 2000.

		5. Elements of Modern Physics: S. H. Patil, Tata McGraw Hill, 1984. 6. Concepts of Modern Physics, A Beiser, Tata McGraw Hill, 2009.
ix	**Name(s) of Instructor(s)**	RP
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This course develops the concepts of Quantum Mechanics such that the behavior of the physical universe can be understood from a fundamental point of view. It provides a basis for further study of quantum mechanics. It is necessary for students to undertake this course, as the course sheds light on topics like, the basic principles behind the working of semiconductor devices, superconductors, etc. It is important to note that, such devices occupy the central stage in current technological advancements. The course also deals with the basic concepts behind the most advanced techniques like quantum communication and quantum computation.

Name of Academic Unit: Chemistry
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	CH 105 Organic Chemistry and Inorganic Chemistry
ii	**Credit Structure (L-T-P-C)**	(2-0-0-4)
iii	**Type of Course**	Common for all
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Half
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Molecular orbitals of common functional groups, Qualitative Huckel MOs ofconjugated polyenes and benzene.Aromaticity. Configuration, molecular chirality and isomerism, Conformation of alkanes and cycloalkanes, Reactivity of carbonyl group), Functional group interconversions involving oxidation and reduction, Periodic properties: trends in size, electron affinity, ionization potential and electronegativity, Use of Ellingham diagram and thermodynamics in the extraction of elements, Transition metal chemistry: inorganic complexes, bonding theories, magnetism, bonding aspects and structural distortion, Bioinorganic chemistry: storage and transport proteins, Catalysis: hydrogenation, hydroformylation and olefin metathesis.
Viii	**Text / References**	1)P. Volhardt and N. Schore, Organic Chemistry: Structure and Function, 5th Edition, W. H Freeman & Co, 2006 (2)T. W. G. Solomons, C. B. Fryhle, Organic Chemistry, 9th Edition, WilelyIndia Pvt. Ltd., 2009 (3)R. T. Morrison and R. N. Boyd, Organic Chemistry, 6th edition, Pearson Com., 1992 (4)L. G. Wade, Organic Chemistry, Pearson Education 6th edition, 2006. (5)M. J. Sienko and R. A. Plane, Chemical Principles and Applications, McGraw Hill, 1980. (6)J. D. Lee, Concise Inorganic Chemistry, 4th Edition, ELBS, 1991. (7)D. D. Ebbing, General Chemistry, Houghton Miffin Co., 1984.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Nil

Name of Academic Unit: Chemistry
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	CH 107 Physical Chemistry
ii	**Credit Structure (L-T-P-C)**	(2-0-0-4)
iii	**Type of Course**	Common for all
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Half
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Schrodinger equation,Origin of quantization, Born interpretation of wave function, Hydrogen atom: solution to □-part, Atomic orbitals, many electron atoms and spin orbitals. Chemical bonding: MO theory: LCAO molecular orbitals, Structure, bonding and energy levels of diatomic molecules.Concept of sp, sp2and sp3hybridization; Bonding and shape of many atom molecules; IntermolecularForces; Potential energy surfaces-Rates of reactions; Steady state approximationand its applications; Concept of pre-equilibrium; Equilibrium and relatedthermodynamic quantities
Viii	**Text / References**	(1)P. Atkins and J. de Paula, Atkins' Physical Chemistry, Oxford University Press, 8th edition, 2006. (2)I. N. Levine, Physical Chemistry, 5th edition, Tata McGraw-Hill, New Delhi, 2002. (3)D. A. McQuarrie and J.D. Simon, Physical Chemistry - a molecular approach, Viva Books Pvt. Ltd. (1998).
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Nil

Name of Academic Unit: Chemistry
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	CH 117 Chemistry Laboratory
ii	**Credit Structure (L-T-P-C)**	(0-0-3-4)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Experimentsillustratingtheconceptsof1) Electrochemical Cell, (2) Chemical kinetics, (3) Estimation of Iron, (4) Oscillatory Chemical Reactions, (5a) Electrolytic Conductance (5b) Crystalline Solids (6) Colorimetric Analysis (7) Complexometric Titration (8) Thin Layer Chromatography
viii	**Texts/References**	1.Physical Chemistry, P.W. Atkins, 5th Edition (ELBS/OUP) 1994. 2.Vogel's Textbook of Quantitative Analysis revised by G. H. Jeffery, J. Basset J. Mendham and R. C. Denny, 5th Edition. 3.Organic Chemistry, Morrison and Boyd, 6th Edition. 4."Patterns in Time and Space - Generated by Chemistry", I. R. Epstein, C and E News, March 1987. 5."An Oscillating Iodine Clock", T. S. Brigg and W.C. Rauischer, Journal of chemical education., Vol no. 50, Issue no 7, Page no 496, year 1973. 6."Oscillating Chemical Reactions",I.R. Epstein, K. Kustin, P. DeKepper and M.Orban, Scientific American, Vol no.248, Page no.112, year 1983. 7."Physical Chemistry", G.K.Vemulapalli (1997). 8.Calimente, S.; Strand, S. M.; Chang, S-C.; Lewis, D. E. J. Chem. Ed. 1999, 76, 82-83. 9.Wagner, A.J.; Miller, S.M.; Naguyen, S.; Lee, G. Y.; Rychnovsky, S.; Link, R.D. J. Chem. Ed. 2014, 91, 716-721.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Nil

Name of Academic Unit: Computer Science and Engineering
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 101 Computer Programming
ii	**Credit Structure (L-T-P-C)**	(3-0-2-8)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Nil
vii	**Course Content**	This course provides an introduction to problem solving with computers using a modern language such as Java or C/C++. Topics covered will include: **Utilization**: Developer fundamentals such as editor, integrated programming environment, Unix shell, modules, libraries. **Programming features**: Machine representation, primitive types, arrays and records, objects, expressions, control statements, iteration, procedures, functions, and basic i/o. **Applications**: Sample problems in engineering, science, text processing, and numerical methods.
viii	**Texts/References**	1. An Introduction to Programming through C++, 1st edition, by Abhiram G. Ranade, McGraw Hill Education, 2014. 2. C++ Program Design: An introduction to Programming and Object-Oriented Design, 3rd Edition, by Cohoon and Davidson, Tata McGraw Hill, 2003. Other references 1. Thinking in C++ 2nd Edition, by Bruce Eckel (avaiLaboratoryle online). 2. How to Solve It by Computer, by G. Dromey, Prentice-Hall, Inc., Upper Saddle River, NJ, 1982. 3. How to Solve _It (2nd ed.), by Polya, G., Doubleday and co, 1957. 4. Let Us C, by Yashwant Kanetkar, Allied Publishers, 1998. 5. The Java Tutorial, Sun Microsystems, Addison-Wesley, 1999.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/**	No

2017 Batch (II SEMESTER)

Name of Academic Unit: Mathematics
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	MA 106 Linear Algebra
ii	**Credit Structure (L-T-P-C)**	(3-1-0-4)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be**	Spring
v	**Whether Full or Half Semester Course**	Half
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Vectors in R^n, notion of linear independence and dependence, linear span of a set of vectors, vector subspaces of R^n, basis of a vector subspace. Systems of linear equations, matrices and Gauss elimination, row space, null space, and column space, rank of a matrix. Determinants and rank of a matrix in terms of determinants. Abstract vector spaces, linear transformations, matrix of a linear transformation, change of basis and similarity, rank-nullity theorem. Innerproductspaces,Gram-Schmidtprocess, orthonormal bases, projections and least squares approximation. Eigenvalues and eigenvectors, characteristic polynomials, eigenvalues of special matrices (orthogonal, unitary, hermitian, symmetric, skew-symmetric, normal). Algebraic and geometric multiplicity, diagonalization by similarity transformations, spectral theorem for real symmetric matrices, application to quadratic forms.
viii	**Texts/References**	1. H. Anton, Elementary linear algebra with applications (8th Edition), John Wiley (1995). 2. G. Strang, Linear algebra and its applications (4th Edition), Thomson (2006) 3. S. Kumaresan, Linear algebra - A Geometric approach, Prentice Hall of India (2000) 4. E. Kreyszig, Advanced engineering mathematics (10th Edition), John Wiley (1999)
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This is a fundamental mathematics course which is essential for any branch of engineering

Name of Academic Unit: Mathematics
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	MA 108 Differential Equations
ii	**Credit Structure (L-T-P-C)**	(3-1-0-4)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Half
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Nil
vii	**Course Content**	Review of solution methods for first order as well as second order equations, Power Series methods with properties of Bessel functions and Legendre polynomials.Existence and Uniqueness of Initial Value Problems: Picard`s and Peano`s Theorems, Gronwall`s inequality, continuation of solutions and maximal interval of existence, continuous dependence.Higher Order Linear Equations and linear Systems: fundamental solutions, Wronskian, variation of constants, matrix exponential solution, behaviour of solutions.Two Dimensional Autonomous Systems and Phase Space Analysis: critical points, proper and improper nodes, spiral points and saddle points.Asymptotic Behavior: stability (linearized stability and Lyapunov methods).Boundary Value Problems for Second Order Equations: Green`s function, Sturm comparison theorems and oscillations, eigenvalue problems.
viii	**Texts/References**	M. Hirsch, S. Smale and R. Deveney, Differential Equations, Dynamical Systems and Introduction to Chaos, Academic Press, 2004L. Perko, Differential Equations and Dynamical Systems, Texts in Applied Mathematics, Vol. 7, 2nd Edition, Springer Verlag, New York, 1998. M. Rama Mohana Rao, Ordinary Differential Equations: Theory and Applications. Affiliated East-West Press Pvt. Ltd., New Delhi, 1980.D. A. Sanchez, Ordinary Differential Equations and Stability Theory: An Introduction, Dover Publ. Inc., New York, 1968.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This is a fundamental mathematics course which is essential for any branch of engineering

Name of Academic Unit: Physics
Level: B.Tech.
Programme: B.Tech.

i	**Title of the Course**	PH 108: Electricity and Magnetism
ii	**Credit Structure (L-T-P-C)**	(2-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	• Review of vector calculus: Spherical polar and cylindrical coordinates; gradient, divergence and curl; • Divergence and Stokes` theorems; • Divergence and curl of electric field, Electric potential, properties of conductors; • Poisson's and Laplace's equations, uniqueness theorems, boundary value problems, separation of variables, method of images, multipoles; • Polarization and bound charges, Gauss` law in the presence of dielectrics, Electric displacement D and boundary conditions, linear dielectrics; • Divergence and curl of magnetic field, Vector potential and its applications; • Magnetization, bound currents, Ampere`s law in magnetic materials, Magnetic field H, boundary conditions, classification of magnetic materials; • Faraday's law in integral and differential forms, Motional emf, Energy in magnetic fields, Displacement current, Maxwell's equations, • Electromagnetic (EM) waves in vacuum and media, Energy and momentum of EM waves, Poynting`s theorem; • Reflection and transmission of EM waves across linear media.
viii	**Texts/References (separate sheet may be used, if necessary)**	(1) Introduction to Electrodynamics (4th ed.), David J. Griffiths, Prentice Hall, 2015. (2) Classical Electromagnetism, J. Franklin, Pearson Education, 2005.
ix	**Name(s) of Instructor(s)**	DN/RP
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA

xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	The course introduces the principles of electricity and magnetism. This is a fundamental and necessary course of physics; which every B. Tech. students have to undergo at least once.

Name of Academic Unit: Electrical engineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	EE101: Introduction to Electrical Systems and Electronics
ii	**Credit Structure (L-T-P-C)**	(3-0-1-7)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Exposure to Calculus
vii	**Course Content**	**From Physics to Electrical Engineering** (a) Lumped matter discipline (b) Batteries, resistors, current sources and basic laws (c) I-V characteristics and modeling physical systems **Basic Circuit Analysis Methods** (a) KCL and KVL, voltage and current dividers (b) Parallel and serial resistive circuits (c) More complicated circuits (d) Dependent sources, and the node method (e) Superposition principle (f) Thevenin and Norton method of solving linear circuits (g) Circuits involving diode. **Analysis of Non-linear Circuits** (a) Toy example of non-linear circuit and its analysis (b) Incremental analysis (c) Introduction to MOSFET Amplifiers (d) Large and small signal analysis of MOSFETs (e) MOSFET as a switch **Introduction to the Digital World** (a) Voltage level and static discipline (b) Boolean logic and combinational gates (c) MOSFET devices and the S Model (d) MOSFET as a switch; revisited (e) The SR model of MOSFETs (f) Non-linearities: A snapshot **Capacitors and Inductors** (a) Behavior of capacitors, inductors and its linearity (b) Basic RC and RLC circuits (c) Modeling MOSFET anomalies using capacitors (d) RLC circuit and its analysis (e) Sinusoidal steady state analysis (f) Introduction to passive filters **Operational Amplifier Abstraction** (a) Introduction to Operational Amplifier (b) Analysis of Operational amplifier circuits (c) Op-Amp as active filters (d) Introduction to active filter design **Transformers and Motors**

		(a) AC Power circuit analysis (b) Polyphase circuits (c) Introduction to transformers (d) Introduction to motors
viii	**Texts/References**	1. Anant Agarwal and Jefferey H. Lang, "Foundations of Analog and Digital Electronics Circuits," Morgan Kaufmann publishers, 2005 2. Wlilliam H. Hayt, Jr., Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis," Tata McGraw-Hill 3. Theodore Wildi, "Electrical Machines, Drives and Power Systems," Pearson, 6-th edition. 4. V. Del. Toro, "Electrical Engineering Fundamentals," Pearson publications, 2nd edition.
ix	**Name(s) of Instructor(s)**	BNB
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Core course for first year B.Tech
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	To introduce students to basics of electrical engineering.

EE101 Lab Component: The lab experiments are designed to complement the theory classes. Towards this, experiments involving modelling of two/three terminal electronic/electrical devices/systems, a use in building circuits for practical applications will be conducted. Students will use the analysis learnt in the class to design circuits in the lab, and they will demonstrate the accuracy/inaccuracy in the analysis. In summary, students will get exposed to the basics of modelling and its use in building electronic/electrical circuits and systems. **Plan:** Two hours of lab every alternate week.

Name of Academic Unit: Mechanical Engineering

Level: B.Tech.
Programme: B.Tech.

i	**Title of the Course**	ME 119: Engineering Graphics
ii	**Credit Structure (L-T-P-C)**	(5-0-5-8)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Nil
vii	**Course Content**	Introduction to engineering drawing and orthographic projections; Projection of points and straight line; Projection of planes and solids; Projection of simple machine elements; Development of surfaces, Intersection of surfaces; Construction of isometric views from orthographic projections. v
viii	**Texts/References (separate sheet**	Bhatt N. D. and Panchal V. M., Engineering Drawing, Charotar Publishers, Anand, 2007. Luzadder Warren J. and Duff Jon M., Fundamentals of Engineering Drawing, Prentice Hall of India, 2001. French Thomas E. and Vierck Charles J., Engineering Drawing and Graphic Technology, McGraw Hill, 1993. Jolhe Dhananjay A., Engineering Drawing, Tata McGraw Hill, 2007. Shah M. B. and Rana B. C., Engineering Drawing, Dorling Kindersley (India) Pvt. Ltd, Pearson Education,
ix	**Name(s) of Instructor(s)**	DN/RP
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	The course introduces to the practical aspects of Mechanics, Electricity & Magnetism, optics, etc.

Name of Academic Unit: Physics

Level: B.Tech.
Programme: B.Tech.

i	**Title of the Course**	PH 117: Physics Laboratory
ii	**Credit Structure (L-T-P-C)**	(0-0-3-3)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Nil
vii	**Course Content**	Experiments on • Young's Modulus by Koenig's Method • Thermal Conductivity by Lee's Disc • Helmholts Coils • LCR Circuit • Speific Charge of Electron • Grating Spectrometer • Fresnel's Bi-Prism • Single Slit Diffraction
viii	**Texts/References (separate sheet may be used, if necessary)**	(1) Practical Physics: S. L. Squires, Cambridge University Press, 2017. (2) Advanced Practical Physics, B. L. Worsnop and H. T. Flint, Littlehampton Book Services Ltd, 1951. (3) Physics, Vols. 1 & 2, D. Halliday, R. Resnick, and K. S. Krane, Wiley, 2007, 5th edition. (4) Fundamentals of Optics, F.A. Jenkins and H. E. White, McGraw Hill Education, 2017, 4^{th} edition.
ix	**Name(s) of Instructor(s)**	DN/RP
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	The course introduces to the practical aspects of Mechanics, Electricity & Magnetism, optics, etc.

Name of Academic Unit: Biosciences and Bioengineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	BB 101: Biology
ii	**Credit Structure (L-T-P-C)**	(3-0-1-7)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Nil
vii	**Course Content**	Quantitative views of modern biology. Importance of illustrations and building quantitative/qualitative models. Role of estimates. Cell size and shape. Temporal scales. Relative time in Biology. Key model systems – a glimpse. Management and transformation of energy in cells. Mathematical view – binding, gene expression and osmotic pressure as examples. Metabolism. Cell communication. Genetics. Eukaryotic genomes. Genetic basis of development. Evolution and diversity. Systems biology and illustrative examples of applications of Engineering in Biology.
viii	**Texts/References**	1 Miko, I. & Lejeune, L., eds. Essentials of Genetics. Cambridge, MA: NPG Education, 2009.O'Connor, C. M. & Adams, J. U. Essentials of Cell Biology. Cambridge, MA: NPG Education,2010. 2. Watson JD, Baker, TA, Bell SP, Gann A, Levin M, Losick R, Molecular Biology of the Gene, Pearson Education, 2004. 3. Dan E. Krane, Michael L. Raymer. Fundamental Concepts of Bioinformatics, Pearson Education India. 2003
ix	**Name(s) of Instructor(s)**	SS
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	To introduce students to modem biology with an emphasis on evolution of biology as a multi-disciplinary field, to make them aware of application of engineering principles in biology, and engineering

		robust solutions inspired by biological examples. Based on student's feedback, Laboratory experiments are being added to the course. The addition of laboratory work will change the course structure to 3-0-1-7.

Proposed Laboratory activities:

Before Mid Semester

Biosafety Laboratory practices and biological waste disposal + Buffers in biology, buffering capacity and pKa

Observing cell surface and intracellular contents using phase contrast microscopy

DNA isolation, PCR, and visualization

Protein isolation and Visualization

After Mid-semester

DNA cloning and transformation

Bacterial growth kinetics

BLAST, BLAT, sequence identification

Gene expression analysis

2017 Batch (III SEMESTER)

Name of Academic Unit: Computer Science and Engineering
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 201 Data Structures and Algorithms
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Exposure to Computer Programming (CS 102)
vii	**Course Content**	**Introduction**: data structures, abstract data types, analysis of algorithms. **Creation and manipulation of data structures**: arrays, lists, stacks, queues, trees, heaps, hash tables, balanced trees, tries, graphs. Algorithms for sorting and searching, order statistics, depth-first and breadth-first search, shortest paths and minimum spanning tree.
viii	**Texts/References**	1. Introduction to Algorithms, 3rd edition, by T. Cormen, C. Leiserson, R. Rivest, C. Stein, MIT Press and McGraw-Hill, 2009. 2. Data structures and algorithms in C++, by Michael T. Goodrich, Roberto Tamassia, and David M. Mount, Wiley, 2004.
ix	**Name(s) of Instructor(s)**	SRB
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Basic course in data structures and algorithms.

Name of Academic Unit: Computer Science and Engineering
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 203 Discrete Structures
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	There are four modules in the course: **1) Proofs and structures** Introduction, propositions, predicates, examples of theorems and proofs, types of proof techniques, Axioms, Mathematical Induction, Well-ordering principle, Strong Induction, Sets, Russell's paradox, infinite sets, functions, Countable and uncountable sets, Cantor's diagonalization technique, Relations, Equivalence relations, partitions of a set. 2) **Counting and Combinatorics** Permutations, combinations, binomial theorem, pigeon hole principle, principles of inclusion and exclusion, double counting. Recurrence relations, solving recurrence relations. 3) **Elements of graph theory** Graph models, representations, connectivity, Euler and Hamiltonian paths, planar graphs, Trees and tree traversals. 4) **Introduction to abstract algebra and number theory** Semigroups, monoids, groups, homomorphisms, normal subgroups, congruence relations. Ceiling, floor functions, divisibility. Modular arithmetic, prime numbers, primality theorems.
viii	**Texts/References**	1. Discrete Mathematics and its applications with Combinatorics and graph theory, 7th edition, by Kenneth H Rosen. Special Indian Edition published by McGraw-Hill Education, 2017. 2. Introduction to Graph Theory, 2nd Edition, by Douglas B West. Eastern Economy Edition published by PHI Learning Pvt. Ltd, 2002. 3. Discrete Mathematics, 2nd Edition, by Norman L Biggs. Indian Edition published by Oxford University Press, 2003.
ix	**Name(s) of Instructor(s)**	PRB

x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This is a fundamental and core course which forms the foundations for all theory courses in Computer Science.

Name of Academic Unit: Electrical Engineering

Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	EE 201 Data Analysis
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	The role of statistics. Graphical and numerical methods for describing and summarising data. Probability. Population distributions. Sampling variability and sampling distributions. Estimation using a single sample. Hypothesis testing a single sample. Comparing two populations or treatments. Simple linear regression and correlation. Case studies.
viii	**Texts/References**	1. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Elsevier, New Delhi, 3rd edition (Indian), 2014. 2. Probability, Random Variables and Stochastic processes by Papoulis and Pillai, 4th Edition, Tata McGraw Hill, 2002. 3. An Introduction to Probability Theory and Its Applications, Vol. 1, William Feller, 3rd edition, Wiley International, 1968.
ix	**Name(s) of Instructor(s)**	SRMP
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	CSE & ME
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Analyzing data and interpreting results are integral part of almost every research and it finds extensive use in industry as well. From Machine learning to Finance, its applications are enormous.

Name of Academic Unit: Humanities and Social Sciences
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	HS 201 Economics
ii	**Credit Structure (L-T-P-C)**	(2-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Basic economic problems. resource constraints and Welfare maximizations. Nature of Economics: Positive and normative economics; Micro and macroeconomics, Basic concepts in economics. The role of the State in economic activity; market and government failures; New Economic Policy in India. Theory of utility and consumer's choice. Theories of demand, supply and market equilibrium. Theories of firm, production and costs. Market structures. Perfect and imperfect competition, oligopoly, monopoly. An overview of macroeconomics, measurement and determination of national income. Consumption, savings, and investments. Commercial and central banking. Relationship between money, output and prices. Inflation - causes, consequences and remedies. International trade, foreign exchange and balance payments, stabilization policies : Monetary, Fiscal and Exchange rate policies.
viii	**Texts/References**	1. P. A. Samuelson & W. D. nordhaus, Economics, McGraw Hill, NY, 1995. 2. A. Koutsoyiannis, Modern Microeconomics, Macmillan, 1975. R. Pindyck and D. L. Rubinfeld, Microeconomics, Macmillan publishing company, NY, 1989. 3. R. J. Gordon, Macroeconomics 4th edition, Little Brown and Co., Boston, 1987. 4. William F. Shughart II, The Organization of Industry, Richard D. Irwin, Illinois, 1990. 5. R.S. Pindyck and D.L. Rubinfeld. Microeconomics (7^{th} Edition), Pearson Prentice Hall, New Jersey, 2009. 6. R. Dornbusch, S. Fischer, and R. Startz. Macroeconomics (9th Edition), McGraw-Hill Inc. New York, 2004.
ix	**Name(s) of Instructor(s)**	--

x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	CSE, EE & ME
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This course is a basic course on economics and useful for all students of B.Tech.

Name of Academic Unit: Computer Science and Engineering
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 211 Data Structures and Algorithms Laboratory
ii	**Credit Structure (L-T-P-C)**	(0-0-3-3)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Exposure to Computer Programming (CS 102)
vii	**Course Content**	Laboratory course for CS 211 is based on creating and manipulating various data structures and implementation of algorithms.
viii	**Texts/References**	1. Introduction to Algorithms, 3rd edition, by T. Cormen, C. Leiserson, R. Rivest, C. Stein, MIT Press and McGraw-Hill, 2009. 2. Data structures and algorithms in C++, by Michael T. Goodrich, Roberto Tamassia, and David M. Mount, Wiley, 2004.
x	**Name(s) of Instructor(s)**	SRB
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Basic Laboratory course in data structures and algorithms.

Name of Academic Unit: Computer Science and Engineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	CS 213 Software Systems Laboratory
ii	**Credit Structure (L-T-P-C)**	(1-3-0-8)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Vim/emacs HTML, CSS 2. Report and presentation software: latex, beamer, drawing software (e.g. inkscape, xfig, open-office) 3. IDE (e.g. eclipse, netbeans), code reading, debugging Basic Java Java collections, interfaces 4. Java threads Java GUI Introduction to documentation: e.g. doxygen/javadocs 5. Version management: SVN/Git 6. Unix basics: shell, file system, permissions, process hierarchy, process monitoring, ssh, rsync 7. Unix tools: e.g. awk, sed, grep, find, head, tail, tar, cut, sort 8. Bash scripting: I/O redirection, pipes 9. Python programming 10. Makefile, libraries and linking 11. Graph plotting software (e.g., gnuplot) 12. Profiling tools (e.g., gprof, prof) 13. Optional topics (may be specific to individual students302222 projects): intro to sockets, basic SQL for data storage,JDBC/pygresql A project would be included which touches upon many of the above topics, helping students see the connect across seemingly disparate topics. The project is also expected to be a significant load: 20-30 hours of work.
viii	**Texts/References**	1. Online tutorials for HTML/CSS, Inkscape, OODrawUnix Man Pages for all unix tools, Advanced Bash Scripting Guide from the Linux Documentation Project (www.tldp.org). 2. The Python Tutorial Online Book (http://docs.python.org/3/tutorial/index.html). 3. The Java Tutorials (http://docs.oracle.com/javase/tutorial/). 4. Latex - A document preparation system, 2/e, by Leslie Lamport, Addison-Wesley, 1994.
ix	**Name(s) of Instructor(s)**	PRB, RK, SRB
x	**Name(s) of other Departments/ Academic Units to whom the course is**	NA

	relevant	
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This is a fundamental and core course which trains students on different programming platforms, as well as on basic software engineering principles.

2017 Batch (IV SEMESTER)

Name of Academic Unit: Computer Science and Engineering

Level: UG

Programme: B.Tech.

i	**Title of the course**	CS 202 Automata Theory
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Exposure to Discrete Structures
vii	**Course Content**	Finite state machines (DFA/NFA/epsilon NFAs), regular expressions. Properties of regular languages. My hill-Nerode Theorem. Non-regularity. Push down automata. Properties of context-free languages. Turing machines:Turing hypothesis, Turing computability, Nondeterministic, multi tape and other versions of Turing machines. Church`s thesis, recursively enumerable sets and Turing computability. Universal Turing machines. Unsolvability, The halting problem, partial solvability, Turing enumerability, acceptability and decidability, unsolvable problems about Turing Machines. Post`s correspondence problem.
Viii	**Texts/References**	1. Introduction to Automata Theory, Languages and Computation, by John. E. Hopcroft, Rajeev Motwani, J. D. Ullman, 3rd edition. Pearson. 2013. 2. Elements of the Theory of Computation, by H.R. Lewis and C.H.Papadimitrou, 2nd Edition. Prentice Hall Inc, 1998.
x	**Name(s) of Instructor(s)**	GN
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Nil
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Fundamental course on computability.

Name of Academic Unit: Computer Science and Engineering
Level: UG
Programme: B.Tech.

i	**Title of the course**	CS 204 Computer Networks
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Nil
vii	**Course Content***	Design of Computer Networking protocols at all layers: transmission media, data link protocols, media access control, routing and congestion control, admission control, traffic shaping and policing, Internet working (IP) and transport layer protocols (TCP). Performance analysis of networks.
viii	**Texts/References**	1. Data and Computer Communications, 6th edition, by W. Stallings, Prentice Hall, 2000. 2. Computer Networks, 4th edition, by A. S. Tannenbaum, Prentice Hall, 2003. 3. Data Communications, Computer Networks and Open Systems, 4th edition, by F. Halsall, Addison-Wesley, 1996. 4. High Performance Communication Networks, by Walrand and Varaiya, Morgan Kaufman, 1996. 5. Internet working with TCP/IP: Principles, Protocols, Architecture, 3rd edition, by D. E. Comer, Prentice Hall, 1996. 6. TCP/IP Illustrated Vol. I, by W. R. Stevens, Addison Wesley, 1994.
ix	**Name(s) of Instructor(s)**	BR
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Electrical Engineering
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Fundamental course on computer networks.

Name of Academic Unit: Computer Science and Engineering

Level: UG

Programme: B.Tech.

i	**Title of the course**	CS 205 Design and Analysis of Algorithms
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Computer Programming and Utilization, Discrete Structures, Data Structures and Algorithms , Data Structures and Algorithms Laboratory
vii	**Course Content***	Syl Laboratory is divided roughly 8 modules; each module roughly takes two weeks. Module 1: Introduction Examples and motivation. Asymptotic complexity: informal concepts, formal notation, examples Module 2: Searching in list: binary search, Sorting: insertion sort, selection sort, merge sort, quicksort, stability and other issues. Module 3: Divide and conquer: binary search, recurrence relations. nearest pair of points, merge sort, integer multiplication, matrix multiplication. Module 4: Graphs: Motivation, BFS, DFS, DFS numbering and applications, directed acyclic graphs, directed acyclic graphs, Shortest paths: unweighted and weighted, Single source shortest paths: Dijkstra, Minimum cost spanning trees: Prim's algorithm, Kruskal's Algorithm Module 5: Union-Find data structure, Priority queues, heaps. Heap sort. Dijstra/Prims revisited using heaps, Search Trees: Introduction Traversals, insertions, deletions Balancing Module 6: Greedy algorithms: Greedy: Interval scheduling, Proof strategies, Huffman coding. Module 7: Dynamic Programming: weighted interval scheduling, memoization, edit distance, longest ascending subsequence. matrix multiplication, shortest paths: Bellman Ford, shortest paths: Floyd Warshall Module 8: Intractability: NP completeness, reductions, examples, Misc topics.
viii	**Texts/References**	1. Algorithms, by Sanjoy Dasgupta, Christos Papadimitriou and Umesh Vazirani, McGraw Hill Education, 2006. 2. Introduction to Algorithms, 3rd edition, by Cormen, Leiserson, Rivest and Stein, PHI Learning Pvt. Ltd., 2010. 3. Algorithm Design, 1st edition, by Kleniberg and Tardos, Pearson, 2014.
ix	**Name(s) of Instructor(s)**	PRB

x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Nil
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Core Course for Computer Science undergraduate students.

Name of Academic Unit: Electrical Engineering
Level: UG
Programme: B.Tech.

i	**Title of the course**	EE 204 Digital Systems
ii	**Credit Structure (L-T-P-C)**	(2-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) specify course number(s)**	None
vii	**Course Content**	• **Introduction to Digital Systems** • **Number systems and Logic:** Number Systems, Different Codes, Boolean logic, basic gates, truth tables • **Introduction to Logic families:** TTL, CMOS etc. • **Boolean Algebra:** Laws of Boolean Algebra, logic minimization using K maps • **Combinational Logic Circuits:** Adders, Subtractors, Multipliers, MSI components like Comparators, Decoders, Encoders, MUXs, DEMUXs • **Sequential circuits:** Latches, Flipflops, Analysis of clocked sequential circuits, Registers and Counters (Synchronous and Asynchronous), State Machines • **Introduction to Hardware Description Languages** • **Array based logic elements:** Memory, PLA, PLD, FPGA • **Special Topics:** Asynchronous State machines, Testing and Verification of Digital Systems
viii	**Texts/References**	1. J. F. Wakerly: Digital Design, Principles and Practices,4th Edition,Pearson Education, 2005 2. M. Moris Mano; Digital Design, 4th Edition, Pearson,2009 3. Ronald J. Tocci; Digital System, Principles and Applications, 10th Edition, Pearson, 2009 4. H.Taub and D. Schilling; Digital Integrated Electronics, McGraw Hill, 1977 5. Charles H Roth; Digital Systems Design using VHDL, Thomson Learning, 1998
ix	**Name(s) of Instructor(s)**	RG
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Computer Science Engineering
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which**	No

	is/ are equivalent to this course? If so, please give details.	
xii	**Justification/ Need for introducing the course**	This course introduces students to the world of Digital Systems by introducing concept of Boolean Algebra and Logic Functions. This course is a beginning of the spine related to Digital Design, Microprocessor, Embedded Systems etc,

Name of Academic Unit: Mathematics
Level: UG
Programme: B. Tech.

i	**Title of the course**	MA 204 Numerical Analysis
ii	**Credit Structure (L-T-P-C)**	((3-1-0-8)
iii	**Type of Course**	Core course for CSE & ME
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – specify course number(s)**	Calculus (MA 101), Linear Algebra (MA 102), Differential Equations I (MA 104)
vii	**Course Content**	Interpolation by polynomials, divided differences, error of the interpolating polynomial, piecewise linear and cubic spline interpolation. Numerical integration, composite rules, error formulae. Solution of a system of linear equations, implementation of Gaussian elimination and Gauss-seidel methods, partial pivoting, row echelon form, LU factorization Cholesky's method, ill-conditioning, norms. Solution of a nonlinear equation, bisection andsecant methods. Newton's method, rate of convergence, solution of a system of nonlinear equations, numerical solution of ordinary differential equations, Euler and Runge-Kutta methods, multi-step methods, predictor-corrector methods, order of convergence, nite dierence methods, numerical solutions of elliptic, parabolic, and hyperbolic partial differential equations. Eigenvalue problem, power method, QR method, Gershgorin's theorem.
viii	**Texts/References**	1. S. D. Conte and Carl de Boor, Elementary Numerical Analysis- An Algorithmic Approach (3rd Edition), McGraw-Hill, (1980) 2. C. E. Froberg, Introduction to Numerical Analysis (2nd Edition), Addison-Wesley (1981) 3. David Kincaid and Ward Cheney, Numerical Analysis: Mathematics of Scientific Computing (2002) 4. E. Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley (1999)
ix	**Name(s) of Instructor(s)**	AB
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	CSE, ME
xi	**Is/Are there any course(s) in the same/**	No

	other academic unit(s) which is/ are equivalent to this course? If so, please give details.	
	xii **Justification/ Need for introducing the course**	Numerical Analysis is needed for different branches of science and engineering for solving problems which generally have no closed form solutions

Name of Academic Unit: Computer Science and Engineering
Level: UG
Programme: B.Tech.

i	**Title of the course**	CS 212 Computer Networks Laboratory
ii	**Credit Structure (L-T-P-C)**	(0-0-3-3)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Nil
vii	**Course Content**	Experiments to support study of the Internet protocol stack: (a) Experimental study of application protocols such as HTTP, FTP, SMTP, using network packet sniffers and analyzers such as Ethereal. Small exercises in socket programming in C/C++/Java. (b) Experiments with packet sniffers to study the TCP protocol. Using OS (netstat, etc) tools to understand TCP protocol FSM, retransmission timer behavior, congestion control behaviour. (c) Introduction to ns2 (network simulator) - small simulation exercises to study TCP behavior under different scenarios. (d) Setting up a small IP network - configure interfaces, IP addresses and routing protocols to set up a small IP network. Study dynamic behaviour using packet sniffers (e) Experiments with ns2 to study behaviour (especially performance of) link layer protocols such as Ethernet and 802.11 wireless LAN.
viii	**Texts/References**	Nil
ix	**Name(s) of Instructor(s)**	BR
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Electrical Engineering
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Fundamental Laboratory course on computer networks.

2017 Batch (V SEMESTER)

Name of Academic Unit: Computer Science and Engineering
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 301 Computer Architecture
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	The Language of Bits, Assembly Language, Logic Gates, Registers, and Memories, Processor Design, Principles of Pipelining, The Memory System, Multiprocessor Systems, I/O and Storage Devices. Each concept will be first taught on the basis of the fundamental driving principles. Following this, real world examples (e.g., ARM processors) will be used to emphasize the content.
viii	**Texts/References**	1. Computer Organization and Architecture, by Smruti Ranjan Sarangi, McGraw Higher Ed, 2017. 2. Computer Architecture A Quantitative Approach, Sixth edition, by David Patterson and John L. Hennesy, Morgan Kaufmann, 2017.
ix	**Name(s) of Instructor(s)**	RK
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	EE
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This course deals with the fundamentals of how a programmable computer functions.

Name of Academic Unit: Computer Science and Engineering

Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 303 Data Bases and Information Systems
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Overview of data management systems. Relational model and query languages (relational algebra and calculus, SQL). Database design using the ER Model, ER Diagrams, UML Class Diagrams. Relational database design and normalization. Integrity and Security. Design and development of Web based information systems. Overview of storage structures and indexing, query processing and optimization, and transaction processing. Introduction to Big Data management concepts such as: distributed and scalable data storage, including distributed file systems, key value stores, column stores and graph databases, replication and consistency, and concurrent data processing using the Map Reduce paradigm. Introduction to decision support and data analysis, data warehousing and data mining, and Information Retrieval.
viii	**Texts/References**	1. Database System Concepts, 6th edition, by Abraham Silberschatz, Henry F. Korth and S. Sudarshan, McGraw Hill, 2010.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Fundamental course on Databases

Name of Academic Unit: Computer Science and Engineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	CS 305 Graph Theory and Combinatorics
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Elective
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Exposure to Discrete Structures (CS 203)
vii	**Course Content**	Fundamentals of graph theory. Topics include: connectivity, planarity, perfect graphs, coloring, matchings and extremal problems. Basic concepts in Combinatorics. Topics include: counting techniques, inclusion-exclusion principles, permutations, combinations and pigeon-hole principle.
viii	**Texts/References**	1. D. B. West, ``Introduction to Graph Theory" 2nd edition. Prentice Hall. 2. Martin C. Golumbic, ``Algorithmic Graph Theory and Perfect Graphs." 2nd edition. 3. R. Diestel, ``Graph Theory", 5th edition.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Graph Theory and Combinatorics have applications in many areas in computer science and electrical engineering. This is considered an essential course for those who want to explore further on theoretical computer science.

Name of Academic Unit: Electrical Engineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	EE 305 Digital Signal Processing
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Discrete time signals: Sequences, representation of signals on orthogonal basis, Sampling and reconstruction of signals, Discrete systems: attributes, Z-Transform, Analysis of LSI systems, Frequency analysis, Inverse Systems, Discrete Fourier Transform (DFT), Fast Fourier Transform algorithm, Implementation of Discrete Time Systems. Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations, Lowpass, Bandpass, Bandstop and High pass filters. Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multirate signal processing. Application of DSP to Speech and Radar signal processing. Assignments and course projects based on MATLAB and ARM based digital signal processing lab.
viii	**Texts/References**	1. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989. 2. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall, 1997. 3. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, 1992. 4.J.R. Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1992. 5. J. DeFatta, J. G. Lucas and W. S. Hodgkiss, Digital Signal Processing, J Wiley and Sons, Singapore, 1988.
ix	**Name(s) of Instructor(s)**	SRMP
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	CSE
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please**	No

	give details.	
xii	**Justification/ Need for introducing the course**	This is foundation course in digital signal processing and essential for all electrical engineers. The course can be offered as an elective course for the computer science and engineering students also.

Name of Academic Unit: Electrical Engineering
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	EE 307 Probability and Random Process
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Core course for EE and electives for CS
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Exposure to Calculus (MA 101)
vii	**Course Content**	**Introduction:** Motivation for studying the course, revision of basic math required, connection between probability and length on subsets of real line, probability-formaldefinition,eventsandsigma-algebra, independence of events, and conditional probability, sequence of events, and Borel-Cantell Lemma. **Random Variables:** Definition of random variables, and types of random variables, CDF, PDF and its properties, examples of random variables, random vectors and independence, brief introduction to transformation of random variables, introduction to Gaussian random vectors **Mathematical Expectation:** Importance of averages through examples, definition of expectation, moments and conditional expectation, use of MGF, PGF and characteristic functions, variance and k-th moment. **Inequalities and Notions of convergence:** Markov, Chebychev, Chernoff and Mcdiarmid inequalities, convergence in probability, mean, and almost sure. **Random Process:** Example and formal definition, stationarity, autocorrelation, and cross correlation function, ergodicity, KL expansion, introduction to special random process such as Markov chains, Martinagale and Brownian motion. **Markov Chain:** Communication classes and its properties, stationary distribution and its existence, Poisson processes, Example applications of Markov decision process. Applications of the tools discussed in the course in electrical engineering and computer science

viii	**Texts/References**	1. Robert B. Ash, ``Basic Probability Theory," Reprint of the John Wiley & Sons, Inc., New York, 1970 edition. 2. Sheldon Ross, ``A first course in probability," Pearson Education India, 2002. 3. Bruce Hayek, ``An Exploration of Random Processes for Engineers," Lecture notes.
ix	**Name(s) of Instructor(s)**	BBN
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	CSE
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	"Randomness" is inherent to most of the systems in electrical engineering. Especially, in the field of communication, the noise at the receiver brings in several challenges in designing systems that are immune to noise. To face this challenge, it is fundamental to model and understand the "randomness." This course is aimed at covering tools necessary to achieve this goal through several example applications in electrical and computer science engineering disciplines.

Name of Academic Unit: Mathematics
Level: B.Tech.
Programme: B.Tech.

I	**Title of the course**	MA 301 Elementary Algebra and number theory
ii	**Credit Structure (L-T-P-C)**	(3-0-0-6)
iii	**Type of Course**	Offered to 5^{th} semester Computer Science and Engineering
iv	**Semester in which normally to be offered**	Autumn
V	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	Some knowledge of discrete structures, would help but is not essential
vii	**Course Content**	Groups, subgroups, normal subgroups and quotient groups; homomorphism theorems; Symmetric and alternating groups; Group actions, Sylow theorems and applications. Rings; subrings, ideals, factor rings, polynomial rings, discriminents. Fields, algebraic and transcendental extensions, Separable and normal extensions, Statement of Galois theorem, Finite fields. Congruence relations in integers; Chinese reminder theorem; quadratic reciprocity law, cyclotomic polynomials
viii	**Texts/References**	1. D.S. Dummit and R.S. Foote, Abstract Algebra, John Wiley (Asian reprint 2003) 2. M.Artin, Algebra, Prentice Hall (2011), paperback Indian edition is available. 3. N.Jacobson, Basic Algebra vol I, W.H. Freeman and Co (1985) paperback Indian edition is available. 4. J.H.Siverman, A friendly introduction to number theory, Second edition,Prentice (2005) 5. K.Ireland and M.Rosen, A classical introduction to modern number theory, Second edition, Springer (Indian edition available).
ix	**Name(s) of Instructor(s)**	NSNS
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Nil
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Knowledge of this course is required in many areas of Computer Science and Engineering

Name of Academic Unit: Humanities and Social Sciences
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	HS 301: Philosophy
ii	**Credit Structure (L-T-P-C)**	3-0-0-6
iii	**Type of Course**	Core – Humanities
iv	**Semester in which normally to be offered**	1
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – specify course number(s)**	None
vii	**Course Content**	1. What is Philosophy? (Philosophy in India and West) 2. Main Branches of Philosophy 3. Three Laws of Thought 4. Epistemology and Logic (Indian and Western) 5. Metaphysics (Universal and Particular, Substance and Attributes, Causality, Space, Time, Soul, God, Freedom) 6. Three Great Greek Philosophers: Socrates, Plato and Aristotle 7. Modern Philosophy: Rationalism and Empiricism (Descartes, Locke, Berkeley and Hume) 8. Ethics (Utilitarianism, Categorical Imperative of Kant, Ethical Relativism, Bio-Medical Ethics, Ethical Issues) 9. Indian Philosophy Component (Nishkama-karma of Gita, Virtue Ethics of Buddhism, Advaita Vedanta). 10. Meaning of Life.
viii	**Texts/References**	1. Ganeri, Jonardon, *Philosophy in Classical India: An Introduction and Analysis* (London: Routledge, 2001). 2. Maritain, Jacques, *An Introduction of Philosophy* (New York and Oxford: Rowman & Littlefield, 2005). 3. Mohanty, J. N. *Classical Indian Philosophy: An Introductory Text* (New York and Oxford: Rowman & Littlefield, 2000). 4. Nagel, Thomas, *What Does It All Mean? A Short Introduction to Philosophy* (Oxford: Oxford University Press, 2004). 5. Russel, Bertrand, *The Problems of Philosophy* (Oxford: Oxford University Press, Reprint by Kalpaz Publication, 2017). 6. Sharma, Chandradhar, *A Critical Survey of Indian Philosophy* (Delhi: Motilal Banarsidass, 2016).

		7. Thilly, Frank, *A History of Philosophy* (New Delhi: SBW Publishers, 2018). 8. Williams, Bernard, *Morality: An Introduction to Ethics* (Cambridge: Cambridge University Press, 2012).
ix	**Name(s) of Instructor(s)**	C. D. Sebastian
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	All
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	HS 301 is a unique course that aims to provide the BTech students an understanding of philosophy and history of ideas. Through this course they are expected to develop philosophical analysis and critical thinking which will enhance their engineering imagination as a skill and profession with the training in epistemology, logic, philosophical speculation and creativity. The ethics-module of the course will help them to think and act ethically in their profession with relation to the societal expectations of their fellow humans in India.

Name of Academic Unit: Humanities and Social Sciences
Level: B.Tech.
Programme: B.Tech.

i	**Title of the course**	HS 303 Introduction to Literature
ii	**Credit Structure (L-T-P-C)**	(3-1-0-6)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	What is Literature, Genres of Literature, Literary Texts and Contexts, Major Themes in Literature
viii	**Texts/ References**	*Glossary of Literary Terms* by MH Abrams, *The Norton Anthology of Poetry* edited by Margaret Ferguson, *Animal Farm* by George Orwell, *The Penguin Book of Modern Indian Short Stories*- Stephen Alter, *Oxford Book of English Short Stories Reissue* Edition (English, Paperback, A. S. BYATT), *Three Theban Plays: Antigone; Oedipus the King; Oedipus at Colonus* (English, Paperback, Sophocles)
ix	**Name(s) of Instructor(s)**	Prof. Ridhima Tewari
xii	**Justification/ Need for introducing the course**	The course is aimed at introducing students to literature- its reading and appreciation, and its relation to contemporary world, knowledge systems and contexts.

Name of Academic Unit: Computer Science and Engineering
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 311 Computer Architecture Laboratory
ii	**Credit Structure (L-T-P-C)**	(0-0-3-3)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	The lab will closely follow the theory course. The idea is to have the students develop a software model of a simple processor, capturing both functionality and timing aspects. They will implement modules as the concepts are taught in class.
viii	**Texts/References**	Nil
ix	**Name(s) of Instructor(s)**	RK
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	EE
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Fundamental lab course on computer architecture.

Name of Academic Unit: Computer Science and Engineering
Level: B. Tech.
Programme: B.Tech.

i	**Title of the course**	CS 313 Data Bases and Information Systems Laboratory
ii	**Credit Structure (L-T-P-C)**	(0-0-3-3)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Autumn
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) – *specify course number(s)***	--
vii	**Course Content**	Use of database systems supporting interactive SQL. Two-tier client-server applications using JDBC or ODBC, Three-tier web applications using Java servlets/JDBC or equivalent. Design of applications and user interfaces using these systems. Data analysis tools. Laboratory project involving building data backed applications with Web or mobile app frontends.
viii	**Texts/References**	1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts 6th Ed, McGraw Hill, 2010.
ix	**Name(s) of Instructor(s)**	--
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	NA
xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	Fundamental lab course on Databases

Name of Academic Unit: Electrical Engineering
Level: UG
Programme: B.Tech.

i	**Title of the course**	EE 214 Digital Systems Laboratory
ii	**Credit Structure (L-T-P-C)**	(0-0-3-3)
iii	**Type of Course**	Core course
iv	**Semester in which normally to be offered**	Spring
v	**Whether Full or Half Semester Course**	Full
vi	**Pre-requisite(s), if any (For the students) specify course number(s)**	None
vii	**Course Content**	• **Introduction to Digital Systems** • **Number systems and Logic:** Number Systems, Different Codes, Boolean logic, basic gates, truth tables • **Introduction to Logic families:** TTL, CMOS etc. • **Boolean Algebra:** Laws of Boolean Algebra, logic minimization using K maps • **Combinational Logic Circuits:** Adders, Subtractors, Multipliers, MSI components like Comparators, Decoders, Encoders, MUXs, DEMUXs • **Sequential circuits:** Latches, Flipflops, Analysis of clocked sequential circuits, Registers and Counters (Synchronous and Asynchronous), State Machines • **Introduction to Hardware Description Languages** • **Array based logic elements:** Memory, PLA, PLD, FPGA • **Special Topics:** Asynchronous State machines, Testing and Verification of Digital Systems
viii	**Texts/References**	1. J. F. Wakerly: Digital Design, Principles and Practices,4th Edition,Pearson Education, 2005 2. M. Moris Mano; Digital Design, 4th Edition, Pearson,2009 3. Ronald J. Tocci; Digital System, Principles and Applications, 10th Edition, Pearson, 2009 4. H.Taub and D. Schilling; Digital Integrated Electronics, McGraw Hill, 1977 5. Charles H Roth; Digital Systems Design using VHDL, Thomson Learning, 1998
ix	**Name(s) of Instructor(s)**	RG
x	**Name(s) of other Departments/ Academic Units to whom the course is relevant**	Computer Science Engineering

xi	**Is/Are there any course(s) in the same/ other academic unit(s) which is/ are equivalent to this course? If so, please give details.**	No
xii	**Justification/ Need for introducing the course**	This course introduces students to the world of Digital Systems by introducing concept of Boolean Algebra and Logic Functions. This course is a beginning of the spine related to Digital Design, Microprocessor, Embedded Systems etc,