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. (INFORMATION TECHNOLOGY)

About the Department

The department, established in 2001 and accredited by the National Board of Accreditation AICTE, in 2008 and 2014 respectively, has an excellent infrastructure well-qualified field and experienced faculties with average teaching experience of 17 years. The curriculum is designed so as to cater to Core IT subjects as well as those related to current trends in IT Industries. The department has excellent industry interaction and a strong alumni network which gives inputs in curriculum development, guest lectures, summer/winter training for students. Option of full six months internship is provided in reputed IT industries, for VIII semester students. The laboratories of the department are well equippedwith computers of latest configuration and internet facility. Latest software, wireless access point, LCD projectors and separate routers are used in the laboratories for teaching purpose. Department takes pride in excellent placements of the final year students and has the distinction of consistently gettinggood results in all semesters. The department also coordinates Semicolon Tech Club of RCOEM,under which various technical and co- curricular activities are organized for the benefit of students.

Department Vision

To establish the department as a major source of manpower for the IT sector.

Department Mission

To produce engineering graduates with sound technical knowledge in Information Technology, good communication skills and ability to excel in professional career.

Program Educational Objectives

1. To produce Quality Manpower catering to the requirements of IT Industry with sound fundamentals and core Engineering knowledge along with adequate exposure to Emerging Technologies.
2. To develop graduates possessing abilities to Interpret, Analyze and Design effective solutions while working in a team and capable of adapting to current trends by engaging in Lifelong learning.
3. To imbibe in graduate an understanding of issue related to Environment, Society, Profession and Ethics along with importance of Effective Communication Skills.

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

ITPSO1: Foundation of Logic development and Mathematical concepts:

Demonstrate logic development ability along with mathematical concepts to solve realworld problems.

ITPSO2: Foundations of Computer Systems and Software development:

Ability to understand the principles and working of computer systems, Software Engineering principles, Familiarity and practical competence with a broad range of programming languages and open-source platforms relevant to IT Industry.

ITPSO3: Application of Computing knowledge and Research ability:

Ability to work professionally in IT Industry, prepare for higher studies and to develop systems based on cutting edge technologies to solve the real-world problems in IT Industry.

Teaching Scheme for B.Tech. Information Technology

SEMESTER -I											
								Maximum Marks			ESE Duration (Hrs)
Sr. No.	Category	Course Code	Course Name	Hours/week			Credit	Continuous Evaluation	End Sem Exam	Total	
				L	T	P					
01	BSC	PHT154	Introduction to Quantum Computing	3	1	0	4	40	60	100	03
02	BSC	PHP154	Introduction to Quantum Computing Lab	0	0	2	1	25	25	50	-
03	BSC	MAT153	Mathematics-I	3	0	0	3	40	60	100	03
04	BSC	MAP153	Mathematics-I Lab	0	0	2	1	25	25	50	-
05	ESC	ITT151	Fundamentals of Programming	3	0	0	3	40	60	100	03
06	ESC	ITP151	Fundamentals of Programming Lab	0	0	2	1	25	25	50	-
07	ESC	ITT152	Digital Circuits	2	1	0	3	40	60	100	03
08	ESC	ITP152	Digital Circuits Lab	0	0	2	1	25	25	50	-
09	MC	HUT152	Constitution of India	2	0	0	0	-	-	-	-
10	MC	PEP151	Yoga/Sports	0	0	2	0	-	-	-	-
TOTAL				**13**	**02**	**10**	**17**				
				25 Hrs.							

SEMESTER –II											
Sr. No.	**Category**	**Course Code**	**Course Name**	**Hours/week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
01	ESC	ITT153	Object Oriented Programming	3	1	0	4	40	60	100	03
02	ESC	ITP153	Object Oriented Programming Lab	0	0	2	1	25	25	50	-
03	PCC	ITT154	Data Structures	2	1	0	3	40	60	100	03
04	PCC	ITP154	Data Structures Lab	0	0	2	1	25	25	50	-
05	ESC	ITP155	IT Workshop Lab -I	0	0	4	2	25	25	50	-
06	BSC	CHT154	Chemistry	2	0	0	2	40	60	100	03
07	BSC	CHP154	Chemistry Lab	0	0	2	1	25	25	50	-
08	BSC	MAT154	Mathematics-II	3	1	0	4	40	60	100	03
09	HSSM	HUT151	English	2	0	0	2	40	60	100	03
10	HSSM	HUP151	English Lab	0	0	2	1	25	25	50	-
11	ESC	IDT151	Creativity, Innovation & Design Thinking	1	0	0	1				
TOTAL				**13**	**03**	**12**	**22**				
				28 Hrs.							

SEMESTER -III											
Sr. No.	Category	Course Code	Course Name	Hours/week			Credits	Maximum Marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
01	PCC	ITT261	Computer Organization and Architecture	3	0	0	3	40	60	100	03
02	PCC	ITT262	Advanced Data Structures	2	1	0	3	40	60	100	03
03	PCC	ITP262	Advanced Data Structures Lab	0	0	2	1	25	25	50	-
04	PCC	ITT263	IT Infrastructure Services	2	0	0	2	40	60	100	03
05	PCC	ITP263	IT Infrastructure Services Lab	0	0	2	1	25	25	50	-
06	ESC	ITT264	Cyber Laws and Ethics	2	0	0	2	40	60	100	03
07	PCC	ITT265	Computer Graphics	2	1	0	3	40	60	100	03
08	PCC	ITP265	Computer Graphics Lab	0	0	2	1	25	25	50	-
09	BSC	MAT252	Linear Algebra & Statistics	3	0	0	3	40	60	100	03
10	HSSM	HUT254	Technical Communication	3	0	0	3	40	60	100	03
11	MC	CHT251	Environmental Science	2	0	0	0	-	-	-	-
TOTAL				**19**	**02**	**08**	**22**				
				29 Hrs.							

SEMESTER – IV											
Sr. No.	Category	Course Code	Course Name	Hours/week			Credits	Maximum Marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
01	PCC	ITT266	Formal Languages and Automata Theory	2	1	0	3	40	60	100	03
02	PCC	ITT267	Software Engineering	3	0	0	3	40	60	100	03
03	PCC	ITP267	Software Engineering Lab	0	0	2	1	25	25	50	-
04	PCC	ITT268	Design and Analysis of Algorithms	3	0	0	3	40	60	100	03
05	PCC	ITP268	Design and Analysis of Algorithms Lab	0	0	2	1	25	25	50	-
06	PCC	ITT269	Database Management System	3	0	0	3	40	60	100	03
07	PCC	ITP269	Database Management System Lab	0	0	2	1	25	25	50	-
08	OEC	ITT299	Open Elective – I	3	0	0	3	40	60	100	03
09	BSC	MAT281	Discrete Mathematics	3	0	0	3	40	60	100	03
10	MC	HUT252	Indian Traditional Knowledge	2	0	0	0	-	-	-	-
TOTAL				**19**	**01**	**06**	**21**				
				26 Hrs.							

Open Elective – I	
Course Code	**Course Title**
ITT299-01	Linux Fundamentals

SEMESTER – V											
Sr. No.	**Category**	**Course Code**	**Course Name**	**Hours/week**			**Credits**	**Maximum Marks**			**ESE Duration (Hrs)**
				L	**T**	**P**		**Continuous Evaluation**	**End Sem Exam**	**Total**	
01	PCC	ITT371	Compiler Design	3	1	0	4	40	60	100	03
02	PCC	ITT372	Operating Systems	3	0	0	3	25	25	50	-
03	PCC	ITP372	Operating Systems Lab	0	0	2	1	25	25	50	-
04	PCC	ITT373	Computer Networks	3	0	0	3	40	60	100	03
05	PCC	ITP373	Computer Networks Lab	0	0	2	1	25	25	50	-
06	PCC	ITT374	Introduction to Machine	2	1	0	3	40	60	100	03
07	PCC	ITP374	Introduction to Machine Learning Lab	0	0	2	1	25	25	50	-
08	OEC	ITT398	Open Elective– II	3	0	0	3	40	60	100	03
09	PROJC	ITP375	Project -I	0	0	4	2	50	50	100	
10	HSSM	HUT354	Managerial Economics	2	0	0	2	40	60	100	03
TOTAL				**16**	**02**	**10**	**23**				
				28 Hrs.							

Open Elective – II	
Course Code	**Course Title**
ITT398-01	Python Programming
ITT398-02	Client Server Computing and Applications

SEMESTER -VI											
Sr. No.	Category	Course Code	Course Name	Hours/week			Credits	Maximum Marks			ESE Duration
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
01	PCC	ITT376	Cryptography and Network Security	3	0	0	3	40	60	100	03
02	PCC	ITT377	Artificial Intelligence	2	1	0	3	40	60	100	03
03	PCC	ITP377	Artificial Intelligence Lab	0	0	2	1	25	25	50	-
04	PCC	ITT378	Cloud Computing	2	1	0	3	40	60	100	03
05	PCC	ITP378	Cloud Computing Lab	0	0	2	1	25	25	50	-
06	PEC	ITT379	Elective-I	3	0	0	3	40	60	100	03
07	OEC	ITT399	Open Elective– III	3	0	0	3	40	60	100	03
08	PCC	ITP380	IT Workshop Lab-II	0	0	4	2	25	25	50	-
09	HSSM	HUT358	Organizational Behavior	2	0	0	2	40	60	100	03
10	PROJC	ITP381	Project-II	0	0	6	3	75	75	150	-
TOTAL				**15**	**02**	**14**	**24**				
				31 Hrs.							

Elective-I	
Course Code	**Course Name**
ITT379-01	Customer Relationship Management
ITT379-02	Product and Project Management

Open Elective – III	
Course Code	**Course Title**
ITT399-01 (Self-Study)	Cyber Security and Laws

SEMESTER – VII											
Sr. No.	Category	Course Code	Course Name	Hours/week			Credits	Maximum Marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
01	PCC	ITT481	Software Architecture	3	0	0	3	40	60	100	03
02	PEC	ITT482	Elective-II	3	1	0	4	40	60	100	03
03	PEC	ITP482	Elective-II Lab	0	0	2	1	25	25	50	-
04	PEC	ITT483	Elective-III	3	1	0	4	40	60	100	03
05	PEC	ITP483	Elective-III Lab	0	0	2	1	25	25	50	-
06	OEC	ITT498	Open Elective-IV	3	0	0	3	40	60	100	03
07	PROJC	ITP484	Industry Internship Evaluation*	0	0	2	1	-	-	-	-
08	PROJC	ITP485	Project-III	0	0	6	3	75	75	150	-
TOTAL				**12**	**02**	**12**	**20**				
				29 Hrs.							

***6-8 weeks Internship must be completed before reaching VII Semester**

Elective-II		Elective-III	
Course Code	**Course Name**	**Course Code**	**Course Name**
ITT482-01	Frontend Technologies	ITT483-01	Backend Technologies and DevOps
ITT482-02	Internet of Things (IoT)	ITT483-02	Mobile Application Development

Open Elective – IV	
Code	**Course Title**
ITT498-01	Internet Technologies
ITT498-02	E-Commerce

SEMESTER – VIII											
Sr. No.	Category	Course Code	Course Name	Hours/week			Credits	Maximum Marks			ESE Duration (Hrs)
				L	T	P		Continuous Evaluation	End Sem Exam	Total	
01	PEC	IDT457/ ITT486	Elective-IV	3	0	0	3	40	60	100	03
02	PEC	ITT487	Elective-V	2	1	0	3	40	60	100	03
03	PEC	ITP487	Elective-V Lab	0	0	2	1	25	25	50	-
04	PEC	ITT488	Elective-VI	2	1	0	3	40	60	100	03
05	PEC	ITP488	Elective-VI Lab	0	0	2	1	25	25	50	-
			TOTAL	**07**	**02**	**04**					
				13 Hrs.			**11**				

OR

Sr. No.	Category	Course Code	Course Name	Hours/week	Credits	Maximum Marks			ESE Duration (Hrs.)
						Continuous Evaluation	End Sem Exam	Total	
01	PR	ITP460	Full Semester Internship		11	100	100	400	-

Elective-IV		Elective-V	
Course Code	**Course Name**	**Course Code**	**Course Name**
IDT457	Bioinformatics	ITT487-01	Image Processing
ITT486	Nature Inspired AI	ITT487-02	Data Warehouse and Mining

Elective-VI	
Code	**Course Name**
ITT488-01	Information Retrieval
ITT488-02	Digital Forensics

Syllabus for B. Tech. I Semester
Department of Information Technology

Course Code	PHT154				
Category	Basic Science Course				
Course Title	Introduction to Quantum Computing				
Scheme& Credits	L	T	P	Credits	Semester I
	3	1	0	4	

Course Outcomes
After successful completion of the course, the students will learn,

1. Quantum mechanics as applied in Quantum computing
2. Basics of complex vector spaces
3. Fundamentals of Quantum computations
4. Architecture and algorithms

Module 1: Basic Quantum Theory

(This unit will help the students to understand the electron and its state in quantum well and so in atoms which is acting as a storage device in quantum computers)

Brief introduction about Quantum Computers and Quantum mechanics, Schrodinger's time dependent equation, Wave nature of Particles, expectation values, variance, standard deviation, probability density, Stationary states, Infinite square well, Energy and Eigen value of electron in Infinite Potential well, Uncertainty principle

Module 2: Complex Vector Spaces

(This unit deals with matrix and its properties (real and complex) and transformation between the quantum state using tensors)

Algebra and Geometry of Complex numbers, Real and Complex Vector Spaces, definitions, properties, basis and dimensions, Generalization to n-dimensional space.

Module 3: Linear Algebra in Quantum Computing

(This unit deals with actual energy values of electron and electron states and properties related to change of state of electron with respect to energy and position, degeneracy with respect to it)

Inner products, Hilbert Spaces, Eigenvalues and Eigenvectors, Hermitian and Unitary Matrices, Tensor Product, Applications of linear algebra in computer graphics, Geometric transforms, Positioning the virtual camera

Module 4: Classical and Quantum Systems

(This unit differentiate between quantum approach of computer design from classical computers)

Deterministic and Probabilistic Systems, Quantum Systems, Observations, Quantum measurement principles, Stochastic matrices, Probabilistic double slit experiment with photons, Entangled states, Quantum clocks

Module 5: Architecture

(This unit deals with one-to-one relation between classical and quantum computers)

Bits and Qubits, Classical Gates, Reversible Gates, Quantum Gates, Toffoli and Fradkin Gates, Bloch Sphere, Deusch Gate, No-cloning theorem, Applications in Cryptography and Quantum teleportation

Module 6: Quantum algorithms

(This unit is forming a basic platform for students in implementing quantum algorithm in various application)

Deutsch's algorithm, The Deutsch-Jozsa algorithm, Simon's periodicity algorithm, Grover's search algorithm, Shor's factoring algorithm, Quantum Fourier Transform. Applications of quantum computing in Cybersecurity, banking/finance, advance manufacturing and artificial intelligence.

Text Book

1. Quantum computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008
2. Introduction to Quantum Mechanics, 2nd Edition, David J. Griffiths, Prentice Hall New Jersey 1995

Reference Books

1. Quantum computing explained, David McMahon, Wiley-interscience, John Wiley & Sons, Inc. Publication 2008
2. Quantum computation and quantum information, Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press 2010

Syllabus for B. Tech. I Semester
Department of Information Technology

Course Code	PHP154				
Category	Basic Science Course				
Course Title	Introduction to Quantum Computing Lab				
Scheme& Credits	L	T	P	Credits	Semester I
	0	0	2	1	

Course Outcomes:
The physics laboratory will consist of experiments and programming exercises illustrating the principles of physics relevant to the study of computer science and engineering. During the training in the Physics Lab, the students will be able,

1. To develop skills for experimental verification of physics laws using mathematical models and simulation.
2. To analyze the results using the mathematical tools
3. To learn the computational techniques
4. To interpret the mathematical and computational outcomes from the simulations.

The laboratory will consist of general physics experiments and computational physics practicals.

General Physics
1. Measuring scales and error estimation
2. Verification of Ohm's law and linear least square fitting method
3. Verification of Newton's law of cooling
4. Simple harmonic motion
5. Measurement, analysis and fitting of non-linear IV characteristics of PN junction diode

Computational Physics
1. Linear least square fit method for data analysis
2. Solving 1D Schrodinger Wave Equation for a free and a bound particle and for barrier tunnelling.
3. Superposition of two wavefunctions for 1D and 2D Potential.
3. Plotting of Plank's function and verification of Stefan's law
4. Finding inverse, norm and inner products, rank of a matrix, Tensors
5. Introduction to quantum computing packages (GitHub repository)
6. Implementation of Deutsch-Josza algorithm using Cirq library

Reference Books
1. Lab manual prepared by Physics Department, RCOEM, Nagpur

Syllabus for B. Tech. I Semester
Department of Information Technology

Course Code	MAT153				
Category	Basic Science Course				
Course Title	Mathematics-I				
Scheme& Credits	L	T	P	Credits	Semester I
	3	0	0	3	

Course Objective

The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equation, statistics, probability and Matrices. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes

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

1. The effective mathematical tools for the solutions of ordinary differential equations that modelphysical 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.

Module 1: First order ordinary differential equations(7 hours)

Exact,linearandBernoulli'sequations,Euler'sequations,Equationsnotoffirstdegree:equationssolvablefor p, equations solvable for y, equations solvable for x and Clairaut's type.

Module 2: Ordinary differential equations of higher orders (8 hours)

Second order linear differential equations with constant and variable coefficients, method of variation 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; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley- Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms.

Textbooks/References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley& Sons, 2006.
2. W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 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& Problems of probability and statistics: 2nd ed :J. R. Spiegal, Schaumseries
8. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).
9. S. Ross, AFirst Course in Probability, 6th Ed., Pearson Education India, 2002.

Syllabus for B. Tech. I Semester
Department of Information Technology

Course Code	MAP153				
Category	Basic Science Course				
Course Title	Mathematics-I Lab				
Scheme& Credits	L	T	P	Credits	Semester I
	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 that they have learnt laboratory skills that will enable them to properly acquire and analyze 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 the results 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

Suggested References

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

A minimum of 8 experiments to be performed based on the above list.

Syllabus for B. Tech. I Semester
Department of Information Technology

Course Code	ITT151				
Category	Engineering Science Course				
Course Title	Fundamentals of Programming				
Scheme& Credits	L	T	P	Credits	Semester I
	3	0	0	3	

Course Outcomes

On successful completion of the course student will be able to:

1. Design logic for simple problem statements.
2. Code problem statements involving decision-making and loops
3. Use functions for modular programming
4. Apply the concept of arrays in coding
5. Apply the concept of structures in coding
6. Perform file operations

Unit I: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers, etc.). Algorithm and Flowchart for problem-solving with Sequential Logic Structure. Steps to solve logical and numerical problems. Representation of Algorithm, Flowchart / Pseudo code with examples.

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

Unit III:
Concept of functions, User defined and Library Functions, parameter passing and returning type, Recursion, Storage classes. Pointers and Function Arguments, Pointer Arithmetics, and Pointer operators.

Unit IV:
Arrays: 1-D, 2-D, Character arrays and Strings. Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Pointers to the array, Command line arguments.

Unit V: Structures, Simple structures, Array of Structures, Use of Pointers in referencing structures, the notion of linked list (no implementation), malloc and calloc functions of C.

Unit 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. Programming in C: B. Gottfried, Second Edition, Schaum Outline Series, Tata Mc-Graw Hill Publishers, 1996
3. The C Programming Language: B. W. Kernighan and D. M. Ritchie, Second Edition, Pearson, June 2015

Reference Books

1. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill
2. Let Us C: Yashwant Kanetkar, BPB Publication

Syllabus for B. Tech. I Semester
Department of Information Technology

Course Code	ITP151				
Category	Engineering Science Course				
Course Title	Fundamentals of Programming Lab				
Scheme& Credits	L	T	P	Credits	Semester I
	0	0	2	1	

Minimum 10 Practicals based on Course Outcomes

Course Outcomes

On successful completion of the course student will be able to:

1. Write programs involving decision-making and loops
2. Write programs using arrays
3. Apply the concept of pointers in real-life programming
4. Use structures to code complex problems
5. Perform operations on files.

Syllabus for B.Tech. Semester I
Department of Information Technology

Course Code	ITT152				
Category	Engineering Science Course				
Course Title	Digital Circuits				
Scheme& Credits	L	T	P	Credits	Semester I
	2	1	0	3	

Course outcomes

Upon completion of the course, students will be able to

1. Minimize Boolean expressions using various techniques.
2. Design combinational circuits using Multiplexers, De-multiplexer, Encoders, Decoders
3. Use Flip Flop as a basic sequential circuit element.
4. Design different memory circuits using PLA and PAL
5. Design Shift registers and Moore –Mealy circuits
6. Design Counters

Unit I : Number Systems, Logic and Boolean algebra, Logic Gates & Truth Tables, DE Morgan's law, Digital Logic Family, Karnaugh maps, Quine McCluskey minimization technique.

Unit II: Code Converters, Multiplexers, Demultiplexers, Encoders, Decoders, Adder, Subtractors. Minimization of combinational circuits.

Unit III: Flip-flops and latches: D, T, S/R, J/K & J/K Master Slave flip-flops, Excitation table, Conversion of one type of F/F to another.

Unit IV: Introduction to Memory, ROM, RAM, Array of RAM ICs, Read only PLA, PAL Memory.

Unit V: Registers, Sequential circuit Analysis-Input equations, state table, analysis, and design, Moore & Mealy Circuits.

Unit VI: Counters, asynchronous and synchronous design using state and excitation tables.

Text Books:

1. Modern Digital Electronic: R. P. Jain, 4 edition by Tata McGraw Hill

2. Digital Logic Design: M. Mano, 2 edition. Pearson

Reference Books:

1. Fundamental of Digital Electronics: A. Anand Kumar. PHI

Syllabus for B.Tech. Semester I
Department of Information Technology

Course Code	ITP152				
Category	Engineering Science Course				
Course Title	Digital Circuits Lab				
Scheme& Credits	L	T	P	Credits	Semester I
	0	0	2	1	

Minimum 10 Practical's based on the course

Course Outcomes

Upon completion of the course, students will be able to

1. Design combinational circuits
2. Design sequential circuits.
3. Design basic memory elements
4. Design Counters

Syllabus for B. Tech. I Semester
Department of Information Technology

Course Code	HUT152				
Category	Mandatory Course				
Course Title	Constitution of India				
Scheme& Credits	L	T	P	Credits	Semester I
	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 of India
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 Union and 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 & socialjustice
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

Durga Das Basu “An Introduction to Constitution of India” 22nd Edition, Lexis Nexis

Syllabus for B. Tech. Semester I
Department of Physical Education

Course Code	PEP151				
Category	Mandatory Course				
Course Title	Yoga / Sports				
Scheme& Credits	L	T	P	Credits	Semester I
	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 coordination 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, PhysicalEducation 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 for good health and physical fitness. Theobjective would also be to make the all-round development with team spirit, social values as well as to identifyand 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 importantneutralizer for stress. Additionally, the objective would be to evaluate the health-related fitness of students so asto recommend and conduct specific Yoga and Sports activities. The emphasis is on participation, with healthy competition.

Program Outline

Sports:

1. Introduction to sports, offered by the department.
2. Health and safety issues related to sports; knowledge, recognition and ability to deal with injuries andillness 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, Surya namaskars and Pranayamas.

Physical Efficiency Tests: This includes 6 health related physical fitness tests.

Components	**Name of Tests**
Speed	50 mts Dash
Agility	Shuttle run
Cardiovascular Endurance	8 mins Run/Walk
Test Flexibility	Sit and Reach Test
Abdominal Strength (M)/Shoulder strength (F)	Bent Knee Sit-ups (M)/Modified Pull-ups (F)
Yogic exercises	Surya namaskars

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	ITT153				
Category	Engineering Science Course				
Course Title	Object Oriented Programming				
Scheme& Credits	L	T	P	Credits	Semester II
	3	1	0	4	

Course outcomes

Upon completion of the course, students will be able to

1. Differentiate between Procedural language and Object-Oriented language
2. Use basic features of object-oriented language to solve real life problems
3. Apply advanced features (overloading, polymorphism) of object-oriented language to solve real life problems
4. Apply exception handling mechanism
5. Implement various file operations through different stream classes.
6. Demonstrate the significance of Multithreaded Programming, Networking, Applet, and Servlet in Real-life applications.

Unit I

Introduction to Object Oriented Programming: Features of object-oriented programming languages like data encapsulation, inheritance, polymorphism, and late binding

Unit II

Basic Concept of OOP: Concept of a class, Access control of members of a class, instantiating a class, static and non-static members, overloading a method, Constructors, Garbage Collection, finalize() Method.

Unit III

Building the classes: Deriving a class from another class, access control of members under derivation, different ways of class derivation, overriding of a method, run time polymorphism, Use of super keyword and final keyword in inheritance, run time polymorphism. Abstract classes and methods, interface, implementation of interface, creating packages, importing packages,

Unit IV

Exceptions, types of exception, use of try-catch block, handling multiple exceptions, using finally, throw and throws clause, user-defined exceptions, Generics, the generic class with two type

parameter, bounded generics, Collection classes: Arrays, Vectors, Array list, Linked list, Hash set, Queues, Trees.

Unit V

Introduction to streams, byte streams, character streams, linked lists, stacks, queues, trees, graphs, hash table, Set, Tree Set, File handling in Java, Serialization.

Unit VI

Multithreading: Java Thread models, creating thread using runnable interface and extending Thread, thread priorities, Thread Synchronization, Inter-thread communications. Networking, Applet and Servlet.

Text Books

The Complete Reference: Java 2: Herbert Schildt

1. A programmer's Guide to Java SCJP Certification: A Comprehensive Primer: *Khalid A. Mughal and Rolf W. Rasmussen,* Third Edition.
2. Java Fundamentals: A Comprehensive Introduction: *Herbert Schildt and Dale Skrien*; Tata McGraw-Hill Education Private Ltd., 2013.
3. ArnoldKen,GoslingJ,"TheJavaProgrammingLanguage"5edition,MGH,AddisonWesley
4. MattWeisfeld,"The Object-Oriented Thought Process", Pearson

Reference Books

1. CoxBrad,"Object–OrientedProgramming:AnEvolutionaryApproach",Addison–Wesley
2. Design Patterns By ErichGamma, Pearson Education
3. Core JAVA Volume-II Advanced Features: *Cay S. Horstmann and Gary Cornell;* Eighth Edition; Prentice Hall, Sun Microsystems Press, 2008.
4. Java Programming: A Practical Approach: *C Xavier;* Tata McGraw- Hill Education Private Ltd., 2011

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	ITP153				
Category	Engineering Science Course				
Course Title	Object Oriented Programming Lab				
Scheme& Credits	L	T	P	Credits	Semester II
	0	0	2	1	

Minimum 10 Practical based on Course Outcomes

Course Outcomes

Upon completion of the course, students will be able to

1. Write simple programs in java language for the given problem statement.
2. Write advanced programs in java language to solve real life problems.
3. Design optimized and reusable codes for applications.
4. Implement data structures using object-oriented concepts.
5. Implement Multithreading and Networking mechanisms to solve real life problems.

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	ITT154				
Category	Program Core Course				
Course Title	Data Structures				
Scheme& Credits	L	T	P	Credits	Semester II
	2	1	0	3	

Course Outcomes

Upon completion of the course, students will be able to

1. Analyze algorithms based on their complexities
2. Implement real world problems using Arrays
3. Implement real world problems using Link List
4. Analyze various searching and sorting algorithms
5. Use Trees as a data structure
6. Apply the graph structure for traversals and shortest path problems

Unit I

Introduction to Algorithms: Concept of data types, algorithms, and their features. Analysis of Algorithms, Asymptotic notations, Features of a structured program, Recursion, and Introduction to algorithm design techniques.

Unit II

Arrays: Introduction, Memory Representation, Introduction to Stacks & Queues. Application of array in implementation of structures like stacks, queues, De-queues, and Priority queues. Concept and representation of Sparse matrices and basic operations on them.

Unit III

Linked List: Purpose and representation in memory. Implementation of Single and doubly linked lists and basic operations on them. Applications of linked list: Polynomial operations, Equivalence relation, Generalized lists, Memory Management.

Unit IV

Sorting: Internal and external sorting, Bubble sort, Exchange sort, Insertion sort, Selection sort, Radix sort Merge sort, Quick sort, and Heap sort.
Searching: Sequential, Binary, Indexed search, Hashing techniques, and Collision-handling mechanisms.

Unit V

Trees: Definition and terminologies. Memory representation of binary trees. Tree traversal techniques, Threaded binary trees, Binary search trees, and Heap trees.

Unit VI

Graphs: Definition and terminologies. Implementation in memory. Graph traversal technique, Minimum CostSpanning Trees computation, and ShortestPathalgorithm.

Text Books

1. Fundamentals of Data Structures in C: E. Horowitz, S. Sahani and Anderson- Freed, University Press, 2nd Edition.
2. Data Structures and Program Design in C: Robert Kruse, G. L. Tondo and B. Leung, PHI
3. An Introduction to Data Structures with Applications: J. P. Tremblay & P. G. Sorenson, 2 Edition, MGH.

Reference Books

1. Data Structures: P. S. Deshpande, O. G. Kakde 1st Edition, Wiley Dream Tech.
2. Data Structures Using C / C++: Tanenbaum, 3rd Edition, Pearson.

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	ITP154				
Category	Program Core Course				
Course Title	Data Structure Lab				
Scheme& Credits	L	T	P	Credits	Semester II
	0	0	2	1	

Minimum 10 Practical based on the course ITT153

Course outcomes

Upon completion of the course, students will be able to

1. Analyze the time and space complexities of a given algorithm
2. Use linear data structures for solving real world problems
3. Implement various sorting and searching algorithms
4. Use non-linear data structures for solving real world problems

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	ITP155				
Category	Engineering Science Course				
Course Title	IT Workshop Lab-I				
Scheme& Credits	L	T	P	Credits	Semester II
	0	0	2	1	

Course Outcomes

Upon completion of the course, students will be able to

1. Use basic functions of MS Excel.
2. Use macros in MS Excel.
3. Design static web pages using basic HTML tags.
4. Apply CSS in HTML pages.
5. Use popular IDEs for program development.

MS Excel, Macros

HTML:

HTML Basics: Intro to HTML Syntax, The HTML, head, title, & body tags, Headings, paragraphs, &

lists, The strong & em tags, The doctype, The lang attribute, The meta tag & the Unicode character set Links: Absolute & Relative URLs, Using the width, height, & alt attributes, Using horizontal rules

CSS: Intro to Cascading Style Sheets (CSS), The style tag, Tag selectors, The font size, font-family,

color, & line-height properties, Hexadecimal color code

Study of popular IDEs: NetBeans IDE, Ellipse IDE

Text Book

1. Linux Pocket guide- Daniel J. Barrett, O'Reilly Media
2. Linux: The Complete Reference, Sixth Edition- Richard Petersen, McGraw Hill Education

Reference Books

1. Linux Administration : A Beginner's Guide – Wale Soyinka , McGraw Hill Publication
2. Linux Command Line and Shell Scripting Bible- Richard Blum, Wiley

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	CHT154				
Category	Basic Science Course				
Course Title	Chemistry				
Scheme& Credits	L	T	P	Credits	Semester II
	2	0	0	2	

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

- Predict the properties and interactions of chemical substances by understanding their composition at the atomic and molecular level.
- Discuss unique properties of nano-materials to solve challenges in our life and applications in computational world.
- Discuss how spectroscopic methods are used for qualitative and quantitative analysis.
- Analyze the utilization of green computing technology for environmental issues

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Syllabus:

Module 1: Atomic and Molecular Structure [6 hours]

Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. HOMO, LUMO, Crystal field theory and the energy level diagrams for transition metal ions and their optical and magnetic properties. Band Theory

Module 2: Nanomaterials for Advanced Computing: [6 hours]

Basics of Nanochemistry, classification, synthesis and Industrial applications, quantum dots for quantum computers, Doping of nanocrystals, Nanowires, Nanofibers, Nanotechnological advancements for computing.

Module 3: Characterization Techniques and computational tools: [6 hrs]

Fundamentals of spectroscopy, Electronic Spectroscopy, Nuclear Magnetic Resonance Spectroscopy. Basics of Nuclear magnetic resonance quantum computer

Synthesis of drugs, basic soft-wares for bio-chemical assessment of drugs.

Module 4: Green Computing and Chemistry [6 hrs]

Metal extraction from E-wastes: Constraints and opportunities, Chemical exposure (Lead, Mercury, Cadmium, Chromium etc.) and contamination, Principles of Green Chemistry and Green Computing, Role of Green Computing in Environment and Research, Green devices and Green data Server.

Suggested Text Books:

1. Shikha Agrawal , **Engineering Chemistry : Fundamentals and Applications**, Cambridge University Press.
2. Dr. Rajshree Khare, **A Textbook of Engineering Chemistry(AICTE)**, S.K. Kataria & Sons.
3. S. S. Dara, **A Textbook of Engineering Chemistry**, S. Chand Publications.
4. A. K. Das and M. Das, **An introduction to nanomaterials and nanoscience**, CBS Publishers and Distributors
5. M Afshar Alam, Sapna Jain, Hena Parveen, **Green Computing Approach Towards Sustainable Development**, Wiley Interscience Publications

Suggested Reference Books:

1. C. J. Cramer, **Essentials of Computational Chemistry: Theories and Models**, Second Edition, Wiley Interscience Publications.
2. Hans-Eckhardt Schaefer, **Nanoscience: The Science of the Small in Physics, Engineering, Chemistry, Biology and Medicine**, Springer-Verlag Berlin Heidelberg.

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	CHP154				
Category	Basic Science Course				
Course Title	Chemistry Lab				
Scheme& Credits	L	T	P	Credits	Semester II
	0	0	2	1	

Course Outcomes:

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

The students will learn to:

1. Apply the fundamental principles of measurement and skills in preparation and handling of hazardous chemicals and interpret the statistical data related to measurements.
2. Estimate the rate constants of reactions and order of the reaction and/or to validate adsorption isotherms.
3. Use of various computational tools for analysis of different spectral properties and bio-activities.

List of Experiments: [Any six from the list]

[1] Preparation of different Solutions: Molar solution, Normal solution and percent solution and Determination of concentration.
[2] Demonstration of Handling of hazardous chemicals, MSDS (material safety data sheet), waste minimization strategies and chemical waste disposal.
[3] Basic statistical analysis of results of neutralization of acid against the base and preparing acceptable graphs using software.
[4] Prediction of infrared/NMR spectral and analytical data of organic molecules using Computational Software.
[5]. Spectroscopic/Colorimetric determine of wavelength of maximum absorption of chemical/biological compound in solution and determination of concentration using Lambert-Beer's Law.
[6] To study chemical kinetics of peroxydisulphate and iodide ions reactions and to find out order of the reaction and analysis of experimental data using Computational Software.
[7] Molecular docking of drugs using open computational software.
[8] Determination of rate of the reaction at room temperature and analysis of experimental data using Computational Software
[9] Use of open access software for the interpretation of various parameters of materials including drugs

Suggested Books/Reference Books:

(1) S. S. Dara, **A Textbook on Experiments and Calculations in Engineering Chemistry**, S. Chand Publications.
(2) J. B. Yadav, **Advanced Practical Physical Chemistry**, Krishna's Prakashan Media (P) Limited.

(3) A. J. Elias, **Collection of Interesting General Chemistry Experiments**, Universities Press Publications.
(4) V. K. Ahluwalia, S. Dhingra and A. Gulati, **College Practical Chemistry**, Universities Press Publications.
(5) Ashutosh Kar , **Advanced Practical Medicinal Chemistry**, New Age International Publisher.

Suggested Reference Books:

(1) David Young, **Computational Chemistry: A Practical Guide for Applying Techniques to Real World Problems**, Wiley Interscience Publications

Syllabus for B.Tech. Semester II
Department of Information Technology

Course Code	MAT154				
Category	Basic Science Course				
Course Title	Mathematics-II				
Scheme& Credits	L	T	P	Credits	Semester II
	3	1	0	4	

Course Objective

The objective of this course is to familiarize the prospective engineers with techniques in Calculus and multivariate analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

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 tool of power series and Fourier series for learning advanced Engineering Mathematics.
3. Multivariable Integral Calculus and Vector Calculus and their applications to Engineering problems.

Syllabus

Module 1: Calculus: (7 hours)

Rolle's theorem, Mean value theorems, Taylor's and Maclaurin series expansions; Indeterminate forms and L'Hospital's rule; radius of curvature (Cartesian form), evolutes and involutes

Module 2:Multivariable Calculus (Differentiation) (8 hours)

Limit, continuity and partial derivatives, Eulers Theorem, chain rule , total derivative, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers.

Module 3 Calculus: (6 hours)

Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Tracing of

curves(Cartesian form)

Module 4:Sequences and series: (7 hours)

Convergence of sequence and series, tests for convergence, power series, Fourier series: Half range sine and cosine series, Parseval's theorem.

Module 5: Multivariable Calculus (Integration) (7 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: areas and volumes by(double integration) Center of mass and Gravity (constant and variable densities).

Module 6 : Vector Calculus(7 hours)

Vector Differentiation, Directional derivatives, total derivative , Gradient, curl and divergence. Vector integration, Theorems of Green, Gauss and Stokes.

Topics for self-learning

Maxima and minima for function of one variable, Geometrical interpretation of Partial Differentiation (Tangent plane and Normal line) , Applications of definite integrals to evaluate perimeter, area,surface areas and volumes of revolutions.

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. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
6. A text book of Applied Mathematics Volume I & II, by P. N. Wartikar and J. N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).

Syllabus for B. Tech. Semester II
Department of Information Technology

Course Code	HUT151				
Category	Humanities Social Science and Management				
Course Title	English				
Scheme& Credits	L	T	P	Credits	Semester II
	2	0	0	2	

Course Objectives

The main objective of the subject is to enhance the employability skills of engineering students as wellas communication skills at workplace. The sub-objectives are:

1. To develop vocabulary of students.
2. To orient students in basic writing skills.
3. To orient students in functional grammar.
4. To orient students in the process of effective writing.
5. To provide practice and improve students' oral communication skills.

Course Outcomes

1. Students will have good word power.
2. Students will acquire basic writing skills.
3. Students will understand functional grammar and its usage.
4. Students will organize and express their thoughts effectively through written communication.
5. Students will learn oral communications kills in order to handle themselves effectively in an interview and group discussion

SYLLABUS

1. Vocabulary Building

1.1 The concept of Word Formation
1.2 Root words from foreign languages and their use in English
1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives
1.4 Synonyms, Antonyms and standard abbreviations

2. Basic Writing Skills

2.1 Sentence Structures
2.2 Use of phrases and clauses in sentences
2.3 Importance of proper punctuation
2.4 Creating coherence
2.5 Organizing principles of paragraphs in documents
2.6 Techniques for writing precisely

3. Identifying Common Errors in Writing

3.1 Subject-verb agreement
3.2 Noun-pronoun agreement
3.3 Misplaced modifiers
3.4 Articles
3.5 Redundancies
3.6 Cliches

4. Nature and Style of sensible Writing

4.1 Describing
4.2 Defining
4.3 Classifying
4.4 Providing examples or evidence

5. Writing Practices

5.1 Comprehension
5.2 Precis Writing
5.3 Essay Writing
5.4 Letter Writing
5.5 Email Writing

6. Oral Communication

(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

Books

1. Communication Skills. Sanjay Kumar and Pushp Lata. 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 for B. Tech. Semester II
Department of Information Technology

Course Code	HUP151				
Category	Humanities Social Science and Management				
Course Title	English Lab				
Scheme& Credits	L	T	P	Credits	Semester II
	0	0	2	1	

Course objective

1. To enhance competency of communication in English among learners.

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 Practical (2 hours each for each batch) based on unit 6 (oral communication).

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 for B. Tech. Semester II
Department of Information Technology

Course Code	IDT151				
Category	Engineering Science Course				
Course Title	Creativity, Innovation & Design Thinking				
Scheme& Credits	L	T	P	Credits	Semester II
	1	0	0	1	

Course Outcomes

C1: Be familiar with processes and methods of creative problem solving

C2: Enhance their creative and innovative thinking skills

C3: Practice thinking creatively and innovative design and development

Detailed Topics

Unit 1. Introduction: Making a case for creativity, Creative thinking as a skill, Valuing diversity in thinking: Thinking preferences, Creativity styles, Creativity in problem solving.

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

Unit 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

Unit4. Systematic Inventive Thinking: Systematic inventive thinking: The TRIZ methodology, Decision and Evaluation: Focused thinking framework, six thinking hats, Ethical considerations

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

Unit 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- Rout ledge Taylor &Francis Group
2. 101 Activities for Teaching creativity and Problem Solving- By Arthur B Vangundy- Pfeiffer
3. H. S. Fogler and S.E. Le Blanc, 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)

- Brainteasers (aka Puzzle Busters, to be solved individually)
- Cartoon captions (small teams)
- TRIZ, asystematic 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