RCOEM

Shri Ramdeobaba College of Engineering and Management, Nagpur

SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT NAGPUR – 440013

An Autonomous College affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME

2022-2023

B.TECH. (ELECTRONICS AND COMPUTER SCIENCE)

About the Department

The Department of Electronics and Computer Science established in 2022 offers a degree of B.Tech. in Electronics and Computer Science with an intake of 120. Electronics and Computer Science is the fusion of Computer Science and Electronics Engineering disciplines. Combining these two areas of study gives a solid foundation in both domains and qualifies for a variety of careers, in both or either fields.

Department Vision

Department endeavors to facilitate state of the art technical education in the field of Electronics and Computer Science to produce globally competent engineering professionals.

Department Mission

- To impart quality education in the field of Electronics and Computer Science Engineering.
- To foster mutually beneficial relationship with industries, academics and research organizations.
- To create an intellectually stimulating environment for learning, research and innovation with professional and ethical values.

Program Educational Objectives

PEO1: Exercise the acquired knowledge and skills in electronics and computer science to solve engineering problems.

PEO2: Engage in professional development by pursuing higher education and research.

PEO3: Demonstrate leadership qualities, effective communication skills, and to work in a team in a diverse environment with strong adherence to professional ethics.

PEO4: Engage in lifelong learning for sustained career advancement and adapt to changing professional and societal needs.

Program Outcomes

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design /development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: An ability to apply concepts of Electronics and Computer Science to analyze multidisciplinary problems.

PSO2: An ability to design hardware/software systems using modern tools and techniques in the areas of VLSI, Embedded Systems, Artificial Intelligence, and Software Engineering.

Teaching Scheme for B. Tech. Electronics and Computer Science

SEMESTER-I											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	BSC	PHT156	Semiconductor Physics	3	1	0	4	40	60	100	3
2	BSC	PHP156	Semiconductor Physics Lab	0	0	3	1.5	25	25	50	-
3	BSC	MAT153	Mathematics - I	3	0	0	3	40	60	100	3
4	ESC	ECST101	Programming for Problem Solving	3	0	0	3	40	60	100	3
5	ESC	ECSP101	Programming for Problem Solving Lab	0	0	2	1	25	25	50	-
6	ESC	ECSP102	Electronics and Computer Workshop Lab	0	0	2	1	25	25	50	-
7	HSMC	HUT151	English	2	0	0	2	40	60	100	3
8	HSMC	HUP151	English Lab	0	0	2	1	25	25	50	-
9	ESC	IDT151	Creativity, Innovation & Design Thinking	1	0	0	1	20	30	50	1.5
TOTAL				**12**	**1**	**9**	**17.5**				
				22 Hrs.							

Teaching Scheme for B. Tech. Electronics and Computer Science

SEMESTER- II											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	BSC	CHT152	Chemistry	3	1	0	4	40	60	100	3
2	BSC	CHP152	Chemistry Lab	0	0	3	1.5	25	25	50	-
3	BSC	MAT154	Mathematics - II	4	0	0	4	40	60	100	3
4	BSC	MAP151	Computational Mathematics Lab	0	0	2	1	25	25	50	-
5	ESC	ECST103	Network Theory	3	0	0	3	40	60	100	3
6	ESC	ECST104	Digital Circuits	3	0	0	3	40	60	100	3
7	ESC	ECSP104	Digital Circuits Lab	0	0	2	1	25	25	50	-
8	ESC	ECST105	Object Oriented Programming	3	0	0	3	40	60	100	3
9	ESC	ECSP105	Object Oriented Programming Lab	0	0	2	1	25	25	50	-
10	MC	HUT152	Constitution of India	2	0	0	0				-
11	MC	PEP151	Yoga / Sports	0	0	2	0				-
TOTAL				**18**	**1**	**11**	**21.5**				
				30 Hrs.							

Teaching Scheme for B. Tech. Electronics and Computer Science

Semester III											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	ESC	ECST201	Electronic Devices and Circuits	3	1	0	4	40	60	100	3
2	ESC	ECSP201	Electronic Devices and Circuits lab	0	0	2	1	25	25	50	-
3	PCC	ECST202	Data Structures	3	0	0	3	40	60	100	3
4	PCC	ECSP202	Data Structures Lab	0	0	2	1	25	25	50	-
5	PCC	ECST203	Digital System Design	3	0	0	3	40	60	100	3
6	PCC	ECSP203	Digital System Design Lab	0	0	2	1	25	25	50	-
7	PCC	ECST204	Discrete Signals and Systems	3	0	0	3	40	60	100	3
8	PCC	ECSP204	Discrete Signals and Systems Lab	0	0	2	1	25	25	50	-
9	PCC	ECST205	Probability Theory, Statistics and Stochastic Process	3	1	0	4	40	60	100	3
10	BSC	MAT	Linear Algebra	2	0	0	2	40	60	100	3
TOTAL				**17**	**2**	**8**	**23**				
				27 Hrs.							

Teaching Scheme for B. Tech. Electronics and Computer Science

Semester IV											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	PCC	ECST206	Discrete Mathematics	3	1	0	4	40	60	100	3
2	PCC	ECST207	Operating System	3	0	0	3	40	60	100	3
3	PCC	ECSP207	Operating System Lab	0	0	2	1	25	25	50	-
4	PCC	ECST208	Computer Architecture and Organization	3	1	0	4	40	60	100	3
5	PCC	ECST209	Embedded System Design	3	0	0	3	40	60	100	3
6	PCC	ECSP210	Hardware System Design Lab	0	0	2	1	25	25	50	-
7	PCC	ECSP211	Software Lab-I	0	0	2	1	25	25	50	-
8	HSMC	HUT	Business Communication	3	0	0	3	40	60	100	3
9	OEC		Open Elective I	3	0	0	3	40	60	100	3
10	MC	CHT251	Environmental Sciences	2	0	0	0				
TOTAL				**20**	**2**	**6**	**23**				
				28 Hrs.							

Teaching Scheme for B. Tech. Electronics and Computer Science

Semester V											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	PCC	ECST301	Software Engineering	3	0	0	3	40	60	100	3
2	PCC	ECSP301	Software Engineering Lab	0	0	2	1	25	25	50	-
3	PCC	ECST302	Design and Analysis of Algorithms	3	1	0	4	40	60	100	3
4	PCC	ECST303	Control Systems and Instrumentation	3	1	0	4	40	60	100	3
5	PCC	ECSP304	Software Lab -II	0	0	2	1	25	25	50	-
6	PEC	ECST305	Programme Elective - I	3	0	0	3	40	60	100	3
7	PEC	ECSP305	Programme Elective- I Lab	0	0	2	1	25	25	50	-
8	HSMC	HUT	Business Management and Entrepreneurship	3	0	0	3	40	60	100	3
9	OEC		Open Elective II	3	0	0	3	40	60	100	3
TOTAL				**18**	**2**	**6**	**23**				
				26 Hrs.							

Programme Elective – I (V Semester)	
ECST305-1 / ECSP305-1	Digital VLSI Design
ECST305-2 / ECSP305-2	Internet of Things
ECST305-3 / ECSP305-3	Machine Learning
ECST305-4 / ECSP305-4	Cloud Computing

Teaching Scheme for B. Tech. Electronics and Computer Science

Semester VI											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	PCC	ECST306	Database Management System	3	0	0	3	40	60	100	3
2	PCC	ECSP306	Database Management System Lab	0	0	2	1	25	25	50	-
3	PCC	ECST307	Computer Networks	3	0	0	3	40	60	100	3
4	PCC	ECSP307	Computer Networks Lab	0	0	2	1	25	25	50	
5	PCC	ECST308	Communication Engineering	3	1	0	4	40	60	100	3
6	PEC	ECST309	Programme Elective II	3	0	0	3	40	60	100	3
7	PEC	ECSP309	Programme Elective II Lab	0	0	2	1	25	25	50	-
8	PROJ	ECSP310	Project I	0	0	6	3	25	25	50	-
9	OEC	--	Open Elective III	3	0	0	3	40	60	100	3
TOTAL				**15**	**1**	**12**	**22**				
				28 Hrs.							

Program Elective – II (VI Semester)	
ECST 309-1 / ECSP 309-1	System Verilog for Verification
ECST 309-2 / ECSP 309-2	Industrial Internet of Things
ECST 309-3 / ECSP 309-3	Deep Learning for Visual Computing
ECST 309-4 / ECSP 309-4	Design Pattern

Teaching Scheme for B. Tech. Electronics and Computer Science

Semester VII											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	PEC	ECST401	Programme Elective III	3	0	0	3	40	60	100	3
2	PEC	ECST402	Programme Elective IV	3	0	0	3	40	60	100	3
3	BSC	IDT	Bioinformatics	3	0	0	3	40	60	100	3
4	MC	HUT	Cyber Laws and Ethics	2	0	0	0	40	60	100	3
5	PROJ	ECSP403	Project II	0	0	12	6	50	50	100	-
6	PROJ	ECSP404	Industry Internship Evaluation (6-8 weeks)	0	0	2	0	50	-	50	-
7	OEC		Open Elective IV	3	0	0	3	40	60	100	3
TOTAL				**14**	**0**	**14**	**18**				
				28 Hrs.							

Program Elective – III (VII Semester)		**Program Elective - IV (VII Semester)**	
ECST 401-1	VLSI Testing	ECST 402-1	SoC Design
ECST 401-2	Advanced Embedded System	ECST 402-2	Electromagnetics
ECST 401-3	Data Warehousing and Mining	ECST 402-3	Compiler Design
ECST 401-4	Data Analytics and Engineering	ECST 402-4	Information Security and Cryptography

Teaching Scheme for B. Tech. Electronics and Computer Science

Semester VIII											
Sr. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
1	PEC	ECST405	Programme Elective V	3	0	0	3	40	60	100	3
2	PEC	ECST406	Programme Elective VI	3	0	0	3	40	60	100	3
3	PROJ	ECSP407	Project III	0	0	12	6	50	50	100	-
TOTAL				**6**	**0**	**12**	**12**				
				18 Hrs.							
OR											
4	PROJ	ECSP408	Internship (Six Months)				**12**	150	150	300	-

Program Elective- V (VIII Semester)		**Program Elective- VI (VIII Semester)**	
ECST 405-1	Physical Design	ECST 406-1	Analog IC Design
ECST 405-2	Wearable Technologies	ECST 406-2	Mobile Robots
ECST 405-3	Natural Language Processing	ECST 406-3	Reinforcement Learning
ECST 405-4	Advanced Tools for Data Analytics	ECST 406-4	Industrial Computer and Human Machine Interface

Open Electives			
IV semester	**V semester**	**VI semester**	**VII semester**
ECST299-1: Linux for Beginners	ECST398-1: Design with Arduino	ECST399-1: Designing with Raspberry Pi	ECST498-1: Drone Technology

Syllabus of Semester I B.Tech.

Department of Electronics and Computer Science

Course Code	PHT156				
Category	Basic Science Course				
Course Title	Semiconductor Physics				
Scheme & Credits	L	T	P	Credits	Semester I
	3	1	0	4	

Course Outcomes

After successful completion of the course students will

1. have an elementary understanding of quantum behaviour of electrons in solids;
2. have a grasp of band structure and its consequences for semiconductors;
3. should be able to use band structure to explain effects of doping,on the properties of junctionsbetween semiconductors and metals;
4. have an elementary understanding of working of optoelectronic devices

Module 1: Quantum Mechanics Introduction Wave-particle duality, Heisenberg uncertainty relations, the quantum state wave function and its probability interpretation, Schrodinger's equation, Energies and wave functions of a single electron in one-dimensional infinite potentials:formulae, function graphs, number of bound states, tunneling, One electron atom, periodic table, Quantum confinement effects in nanosystems

Module 2: Electronic Materials Free electron theory, Extension of idea of energy level splitting in molecules to bonding in solids, Energy bands in solids, Kronig-Penny model (to better demonstrate origin of band gaps), Band gap-based classification of electronic materials: metals, semiconductors, and insulators, E-k diagram, Direct and indirect bandgaps, Valence and conduction bands, Density of states, Fermi-Dirac statistics: Occupation probability of states, Fermi level, Effective mass.

Module 3: Intrinsic and Extrinsic Semiconductors Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier transport: diffusion and drift Programme

Module 4: Non-Equilibrium Semiconductors Carrier generation and recombination, Continuity equation, Ambipolar transport equation, QuasiFermi Energy levels, Excess Carrier Lifetime, Qualitative introduction to recombination mechanisms, Shorkley-Read-Hall Recombination, Surface Recombination

Module 5: Junction Physics p-n junction, Zero applied bias, forward bias, reverse bias, Metal-semiconductor junction, Shottky barrier, Ideal junction properties, Ohmic contacts, ideal non- rectifying barrier, tunneling barrier, Heterojunctions, Nanostructures, Energy band diagram, two- dimensional electron gas

Module 6: Light - Semiconductors Interaction Optical absorption in semiconductors, Light emitting diodes, Principles, Device Structures, Materials, High Intensity LEDs, Characteristics, LASERS, Stimulated emission and photon amplification, Einstein Coefficients, Laser oscillation conditions, Laser diode, Solar Energy Spectrum, photovoltaic device principles, Solar Cells

Text Book(s)

Modules 1-5 1. Semiconductor Physics and Devices (Fourth Edition), Donald A. Neamen, McGraw-Hill

2012.

Reference

1. Physics of Semiconductor Devices, S. M. Sze, 2nd Edition, Willey-Interscience Publication1986 Modules 6 1. Online course: Semiconductor Optoelectronics by M. R. Shenoy on NPTEL

2. Optoelectronics and Photonics: Principles and Practices by S. O. Kasap, Prentice Hall 2001

Syllabus of Semester I B.Tech.

Department of Electronics and Computer Science

Course Code	PHP156				
Category	Basic Science Course				
Course Title	Semiconductor Physics Lab				
Scheme & Credits	L	T	P	Credits	Semester I
	0	0	3	1.5	

Course Outcomes

The Physics Lab course consists of experiments illustrating the principles of physics relevant tothe study of science and engineering. At the end of the Course the students will learn to:

1. Develop skills to impart practical knowledge in real time.
2. Understand principle, concept, working and application of areas in physics and compare theresults obtained with theoretical calculations.
3. Understand measurement technique, and report the results obtained through proper graphplotting and error analysis.

In addition to the General physics experiments, the Lab turns will be utilized for performing theexperiments based on the following lists as specific to Program

General Physics

1. Error analysis and graph plotting
2. Newton's law of cooling
3. Simple Pendulum
4. Magnetic flux using deflection magnetometer
5. Dispersive power and determination of Cauchy's constants
6. Data analysis using Mathematica.
7. Cathode Ray Oscilloscope

Semiconductor Physics and Devices

1. Energy gap of semiconductor/thermistor
2. Study of Hall Effect
3. Parameter extraction from I-V characteristics of a PN junction diode
4. Parameter extraction from I-V characteristics of a zener diode 12
5. Study of diode rectification
6. Parameter extraction from I-V characteristics of a transistor in common-emitter configuration.
7. V-I Characteristics of Light Emitting Diodes
8. Study of a photodiode
9. Solar Cell (Photovoltaic cell)
10. Resistivity measurement by Four Probe method

A minimum of 8 experiments to be performed from the following list of experiments 1

Syllabus of Semester I B.Tech.

Department of Electronics and Computer Science

Course Code	MAT 153				
Category	Basic Science Course				
Course Title	MATHEMATICS - I				
Scheme & Credits	L	T	P	Credits	Semester I
	3	0	0	3	

Course Outcomes

On successful completion of the course, the students will learn:

1. The effective mathematical tools for the solutions of ordinary differential equations thatmodel physical processes.
2. The essential tool of matrices in a comprehensive manner.
3. The ideas of probability and various discrete and continuous probability distributions and the basic ideas of statistics including measures of central tendency, correlation and regression.

Syllabus

Module 1: First order ordinary differential equations (7 hours)
Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equationssolvable for p, equations solvable for y, equations solvable for x and Clairaut'stype.

Module 2: Ordinary differential equations of higher orders (8 hours)
Second order linear differential equations with constant and variable coefficients, method ofvariation of parameters, Cauchy-Euler equation.

Module 3: Basic Statistics: (7 hours)
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves, correlation and regression – Rank correlation, Multiple regression and correlation.

Module 4: Basic Probability: (8 hours)
Probability spaces, conditional probability, independence; Discrete random variables, Binomial distribution, Poisson distribution, Normal distribution. Relation between binomial, Poisson and Normal distributions.

Module 5: Matrices (10 hours**)**
Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms.

Topics for Self Learning:
Applications of Differential Equations.

Textbooks/References:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and BoundaryValue Problems, 9th Edition, Wiley India, 2009.

3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Codington, An Introduction to Ordinary Differential Equations, Prentice HallIndia, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition,2000.
7. Theory and Problems of probability and statistics: 2nd ed :*J. R. Spiegal ,Schaum series*
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar,Pune VidhyarthiGrihaPrakashan, Pune-411030 (India).
9.. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Syllabus of Semester I B. Tech.

Department of Electronics and Computer Science

Course Code	ECST101				
Category	Engineering Science Course				
Course Title	Programming for Problem Solving				
Scheme & Credits	L	T	P	Credits	Semester I
	3	0	0	3	

Course Outcomes

On successful completion of course student will be able to:

1. Understand the fundamentals of C programming and choose the loops and decision making statements to solve and execute the given problem.
2. Formulate simple algorithms for arithmetic and logical problems, translate the algorithms to programs, test and execute the programs and correct syntax and logical errors.
3. Use arrays, pointers, structures and I/O operations for the formulation of algorithms andprograms.
4. Apply programming concepts to solve matrix addition, multiplication problems and searching& sorting problems.
5. Implement iterations and recursions, to decompose a problem into functions and synthesize acomplete program using divide and conquer approach.

Syllabus

Module-I: Introduction to Programming

Introduction to components of a computer system (disks, memory, processor, where a program isstored and executed, operating system, compilers etc.)Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart /Pseudo code with examples. Arithmetic expressions and precedence.

Module -II: C Programming Language

Introduction to C language: Keywords, Constant, Variable, Data types, Operators, Types ofStatements, Pre-processor Directives, Decision Control Statement-if, if-else, nested if-elsestatement, switch case, Loops and Writing and evaluation of conditionals and consequent branching.

Module -III: Arrays and Basic Algorithms

Arrays: 1-D, 2-D, Character arrays and Strings. Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Module -IV: Functions and Recursion

User defined and Library Functions, Parameter passing in functions, call by value, passing arraysto functions: idea of call by reference. Recursion: As a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Module -V: Pointers and Structures

Structures, Defining structures, Array of Structures, Introduction to pointers, Defining pointers, Pointer arithmetic, pointer operators, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Module -VI: File handling

Streams in C, Types of Files, File Input/ Output Operations: Modes of file opening, Reading and writing the file, Closing the files, using fflush ().

Text Books:

1. Programming in ANSI C: E. Balguruswami McGraw Hill
2. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill

Reference Books

2. Programming with C: Byron Gottfried, Schaums Outline Series.
3. Let Us C: Yashwant Kanetkar, BPB Publication

Syllabus of Semester I B.Tech.

Department of Electronics and Computer Science

Course Code	ECSP102				
Category	Engineering Science Course				
Course Title	Electronics and Computer Workshop Lab				
Scheme & Credits	L	T	P	Credits	Semester I
	0	0	2	1	

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to:

1. Inspect techniques to identify and test different Electronic components and IntegratedCircuits.
2. Comprehend different EDA tools required for designing of Electronic and computer related circuits.
3. Classify mounting and troubleshooting practices and OS installation and Imaging.

Practical's based on:

1. Acquaintance with basic electronic components and Integrated circuits.
2. Introduction to electronic test and measurement equipment's (multimeter CRO, DSO, Function generator, power supply, etc.)
3. Test and measurement of resistor, capacitor, inductor, P-N junction Diode using Multimeter and DSO.
4. Introduction to EDA tools.
5. Circuit implementation and testing on breadboard
6. Component mounting and soldering on PCB.
7. Assembling and disassembling CPU and identification of peripherals.
8. Processor mounting and troubleshooting practices.
9. USB, Ethernet, HDMI, thunderbolt port variants (peripherals).
10. Types of OS and OS installation, OS imaging.

Text Books

1. K.A. Navas; Electronics lab Manual; Fifth Edition; PHI learning; 2015
2. N. Kumar, T. H. Sheikh; PC Assembly and Installation; Books clinic Publishing; 2020

Reference books

1. C. Bhargava; Digital Electronics: A Comprehensive Lab Manual; BS Publication; 2019
2. C. Zacker; PC Hardware: The Complete Reference; First Edition; McGraw Hill Education; 2017

Syllabus of Semester I B. Tech.

Department of Electronics and Computer Science

Course Code	HUT151				
Category	Basic Science Course				
Course Title	English				
Scheme & Credits	L	T	P	Credits	Semester I
	2	0	0	2	

Course Outcomes

1. Students will have good word power.
2. Students will understand functional grammar and its usage.
3. Students will acquire basic writing skills.
4. Students will organize and express their thoughts effectively through written communication.
5. Students will develop reading and listening comprehension skills.

SYLLABUS

Module-1: Vocabulary Building The concept of Word Formation, Techniques to develop word power: root words from foreign language, affixes, games, etc. Commonly used power verbs, adjectives and adverbs. Synonyms, antonyms, phrases & idioms, one word substitutions and standard abbreviations

Module -2: Identifying Common Errors in Writing Articles, prepositions, modifiers, modal auxiliaries, Tenses Subject-verb agreement, noun-pronoun agreementActive – passive voice

Module -3: Basic Writing Skills

Sentence Structures
Importance of proper punctuation
Creating coherence
Organizing principles of paragraphs in documents
Techniques for writing precisely

Module -4: Nature and Style of sensible Writing

Describing
Defining
Classifying
Providing examples or evidence

Module -5: Writing Practices

Précis Writing
Essay Writing
Email Writing
Note Making (with reference to GD, Meetings, Presentations, and Feedback)

Module -6: Reading and Listening Comprehension

Reading Comprehension: purpose, types, strategies and practice
Listening Comprehension: active listening, reasons for poor listening, traits of a goodlistener, barriers in listening,and practice

Books

1. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Remedial English Grammar. F.T. Wood. Macmillan.2007
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Syllabus of Semester I B. Tech.

Department of Electronics and Computer Science

Course Code	HUP151				
Category	Basic Science Course				
Course Title	English Lab				
Scheme & Credits	L	T	P	Credits	Semester I
	0	0	2	1	

Course outcomes:

1. Students learn presentation and public speaking skills
2. Students learn to practice effective strategies for Personal Interview and Group Discussions
3. Students learn and effectively apply language skills – listening, speaking, reading and writing

List of Practicals

1. Common Everyday Situations: Conversations and Dialogues
2. Pronunciation, Intonation , Stress, and Rhythm
3. Formal Presentations: Orientation
4. Formal Presentations : Practice Session
5. Interviews: Orientation
6. Interviews: Practice Session
7. Communication at Workplace: Group Discussion- Orientation
8. Communication at Workplace: Practice Session

Syllabus of Semester I B.Tech.

Department of Electronics and Computer Science

Course Code	IDT151				
Category	Multidisciplinary Course				
Course Title	Creativity, Innovation & Design Thinking				
Scheme & Credits	L	T	P	Credits	Semester I
	1	0	0	1	

Course Outcomes

1: Be familiar with processes and methods of creative problem solving
2: Enhance their creative and innovative thinking skills
3: Practice thinking creatively and innovative design and development

Syllabus

Module I. Introduction: Making a case for creativity, Creative thinking as a skill, Valuing diversity in thinking: Thinking preferences, Creativity styles, Creativity in problem solving

Module 2. Pattern Breaking: Thinking differently, Lateral thinking, Mind stimulation: games, brain-twisters and puzzles, Idea-collection processes, Brainstorming/Brain- writing, The SCAMPER methods, Metaphoric thinking, Outrageous thinking, Mapping thoughts, Other (new approaches)

Module 3. Using Math and Science, Systematic logical thinking, Using math concepts, Eight-Dimensional (8D) Approach to Ideation:Uniqueness, Dimensionality, Directionality, Consolidation, Segmentation, Modification, Similarity, Experimentation

Module 4. Systematic Inventive Thinking: Systematic inventive thinking: The TRIZ methodology, Decision and Evaluation: Focused thinking framework, Six thinking hats, Ethical considerations

Module 5.Design for Innovation: Introduction to design for interaction, nine lessons for innovation, difference in creativity and innovation, Building blocks for innovation

Module 6. Intellectual Property: Introduction to intellectual property: Patents, Copyrights , Trademarks , Trade Secret, Unfair Competition.

Reference Books and Text Book:

1. Creative Problem Solving for Managers - Tony Proctor - Routledge Taylor & Francis Group
2. 101 Activities for Teaching creativity and Problem Solving - By Arthur B Vangundy - Pfeiffer
3. H. S. Fogler and S.E. LeBlanc, Strategies for Creative Problem Solving, Prentice Hall
4. E. Lumsdaine and M. Lumsdaine, Creative Problem Solving, McGraw Hill,

5. J. Goldenberg and D. Mazursky, Creativity in product innovation. Cambridge University Press, 2002.

Course Assignments for internal continuous assessment of 20 Marks (NO T1 and T2)

- Brain teasers (aka PuzzleBusters, to be solved individually)
- Cartoon captions (small teams)
- TRIZ, a systematic ideation method, reading (individual)
- Book readings and discussions (small teams)
- Small teams presentations on innovation: (1) innovative individual, (2) innovative company, (3) innovative movie/game, (4) sustainable innovation, (5) innovation in business, (6) innovation in art, (7) innovation in architecture, (8) innovative nation, (9) innovation in science, and (10) innovation in engineering.
- Large groups hands-on projects
- Eight-dimensional (8D) ideation method examples
- Large teams videos

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	CHT152				
Category	Basic Science Course				
Course Title	Chemistry				
Scheme & Credits	L	T	P	Credits	Semester II
	3	1	0	4	

Course Outcomes:

After the successful completion of the course, students shall be able to

1. Predict the properties and interactions of chemical substances at the atomic level.
2. Interpret the unique properties of nano-materials to solve challenges in life.
3. Explain the differences in the mechanical behavior of engineering materials based uponbond type, structure, composition, and processing.
4. Examine the chemical kinetics using concepts of computational chemistry.
5. Discuss how spectroscopic methods are used for qualitative and quantitative analyses.
6. Understand the importance of biomaterials.

Syllabus:

Module 1: Chemical Bonding (7 Hours)

Bondings in atoms: Primary bonding: ionic, covalent, metallic. Secondary bonding: dipole-dipole, induced dipole-induced dipole, London dispersion/van der Waals, hydrogen. LCAO-MO Electronic material: Band theory: metals, insulators, and semiconductors. Band gaps,doping. Silicon wafer production. Integrated circuits, Light Emitting Diodes.

Module 2: Nano-materials (7 Hours)

Basics of Nanochemistry: Definition of Nano, carbon age-new form of carbon (CNT to Graphene), One dimensional, Two dimensional and Three dimensional nanostructured materials, mechanical-physical-chemical, optical properties.

Application of Nanomaterials: Molecular electronics and nanoelectronics, Nanotechnology for waste reduction and improved energy efficiency, Carbon Nanotubes for energy storage, Hydrogen Storage in Carbon Nanotubes.

Module 3: Advanced Materials: (7 hours)

Introduction to Composites, their classification Ceramic, Carbon–Carbon Composites,Fiber-Reinforced Composites and Applications.

Reinforcements: Kevlar, silicon carbide, boron carbide.

Industrial Polymer: Thermoplastics, Thermosetting Plastics, Polymers used in electronic industries, Polymers in optical media data storage devices.

Module 4: Computational Chemistry [6 Hours]

Rate of the reaction, Order and Molecularity of the reaction, Rate expression for Zero Order, First Order and Second Order Reactions, Effect of the temperature, Use of computational toolsfor determining rate of the reaction, etc.

Module 5: Material Characterization using different Spectroscopic Techniques [7 Hours]

Fundamentals of spectroscopy, Infrared Spectroscopy, Electronic Spectroscopy, Nuclear Magnetic Resonance Spectroscopy. Fundamentals of X-Ray Diffraction (XRD).

Module 6: Biomaterials [8 Hours]

Introduction, metallic biomaterials like stainless steel, CoCr alloy, Corrosion of metallic implants, Ceramic biomaterials like calcium phosphate, bioactive or surface reactive biomaterials, biodegradable polymers, biocompatibility.

Text Books:

1. Shikha Agrawal , Engineering Chemistry : Fundamentals and Applications, Cambridge University Press.
2. Dr. Rajshree Khare, A Textbook ofEngineering Chemistry(AICTE), S.K. Kataria &Sons
3. S. S. Dara, A Textbook ofEngineering Chemistry, S. Chand Publications.

Reference Books:

1. J. Michael Hollas, Modern Spectroscopy, Fourth Edition, John Wiley and Sons, 2004.
2. William Kemp, Organic Spectroscopy, Third Edition, Palgrave Publication, 1991.
3. Bradley D. Fahlman, Materials Chemistry, Third Edition, Springer Nature, 2018.
4. Brian W. Pfennig, Principles of Inorganic Chemistry, John Wiley and Sons, 2015.
5. Steven S. Zumdahl, Donald J. DeCoste, Chemical Principles,Eighth Edition, Cengage Learning, 2017.
6. Catherine E. Housecroft and Edwin C. Constable, Chemistry: An Introduction to Organic, Inorganic and Physical Chemistry, Third Edition, Pearson Education Limited, 2006.
7. Michael J. Moran and Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, Fifth Edition, John Wiley and Sons, 2006.
8. Donald L. Pavia, Gary M. Lampman, George S. Kriz, and James R. Vyvyan, Introduction to Spectroscopy, Fifth Edition, Cengage Learning, 2009.
9. C. N. R. Rao, A. Muller and A. K. Cheetham, The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Wiley-VCH, 2004.
10. P. C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai Publication.
11. J. D. Lee, Concise Inorganic Chemistry, Fourth Edition, Chapman and Hall Publications.
12. Joon B. Park and Joseph d. Bronzino " Biomaterials : Principles and Applications, CRCPress
13. C. Mouli Agrawal, Joo L Ong, Mark R. Appeleford and Gopinath Mani: Introduction to biomaterials.
14. U Sattyanarayana, U Chakrapani: Biochemistry, Elsevier publications.

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	CHP152				
Category	Basic Science Course				
Course Title	Chemistry Lab				
Scheme & Credits	L	T	P	Credits	Semester II
	0	0	3	1.5	

Course Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles ofchemistry relevant to the study of science and engineering.

The students will learn to:

1. Estimate the amount of different impurities in water/ waste water samples.
   Measure molecular system properties of liquids/oils such as surface tension, viscosity,acid value and saponification number.
2. Estimate the rate constants of reactions and order of the reaction and/or to validateadsorption isotherms.
3. Understand the basics of synthesis of nanomaterial/ polymer or drug molecule and use ofspectroscopic techniques for determination of properties.

List of Experiments: [Any Eight from the List]

[1] Preparation of different Solutions: Molar solution, Normal solution and percent solution and Determination of concentration.

[2] To find out types of alkalinity and estimation of their extent in the water sample.

[3] Estimation of temporary, permanent and total hardness present in the water sample using complexometric titration method.

[4] Determination of rate of the reaction at room temperature and analysis of experimental datausing Computational Software.

[5] To study chemical kinetics of peroxydisulphate and iodide ions reactions and to find outorder of the reaction and analysis of experimental data using Computational Software.

[6] Study the optical property of Nano-materials.

[7] Determination of relative and kinematic viscosities of aqueous solutions of Poly-ethylene glycol (Polymeric Liquid) using Redwood Viscometer (type I or II) at different temperatures andanalysis using computational tools.

[8] To study effect of bondings of water molecules with electrolyte (NaCl/KCl) and non- electrolyte solute (Soap) in the solution through Surface Tension Determination.

[9] Study of ion-exchange column for removal of hardness in the water sample.

[10] Prediction of IR/NMR spectra of materials using open source tools.

[11] Demonstration of in-organic spectral techniques: XRD, XRF.

[12] Spectroscopic/Colorimetric determine of wavelength of maximum absorption of chemical/biological compound in solution and determination of concentration using Lambert- Beer's Law.

[13] Acid base titration and data analysis using computational tools.

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	MAT154				
Category	Basic Science Course				
Course Title	Mathematics- II				
Scheme & Credits	L	T	P	Credits	Semester II
	4	0	0	4	

Course Outcomes

On successful completion of the course, the students will learn:

1. The fallouts of Mean Valve Theorems that is fundamental to application of analysis to Engineering problems, to deal with functions of several variables that are essential in most branches of engineering.
2. Basics of improper integrals, Beta and Gamma functions, Curve Tracing, tool of power seriesand Fourier series for learning advanced Engineering Mathematics.
3. Multivariable Integral Calculus and Vector Calculus and their applications to Engineering problems.

Syllabus

Module 1: Differential Calculus: (12 hours)
Taylor's and Maclaurin's series expansions ;radius of curvature (Cartesian form), evolutes and involutes, Limit and continuity of functions of several variables and their partial derivatives, EulersTheorem, chain rule, total derivative, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers.

Module 2: Integral Calculus: (6 hours)
Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Tracing of curves (Cartesian form)

Module 3: Sequences and series: (7 hours)
Convergence of sequence and series, tests for convergence, power series, Fourier series: Half rangesine and cosine series, Parseval's theorem.

Module 4: **Multiple Integrals** (10 hours)
Multiple Integration: Double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: area, mass and volume by double integration, Center of mass and Gravity (basic concepts).

Module 5: Vector Calculus (10 hours)
Vector Differentiation, Directional derivatives, total derivative, Gradient, Curl and Divergence.Vector integration, Theorems of Green, Gauss and Stokes and their applications.

Topics for self-learning

Rolle's theorem, Mean value theorems, Indeterminate forms , Maxima and minima for function ofone variable, Geometrical interpretation of Partial Differentiation(Tangent plane and Normal line), Applications of definite integrals to evaluate perimeter, area, surface areas and volumes ofrevolutions.

Textbooks / References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition,2000.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. P. N. Wartikar and J. N. Warlike, A text book of Applied Mathematics Volume I & II,Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	MAP151				
Category	Basic Science Course				
Course Title	Computational Mathematics Lab				
Scheme & Credits	L	T	P	Credits	Semester II
	0	0	2	1	

Course Outcomes:

The Computational Mathematics Lab course will consist of experiments demonstrating the principles of mathematics relevant to the study of science and engineering. Students will show thatthey have learnt laboratory skills that will enable them to properly acquire and analyse the data in the lab and draw valid conclusions. At the end of the Course the students will learn to:

1. Develop skills to impart practical knowledge in real time.
2. Understand principle, concept, working and application of areas in mathematics and compare theresults obtained with theoretical calculations.
3. Understand basics of mathematics, and report the results obtained through proper programming.

The Lab turns will be utilized for performing the experiments based on the following list:

1. Calculus
2. Ordinary Differential Equations
3. Statistics
4. Linear Algebra

References

1. Computational Mathematics Lab Manual written by the Teaching Faculty of Mathematics Department, RCOEM.

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	ECST103				
Category	Engineering Science Course				
Course Title	Network Theory				
Scheme & Credits	L	T	P	Credits	Semester II
	3	0	0	3	

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Understand basic electrical circuits with node and mesh analysis.
2. Apply network theorems for the analysis of electrical circuits & Design the filter.
3. Appreciate the importance ofLaplace Transform for steady state and transient analysis.
4. Illustrate different network function.
5. Analyse two port network circuit with different interconnections.

Syllabus

Module I: (7 Hours)

Node and Mesh Analysis: Node and Mesh analysis, matrix approach of network containing voltage, current sources and reactance, source transformation and duality. Mutual coupled circuits, Dot Convention in coupled circuits.

Module II: (6 Hours)

Network Theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC circuits.

Module III: (4 Hours)

Behaviour of AC circuit and Introduction to Filters: AC circuit analysis with dependent currentand voltage sources. Series and parallel resonant circuits. Introduction to band pass, low pass, high pass and band reject filters.

Module IV: (8 Hours)

Electrical Circuit Analysis Using Laplace Transforms: Review of Laplace Transform, partial fractions, singularity functions, Analysis of electrical circuits using Laplace transform for standard inputs, convolution integral, inverse Laplace transform, evaluation of initial conditions. Transformed network with initial conditions, waveform synthesis, and analysis of RC, RL and RLC networks with and without initial conditions with Laplace transforms.

Module V: (5 Hours)

Transient behaviour of Network and Network Functions: Driving points and transfer functionspoles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem.

Module VI: (5 Hours)

Two Port Network: Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters,inter connections of two port networks.

Text Books:

1. M. E. Van Valkenburg, " Network Analysis", Prentice Hall, 2006.
2. Roy Choudhury, "Networks and Systems," New Age International Publications, 1998.3.W . HHayt and J. E. Kemmerly," Engineering Circuit Analysis", McGraw Hill Education, 2013.

Reference Books:

1. Sudhakar, A., Shyammohan, S. P., " Circuits and Network", Tata McGraw Hill New Delhi,1994
2. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
3. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	ECST104				
Category	Engineering Science Course				
Course Title	Digital Circuits				
Scheme & Credits	L	T	P	Credits	Semester II
	3	0	0	3	

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to:

1. Apply techniques to minimize the digital circuits.
2. Design combinational and sequential logic circuits.
3. Analyse combinational and sequential circuits.
4. Write a program for 8085 micro-processor for interfacing
5. Examine the timing diagrams for 8085 micro-processor

Syllabus

Module-I

Basics of Digital Electronics

Motivation for digital systems: Number Systems and arithmetics, Logic and Boolean algebra. Logic Gates & Truth Tables, SOP, POS, Minimization of combinational circuits using Karnaughmaps.

Module-II

Combinational Circuit Design

Multiplexers, Demultiplexers, Encoders, Decoders, Code Converters, Adders, Subtractor (Half, Full), BCD Adder/ Subtractor, ripple and carry look-ahead addition, Unsigned Multiplier ALU.

Module-III

Sequential circuit Design-I

Storage elements, Flip-flops and latches: D, T, J/K, S/R flip-flops. Master Slave flip-flop, Flip Flop conversion, Timing analysis.

Module-IV

Sequential circuit Design-II

Design of asynchronous and synchronous counters, Registers& Shift registers.

Module-V

Fundamental of Microprocessor

Introduction to μp 8085, Architecture, Addressing modes, Instruction set, Programming of μp8085.

Module-VI

8085 Timing diagram and Interrupts: Timing diagrams of 8085, Interrupts, Memory mapping.

Text Books

1. Morris Mano; Digital Logic Design; Fourth edition, McGraw Hill
2. R.P.Jain; Modern Digital Electronic; Fourth edition; Tata McGraw-Hill.
3. V.J.Vibhute; 8-Bit Microprocessor & Microcontrollers; fifth edition.

Reference books

1. A. Anand Kumar; Fundamental of Digital Electronics; Second Edition, PHI
2. A.P.Godse; Digital circuit & design; Technical Publications; 2009.
3. Ramesh Gaonkar; 8 bit Microprocessor; CBS Publishers; 2011.

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	ECST105				
Category	Engineering Science Course				
Course Title	Object Oriented Programming				
Scheme & Credits	L	T	P	Credits	Semester II
	3	0	0	3	

Course Outcomes

On successful completion of the course, students will be able to demonstrate

1. Understand the principles of object-oriented programming; create classes, instantiate objectsand invoke methods.
2. Understand concept of generics and implement collection classes. Use exception handling mechanism.
3. Efficiently work with streams, use multithreading for solving classic synchronization problems. Perform java database connectivity and execute basic SQL commands.
4. Understand characteristics and need of Design Pattern in Software Design Process.

SYLLABUS

Module I

Features of Object Oriented Programming languages, Abstraction, Encapsulation, Inheritance, polymorphism and late binding. Concept of a class, Access control of members of a class, instantiating a class, constructor and method overloading and overriding.

Module II

Concept of inheritance, methods of derivation, use of super keyword and final keyword in inheritance, run time polymorphism, abstract classes and methods, Interface, implementation of interface, creating packages, importing packages, static and non-static members, Lambda Expressions Introduction, Block, Passing Lambda expression as Argument.

Module III

Exceptions, types of exception, use of try catch block, handling multiple exceptions, using finally, throw and throws clause, user defined exceptions, file handling in Java, Serialization.

Module IV

Generics, generic class with two type parameter, bounded generics. Collection classes: Arraylist,Linked List, Hashset, Treeset.

Module V

Multithreading: Java Thread models, creating thread using runnable interface and extending Thread, thread priorities, Thread Synchronization, InterThread communications.

Module VI

Introduction to Design Patterns, Need of Design Pattern, Classification of Design Patterns, and Role of Design Pattern in Software design, Creational Patterns, Structural Design Patterns and Behavioural Patterns.

Text Books

1. Herbert Schildt; JAVA, the Complete Reference; Ninth Edition, Tata McGraw- Hill Publishing Company Limited.
2. Design Patterns by Erich Gamma, Pearson Education.

Reference Books

1. Cay S. Horstmann and Gary Cornell; Core JAVA Volume-II Advanced Features; Eighth Edition; Prentice Hall, Sun Microsystems Press 2008.
2. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; TataMcGraw- Hill Education Private Ltd 2013.

Syllabus of Semester II B.Tech.

Department of Electronics and Computer Science

Course Code	HUT152				
Category	Basic Science Course				
Course Title	Constitution of India				
Scheme & Credits	L	T	P	Credits	Semester II
	2	0	0	0	

Course outcome

1. Students will understand the role of constitution in democratic India
2. Students will be responsible students by knowing their fundamental rights and duties
3. Students will develop better understanding of democratic functions of the government ofIndia
4. Students will form better understanding of system of governance for effective participation

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the Fundamental Rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Unionand the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Union Executive: structure, functions
10. Judiciary: Structure, role with special reference to PIL, writ petitions, strengthening of democracy and social justice
11. Amendment of the Constitutional Powers and Procedure
12. Emergency Provisions: National Emergency, President Rule, Financial Emergency
13. Local Self Government – Constitutional Scheme in India
14. Provisions of civil services: Characteristics, functions, merits and demerits
15. Democratic principles in industry

Book

1. Durga Das Basu "An Introduction to Constitution of India" 22nd Edition, LexisNexis

Syllabus of Semester II B. Tech.

Department of Electronics and Computer Science

Course Code	PEP151				
Category	Basic Science Course				
Course Title	Yoga/Sports				
Scheme & Credits	L	T	P	Credits	Semester II
	0	0	2	0	

Course Outcome:

On successful completion of the course, students will be able to:

1. Understand fundamental skills and basic rules of games offered by the Physical Education Department of RCOEM.
2. Obtained health related physical fitness.
3. Develop body-mind co-ordination through games and yoga.
4. Changed sedentary life styles towards active living.

Brief Objectives of Sports/Yoga Practical Classes:

It has long been proven that a healthy body leads to a healthy mind. With a strong belief in this, Physical Education Department at RCOEM will conduct Sports/Yoga Classes with the objective of maintaining health, fitness and wellness of students as well as create awareness about need forgood health and physical fitness. The objective would also be to make the all-round developmentwith team spirit, social values as well as to identify and develop leadership qualities in students through various sports activities. Sports activities would also be conducted with the objective to provide better interaction and recreation to the students, which is an important neutralizer for stress. Additionally, the objective would be to evaluate the health related fitness of students so also recommend and conduct specific Yoga and Sports activities. The emphasis is on participation, with healthy competition.

Programme Outline:

- **Sports:**
    1. Introduction to sports, offered by the department.
    2. Health and safety issues related to sports; knowledge, recognition and ability todeal with injuries and illness associated with sports.
    3. Practicing the fundamental skills and bringing awareness of basic rules and regulations.
    4. Conduction of small recreational games and activities.
- **Yoga:** Includes various sitting, standing and lying Asanas, Suryanamaskars and Pranayamas.
- **Physical Efficiency Tests:** This includes 6 health related physical fitness test