



SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR – 440013

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

PROGRAMME SCHEME & SYLLABI 2020 – 2021

B. E. (INFORMATION TECHNOLOGY)



Published By

Dr. R. S. Pande

Principal

Shri Ramdeobaba College of Engineering & Management

Ph. : 0712-2580011 Fax : 0712 - 2583237

ISO 9001 : 2015 CERTIFIED ORGANISATION



About the Department

The department, established in 2001 and accredited by National Board of Accreditation AICTE, in 2008 and 2014 respectively, has an excellent infrastructure and well qualified and experienced faculties with average teaching experience of 15 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 MOU's signed with leading software industries which gives inputs in curriculum development, conduction of guest lectures, summer / winter training for students. Option of full six months internship is provided, in reputed IT industries, for VIII semester students. Laboratories of the department are well equipped with computers of latest configuration and internet facility. Latest software, wireless access point, LCD projectors and separate router are used in the laboratories and for teaching purpose. Department takes pride in excellent placements of the final year students and has the distinction of consistently getting good 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.



Programme Specific Outcomes

ITPSO1: Foundation of Logic development and Mathematical concepts :

Demonstrate logic development ability along with mathematical concepts to solve real world 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 First Year (Semester I & II) Bachelor of Engineering
Group 1 : Semester - I / Group 2 : Semester - II

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	PHT156	Semiconductor Physics	3	1	0	4	40	60	100	03
2.	PHP156	Semiconductor Physics Lab	0	0	3	1.5	25	25	50	-
3.	MAT152/ MAT151	Differential Equations, Linear Algebra, Statistics & Probability/Calculus	3	0/1	0	3/4	40	60	100	03
4.	MAT151	Computational Mathematics Lab	0	0	2	1	25	25	50	-
5.	EET151	Basic Electrical Engineering	3	1	0	4	40	60	100	03
6.	EEP151	Basic Electrical Engineering Lab	0	0	2	1	25	25	50	-
7.	MET151	Engineering Graphics & Design	1	0	0	1	40	60	100	03
8.	MEP151	Engineering Graphics & Design Lab	0	0	4	2	50	50	100	-
9.	HUT152	Constitution of India	2	0	0	0	-	-	-	-
10.	PEP151	Yoga / Sports	0	0	2	0	-	-	-	-
		TOTAL	12	2/3	13	17.5/18.5			650	



Group 2 : Semester - 1 / Group 1 : Semester - II

Sr. No.	Code	Course	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	CHT152	Chemistry	3	1	0	4	40	60	100	03
2.	CHP152	Chemistry Lab	0	0	3	1.5	25	25	50	-
3.	MAT151/ MAT152	Calculus/Differential Equations, Linear Algebra, Statistics	3	1/0	0	4/3	40	60	100	03
4.	CST151	Programming for Problem Solving	4	0	0	4	40	60	100	03
5.	CSP151	Programming for Problem Solving Lab	0	0	2	1	25	25	50	-
6.	IDT151	Creativity, Innovation & Design Thinking	1	0	0	1	20	30	50	1.5
7.	INT151	Workshop/Manufacturing Practices	1	0	0	1	20	30	50	1.5
8.	INP151	Workshop/Manufacturing Practices Lab	0	0	2	1	25	25	50	-
9.	HUT151	English	2	0	0	2	40	60	100	03
10.	HUP151	English Lab	0	0	2	1	25	25	50	-
TOTAL			14	2/1	9	20.5/19.5			700	



**Scheme of Teaching & Examination of Bachelor of Engineering
(Information Technology)
Semester III**

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITT251	Object Oriented Programming	2	0	0	2	40	60	100	03
2.	ITP251	Object Oriented Programming Lab	0	0	4	2	25	25	50	--
3.	ITT252	Data Structures	3	0	0	3	40	60	100	03
4.	ITP252	Data Structures Lab	0	0	4	2	25	25	50	--
5.	ITT253	Digital Circuits & Fundamentals of Microprocessor	2	1	0	3	40	60	100	03
6.	ITP253	Digital Circuits & Fundamentals of Microprocessor Lab	0	0	4	2	25	25	50	--
7.	ITP254	IT Workshop Lab	0	0	4	2	25	25	50	--
8.	MAT252	Linear Algebra & Statistics	3	0	0	3	40	60	100	03
9.	HUT254	Technical Communication	3	0	0	3	40	60	100	03
10.	CHT251	Environmental Science	2	0	0	0	--	--	--	--
Total			15	1	16	22				

Semester IV

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITT255	Discrete Mathematics	2	1	0	3	40	60	100	03
2.	ITT256	Computer Organization and Architecture	3	0	0	3	40	60	100	03
3.	ITP256	Computer Organization and Architecture Lab	0	0	2	1	25	25	50	--
4.	ITT257	Software Engineering	3	0	0	3	40	60	100	03
5.	ITP257	Software Engineering Lab	0	0	4	2	25	25	50	--
6.	ITT258	Design and Analysis of Algorithms	3	0	0	3	40	60	100	03
7.	ITP258	Design and Analysis of Algorithms Lab	0	0	4	2	25	25	50	--
8.	HUT255	Organizational Behavior	3	0	0	3	40	60	100	03
9.		Open Elective - I	3	0	0	3	40	60	100	03
10.	HUT252	Indian Traditional Knowledge	2	0	0	0	--	--	--	--
Total			19	1	10	23				

Open Elective - I	
Code	Course Title
ITT299-1	Linux Fundamentals



Programme Scheme & Syllabi B. E. (Information Technology)

Semester V

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITT351	Operating Systems	3	0	0	3	40	60	100	03
2.	ITP351	Operating Systems Lab	0	0	4	2	25	25	50	–
3.	ITT352	Formal Languages and Automata Theory	2	1	0	3	40	60	100	03
4.	ITT353	Computer Networks	3	0	0	3	40	60	100	03
5.	ITP353	Computer Networks Lab	0	0	4	2	25	25	50	–
6.	HUT354	Managerial Economics	3	0	0	3	40	60	100	03
7.	ITT354	Elective-I	3	0	0	3	40	60	100	03
8.		Open Elective-II	3	0	0	3	40	60	100	03
Total			17	1	8	22				

Elective - I		Open Elective - II	
Code	Course Title	Code	Course Title
ITT354 - 1	Adv. Data Structures	ITT398 - 1	Python Programming
ITT354 - 2	Web Technologies	ITT398 - 2	Client Server Computing & Applications

Semester VI

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITT356	Information Security	3	0	0	3	40	60	100	03
2.	ITT357	Compiler Design	3	0	0	3	40	60	100	03
3.	ITP357	Compiler Design Lab	0	0	4	2	25	25	50	–
4.	ITT358	Database Management System	2	1	0	3	40	60	100	03
5.	ITP358	Database Management System Lab	0	0	4	2	25	25	50	–
6.	ITT359	Elective - II	3	0	0	3	40	60	100	03
7.		Open Elective-III	3	0	0	3	40	60	100	03
8.	ITP361	Project-I	0	0	4	2	50	50	100	–
9.	ITP362	Comprehensive Viva	0	0	2	1	25	25	50	–
Total			14	1	14	22				

Elective - III		Open Elective - III	
Code	Course Title	Code	Course Title
ITT359 - 01	IT Infrastructure Services	ITT399 - 1 (self study)	Cyber Security and laws
ITT359 - 02	Mobile Application Development		



**Scheme of Teaching & Examination of Bachelor of Engineering
(Information Technology)
Semester VII**

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITT451	Artificial Intelligence	3	0	0	3	40	60	100	03
2.	ITT452	Elective - III	3	0	0	3	40	60	100	03
3.	ITT453	Elective - IV	3	0	0	3	40	60	100	03
4.		Open Elective - IV	3	0	0	3	40	60	100	03
5.	IDT452	Computational Biology	2	1	0	3	40	60	100	03
6.	ITP455	Industry Internship Evaluation*	0	0	2	0	--	--	--	--
7.	ITP456	Project - II	0	0	12	6	75	75	150	--
Total			14	1	14	21				

*Industry Internship evaluation (6 - 8 weeks, undergone during 3rd to 6th semester)

Elective - III		Elective - IV	
Code	Course Title	Code	Course Title
ITT452 - 01	Distributed Systems	ITT453-01	Image Processing
ITT452 - 02	Virtualization and Cloud Computing	ITT453-02	Wireless Communication

Open Elective - IV		
Sr. No	Course Code	Course Name
1	ITT 498-1	Internet Technologies
2	ITT 498-2	E-Commerce

Semester VIII

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITT457	Elective - V	3	0	0	3	40	60	100	03
2.	ITT458	Elective-VI	3	0	0	3	40	60	100	03
3.	ITP459	Project-III / One Semester Industry Project/Incubation	0	0	12	6	75	75	150	--
Total			6	0	12	12				

Elective - V		Open Elective - VI	
Code	Course Title	Code	Course Title
ITT457 - 01	Information Retrieval	ITT458-01	Data Warehousing& Business Intelligence
ITT457 - 02	Machine Learning	ITT458-02	Internet of Things



**Scheme of Teaching & Examination of Bachelor of Engineering
Specialization in Information Technology**

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITTH41	Foundation to Computer System Design	3	1	-	04				
2.	ITTH51-1	Applied data Science with Python	3	1	-	04				
3.	ITTH51-2	Capstone : Retrieving, Processing and Visualizing Data using Python	3	1	-	04				
4.	ITTH61	Data Mining	3	1	-	04				
5.	ITTH71	Big Data Computing	3	1	-	04				
6.	ITTH81	Block Chain Architecture and use cases.	3	1	-	04				

Note : The above courses are to be opted as MOOC courses with prior permission and consultation with Head, **Information Technology Department**.

**Scheme of Teaching & Examination of Bachelor of Engineering
Specialization in Information Technology**

Sr. No.	Course code	Course Name	Hours/week			Credits	Maximum marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1.	ITTM41	Python for Everybody	3	1	-	04				
2.	ITTM51	Object Oriented Programming in Java	3	1	-	04				
3.	ITTM61	Web Design for Everybody	3	1	-	04				
4.	ITTM71-1	Machine Learning	3	1	-	04				
5.	ITTM71-2	The Bits and Bytes of Computer Networking	3	1	-	04				
6.	ITTM81	Emerging Technologies : IOT, Wireless and Cloud Computing	3	1	-	04				

Note : If any of the above course is accessible to a student in his / her parent branch or open elective then credit transfer against that course will be allowed subject to completion of a MOOC course with prior permission and consultation with Head, Information Technology Department.



Syllabus for Semester BE I / II

(Electronics Engineering, Electronics and Communication Engineering, Computer Science Engineering, Information Technology, Computer Science Engineering (Data Science))

Course Code : PHT156

Category : Basic Science Course

Course : PHYSICS: Semiconductor Physics (Theory)

L: 3 Hr., T: 1 Hrs., P : 0 Hrs., Per week

Total Credits : 4

Course Objectives

1. To introduce ideas of quantum mechanics necessary to begin understanding semiconductor devices;
2. To familiarize prospective engineers with fundamental concepts of semiconductors and their interaction with light and resulting devices

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 junctions between 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



Module 4: Non-Equilibrium Semiconductors

Carrier generation and recombination, Continuity equation, Ambipolar transport equation, Quasi-Fermi Energy levels, Excess Carrier Lifetime, Qualitative introduction to recombination mechanisms, Shockley - Read-Hall Recombination, Surface Recombination

Module 5: Junction Physics

p-n junction, Zero applied bias, forward bias, reverse bias, Metal-semiconductor junction, Schottky 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 Publication 1986

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 for Semester BE I / II

(Electronics Engineering, Electronics and Communication Engineering, Computer Science Engineering, Information Technology, Computer Science Engineering (Data Science))

Course Code : PHP156

Category : Basic Science Course

Course : Semiconductor Physics Lab

L:0Hrs.T:0Hrs.P:3Hrs.Per week

Total Credits : 1.5

Course Outcomes

The Physics Lab course consists of experiments illustrating the principles of physics relevant to the 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 the results obtained with theoretical calculations.
3. Understand measurement technique, and report the results obtained through proper graph plotting and error analysis.

In addition to the General physics experiments, the Lab turns will be utilized for performing the experiments 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/thermister
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
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





**Syllabus for Semester II, B.E.
Department of Information Technology**

Course Code : MAT151

L: 03hrs, T: 1 Hr., P: 0 Hrs Per Week

Course : Calculus

Total Credits: 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 Value 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 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.E. Semester I
Department of Information Technology

Course Code : MAT152

Course : Mathematics-II: Differential Equations,
Linear Algebra Statistics & Probability

L: 3 Hrs., T: 0 Hrs., P: 0 Hrs., Per week Total Credits : 03

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 model 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.

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

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: 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. Spiegel, 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, A First Course in Probability, 6th Ed., Pearson Education India, 2002.





Syllabus of Mathematics Computational Lab for Semester I/II, B.E. (2018-19)

Course Code : MAP151

Course : Computational Mathematics Lab

L:0Hr.,T:0Hrs.,P:2Hrs.,Perweek

Total Credits : 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 realtime.
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 of Group 1 - Semester I and Group 2
Semester II, Bachelor of Engineering**

Course Code : EET151

Course : Basic Electrical Engineering

L : 3 Hrs, T : 0 Hrs., P : 0 Hrs.

Total Credit : 04

Course Outcomes

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

CO1: Understand and analyze basic ac and dc electric circuits and magnetic circuits

CO2: Understand working principles of electrical machines: Transformer, Induction motor, DC machines

CO3: Apply the knowledge of power converter for suitable applications

CO4: Introduce and identify the components of power systems and low-voltage electrical Installations.

Module 1: Introduction to Power system (2 hours)– CO4:

Introduction to Power Generation (Thermal, Hydro, Nuclear, Wind, and Solar) with block schematic presentation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels.

Module 2 : DC Circuits & Magnetic Circuits(8 hours) - CO1:

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation, Time-domain analysis of first order RL and RC circuits, Magnetic materials, BH characteristics, Basics of Magnetic circuits.

Module 3: Single Phase AC Circuits (6 hours) - CO1:

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.

Module 4: Three Phase AC Circuits (4 hours) - CO1:

Three phase Ac generation, Three phase balanced circuits, voltage, and current relations in star and delta connections. Power factor improvement.

Module 5: Transformers (6 hours) - CO2:

Ideal and practical transformer, Equivalent circuit, losses in transformers, regulation, and efficiency. Auto transformer and three-phase transformer connections.

Module 6: Electrical Machines (8 hours) - CO2:

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components, efficiency, starting of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic, and speed control of separately excited dc motor.



Module 7: Power Converters (4 hours) - CO3:

Block schematic introduction to power converters and its practical applications (DC-DC, DC-AC, AC-DC, AC-AC), Types of Batteries, Important Characteristics for Batteries and battery backup.

Module 8: Electrical Installations (4 hours) - CO4:

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, energy tariff.

Text / References

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", Mc Graw Hill, 2009.3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
6. Electrical Technology: B. L. Thereja, S. Chand Publications.
7. Basic Electrical Engineering: S. B. Bodkhe, N. M. Deshkar, P. P. H. Pvt. Ltd.





Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code : EEP151

Course : Basic Electrical Engineering Lab.

L : 0 Hrs, T : 0 Hrs., P : 2 Hrs.

Total Credit : 01

Course Outcomes

Upon completion of this course, the students shall be able to,

CO1: Co-relate, analyze and apply the fundamental principles of science and engineering to understand the laboratory experimental work.

CO2: Connect the electric circuit, perform the experiment, analyze the observed data and make valid conclusion.

CO3: Write report based on the performed experiments (journal) with effective presentation of diagrams and characteristics/graphs.

CO4: Carry out survey of electrical energy consumption at home and calculate monthly energy bill as per the tariff of power Distribution Company.

List of Experiments

1. To verify Kirchoff's laws for D.C. Circuits
2. Verification of Kirchoff's laws to AC circuit(RLC series)
3. Verification of Kirchoff's laws to AC circuit (RLC parallel).
4. To study speed control of D.C. shunts motor by:
 - a) Armature voltage Control method.
 - b) Field current/flux control method.
5. To study the balanced Three phase system for star and delta connected balanced load.
6. Improvement of power factor by using static capacitors
7. To determine regulation and efficiency of a single phase transformer by open circuit (o.c) and short circuit (s.c.) tests.
8. To determine regulation and efficiency of a single phase transformer by direct loading test

Demonstration/ Study experiment

9. To study B-H curve for different magnetic material
10. To study Buck converter
11. To study Boost converter

Demonstration of cut out sections of machines:

- i. DC Machine
- ii. Three phase squirrel cage induction motor
- iii. Synchronous machine





Syllabus of Department of Mechanical Engineering

Course Code : MET151

Course : Engineering Graphics and Design

L:1Hr.,T:0Hrs.,P:0 Hrs.,Per Week

Total Credits : 01

Course Outcomes

The expected learning outcome is that, the students shall be able to

1. Draw and interpret technical drawing
2. Convert 2-D to 3-D drawing and vice versa.
3. Represent the various positions of planes and solids in different orientations.
4. Develop the solid surface for sheet metal working.

UNIT 1 : Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of drawing instruments, Lettering and dimensioning.

UNIT 2 : Orthographic Projections

Principles of Orthographic Projections -Conventions : Projections of Points and lines (line inclined to both planes) Projections of planes(inclined to both the planes), Introduction to Auxiliary Planes.

UNIT 3 : Projections of Solids

Inclined to both the Planes - Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 4 : Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid Cone-Auxiliary Views; Development of surface of Right Regular solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT 5 : Isometric Projections

Principles of Isometric projection - Isometric Scale, Isometric Views, Conventions; Isometric Views of Simple Solids; Conversion of Orthographic views to Isometric Views / Projection.

Suggested Text / Reference Books

- i) Bhatt N. D. Panchal V.M. & Ingle P.R.,(2014) Engineering Drawing, Charotar Publishing House.
- ii) Jolhe D. A. (2016) Engineering Drawing with an Introduction to Auto CAD", Tata McGraw- Hill Publishing Co. Ltd., New Delhi.
- iii) Narayana K. L. & P. Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
- iv) Shah, M. B. &Rana B. C. (2008), Engineering Drawingand Computer Graphics, Pearson Education.
- v) Agrawal B & Agrawal C. M. (2012), Engineering Graphic, TMHPublication.
- vi) Corresponding set of CAD Software Theory and User Manuals.





Syllabus of Department of Mechanical Engineering

Course Code : MEP151

Course : Engineering Graphics & Design Lab

L:0Hr.,T:0 Hrs.,P:4Hrs.,Per week

Total Credits : 02

Course Outcomes

Students are prepared for actual work situations through practical training in a new state of the art computer designed CAD laboratory using engineering software. The student will learn to :

1. Draw and interpret technical drawing
2. Plan the sheet layout for the given drawing
3. Convert 2-D to 3-D drawing and vice versa
4. Represent the various positions of planes and solids in different orientations.
5. Develop the solid surface for sheet metal working
6. Use & demonstrate drafting package.

UNIT 1 : Introduction to Engineering Drawing

Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloids, Hypocycloid and involutes; Introduction to Scales.

UNIT 2 : Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes- Auxiliary Planes.

UNIT 3 : Projections of Solids

Inclined to both the Planes Auxiliary Views; Draw simple annotation, dimensioning and scale, Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 4 : Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone - Auxiliary Views; Development of surfaces of Right Regular Solids Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT 5 : Isometric Projections

Principles of Isometric projection - Isometric Scale, Isometric Views, Conventions; Isometric Views of Simple Solids; conversion of Orthographic views to Isometric views / Projection

UNIT 6 : Overview of Computer Graphics

Demonstrating knowledge of the theory of CAD software such as (the Menu System Toolbars Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, cross hairs, Coordinate Systems), Dialog boxes and windows, Shortcut menus (Button Bars), The command Line



(wherever applicable), The Status Bar, Different methods of zoom as used in CAD, select and erase objects; Isometric Views of lines, Planes, Simple and compound solids);

UNIT 7 : Customization & CAD Drawing

Setting up drawing page and the printer, including scale settings, Setting up of units and Drawing limits; ISO and ANSI standards for coordinate dimensioning; Orthographic constraints, map to objects, manually and automatically, Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

UNIT 8 : Annotations Layering & Other Functions

Applying dimensions to objects, applying annotations to drawings; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques.

UNIT 9 : Demonstration of a simple team design project that illustrates

Geometry and Topology of Engineered Components Creation of Engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; Meshed topologies for engineering, Introduction to Building Information Modeling (BIM), Drafting and design Package, 3D Printing.

List of sheets

1. Curves(ellipse, Parabola, hyperbola, Cycloid, involute)
2. Line, Planes, Solids
3. Application of Section and development of solids
4. Orthographic Projection
5. Isometric
6. Auto CAD practice sheet 1
7. Auto CAD practice sheet 2
8. Blueprint sheet

Suggested Text/ Reference Books

- i) Bhatt N. D., Panchal V. M. & Ingle P.R.,(2014), Engineering drawing, Charotar Publishing house
- ii) Jolhe D.A.,(2016) Engineering drawing with an Introduction to Auto CAD", Tata McGraw- Hill Publishing Co. Ltd., New Delhi.
- iii) Shah M.B.& Rana B.C.(2008), Engineering drawing and Computer Graphic, Pearson Education.
- iv) Agarwal B & Agarwal C.M. (2012), Engineering Graphics, TMH PUBLICATION
- v) Narayana, K. L & P Kannaiah (2008), Text Book on Engineering Drawing, Scitech Publishers.
- vi) (Corresponding set of) CAD Software Theory and USER Manuals.





Syllabus for B.E. Semester I Department of Humanities

Course Code : HUT152

Course : Constitution of India

L:2Hrs.T:0Hrs.P:0Hrs.Per weeks

Total Credits : 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 & 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

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





Syllabus for B.E. Semester I, Department of Physical Education

Course Code : PEP151

Course : Yoga / Sports

L:0Hrs.T:0Hrs.P:2Hrs.Per week

Total Credits : 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 for good health and physical fitness. The objective would also be to make the all-round development with 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 as to 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 to deal 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 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	Suryanamaskars



Syllabus of Chemistry Course

[For Computer Science Engineering, Information Technology Engineering, Data Science, Artificial Intelligence and Machine Learning and Cyber Security Branches]

Course Code : CHT152

L : 03, T: 01, P: 00

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 level. [CO for Unit – 1]
- Conversant in applying unique properties of nano-materials to solve challenges in our life. [CO for Unit – 2]
- Explain the differences in the mechanical behavior of engineering materials based upon bond type, structure, composition, and processing. [CO for Unit – 3]
- Study chemical kinetics using concepts of computational chemistry. [CO for Unit – 4]
- Discuss how spectroscopic methods are used for qualitative and quantitative analyses. [CO for Unit – 5]
- Analyse impurities present in the water and suggest the methodology for its removal. [CO for Unit – 6]

Syllabus

Unit 1: Solid State Chemistry (7 Hours)

Bondings in atoms: Primary bonding: ionic, covalent, metallic. Secondary bonding: dipole-dipole, induced dipole-induced dipole, London dispersion/van der Waals, hydrogen. Shapes of molecules: hybridization, LCAO-MO, VSEPR theory.

Electronic material: Band theory: metals, insulators, and semiconductors. Band gaps, doping. Silicon wafer production.

Unit 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, nanotechnology based water treatment strategies.

Unit 3: Advanced Materials: (7 hours)

Composite materials: Introduction, Classification: Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber- Reinforced Composites and Applications.



Reinforcements: Fibres- Glass, Kevlar, Carbon, silicon carbide, boron carbide, Fibres.

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

Unit 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 Mathematica for determining rate of the reaction, etc.

Unit 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), X-Ray Fluorescence (XRF) spectroscopy.

Unit 6: Water Technology [8 Hours]

Impurities in natural water, hardness and alkalinity, Disadvantages of hardness i. e. sludge and scale formation, softening of water using lime-soda, zeolite and ion-exchange method, advantages and limitations of these water softening processes, Desalination of water using Reverse Osmosis.

Suggested 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. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand Publications.
12. J. D. Lee, Concise Inorganic Chemistry, Fourth Edition, Chapman and Hall Publications.





Syllabus of Chemistry Course

[For Computer Science Engineering, Information Technology Engineering, Data Science, Artificial Intelligence and Machine Learning and Cyber Security Branches]

Course Code : CHP152

L : 00, T: 00, P: 03

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:

- Estimate the amount of different impurities in water/waste water samples.
- Estimate rate constants of reactions and order of the reaction from concentration of reactants/products as a function of time and to validate adsorption isotherms.
- Measure molecular/system properties such as surface tension, viscosity of aqueous or other industrially important liquids/mixtures etc.
- Synthesize a polymer or drug molecule or nano-material.
- Use principle of spectroscopic techniques for structural determination.

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 data using Computational Software.
- [5] 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.
- [6] Study of 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.
- [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] Demonstrations of organic spectral techniques: IR, NMR.
- [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.

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.





**Syllabus of Group 1 - Semester I and Group 2 -
Semester II, Bachelor of Engineering**

Course Code : CST151

Course : Programming for Problem Solving

L: 4 Hrs., T: 0 Hrs., P: 0 Hrs., Per week

Total Credits : 4

Course Outcomes

On successful completion of course student will learn:

1. To formulate simple algorithms for arithmetic and logical problems, translate the algorithms to programs (in C language), test and execute the programs and correct syntax and logical errors.
2. To implement conditional branching, iteration and recursion, to decompose a problem into functions and synthesize a complete program using divide and conquer approach.
3. To use arrays, pointers, structures and I/O operations for the formulation of algorithms and programs.
4. To apply programming to solve matrix addition, multiplication problems and searching & sorting problems.

UNIT-I: Introduction to Programming

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

Idea of Algorithm : Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart / Pseudocode with examples. Arithmetic expressions and precedence

UNIT-II: C Programming Language

Introduction to C language: Keywords, Constant, Variable, Data types, Operators, Types of Statements, Preprocessor Directives, Decision Control Statement-if, if-else, Nested if-else statement, Switch case, Loops and Writing and evaluation of conditionals and consequent branching.

UNIT-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)

UNIT-IV: Functions and Recursion

User defined and Library Functions, Parameter passing in functions, call by value, Passing arrays to 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.



UNIT-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)

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. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill

Reference Books

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





Syllabus of Group 1 - Semester I and Group 2 Semester II, Bachelor of Engineering

Course Code : CSP151

Course : Programming for Problem Solving Lab

L: 0 Hrs., T: 0 Hrs., P: 2 Hrs., Per week

Total Credits : 1

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. Implement different Operations on arrays also design functions to solve the given problem using C programming.
3. Understand pointers, structures, unions and apply them to develop programs.
4. Implement file Operations in C programming for a given application.

List of Experiments

1. To study Unix/Linux Operating System Environment and demonstrate basic data types in C and implementing arithmetic expressions.
 - a) Write C Program to acquire name, roll number and fees paid for a student and display the contents on the screen.
 - b) Write C Program to acquire radius of a circle at the terminal and compute area and circumference of circle.
 - c) Write C Program to execute the expression for projectile motion
$$s = ut + 1/2 at^2$$
where s: Displacement; u: initial velocity, a: acceleration t: time
2. To Study and Demonstrate Decision Control Structure.
 - a) Write C Program to check whether entered 4-digit number is even, odd or zero.
 - b) Write C Program to acquire total marks obtained by student (out of 500) and decide the passing division.

Marks	Division
> 85	Distinction
> 75 and < = 85	First Class
> 65 and < = 75	Second Class
> = 50 and < = 65	Pass
< 50	Fail

- c) Write C Program to accept year (4-digit > 1900) and check whether it is a leap year or not.
3. To Study and Demonstrate Loop Control Structure
 - a) Write C Program to compute sum of integers provided by user. Set the terminating condition for the program as number - 9999.
 - b) Write C program using while loop to find n-digit Armstrong number where value of 'n' should be in the range 2 to 6 (both inclusive)
 - c) Write C Program using for loop to print given pattern.



1
2 3 2
3 4 5 4 3
4 5 6 7 6 5 4
5 6 7 8 9 8 7 6 5

4. To Study and Demonstrate Multi-way Decision Control Structures (Switch Case)
- a) Write C Program which will accept a 4-digit number and depending on the user choice code will perform the following.

Choice Code	Action
1	Reverse of number
2	Sum of its digits
Otherwise	Exit with Error

- b) Write C Program that will accept number of sides from the user (sides > 3 and side < 5) and will compute the area and perimeter of the polygon described by the sides.
5. To Study and Demonstrate 1D and 2D Array.
- a) Write a C Program to implement Linear Search and Binary Search. Given a list of N Numbers. Search the existence of any number in the list. The list is initialized using array.
- b) Write a C Program to find transpose of a matrix.
- c) Write a C Program to implement Insertion Sort and Selection Sort. Create a vector (1-D Array) storing N integers in ascending sequence.
6. To Study and Demonstrate Function and Recursion.
- a) Write a C Program to create user defined function to reverse of a string. (Use Call by Reference)
- b) Write a C Program to create user defined function to compute surface area and volume of a right circular cylinder. Do not print the output in function body. Do not use global variable. (Use Call by Reference)
- c) Write a C Program using Recursive Function to compute
- 1) GCG of two number
 - 2) Power of a number
 - 3) n^{th} Fibonacci terms (number) ($n \leq 40$)
7. To Study and Demonstrate Structure and Pointers.
- a) Write a C Program to define Structure to store information of five student. The Student record is comprised as Roll Number, Name, Mark 1, Mark 2, Mark 3. Compute and display the aggregated marks scored by each student.
- b) Write a C Program to create user defined function (by using pointer) to copy source string to target string.
8. To Study and Demonstrate File Handling in C.
- a) Write a C Program (Using Structure) to create a File named STUD_FL which will store information of 20 Students. (A class of B.E. First year has 20 student. Each student records comprised of Roll Number, Name, Fee Paid.)
- b) Write a C Program to read the STUD_FL file and print contents of it.





Creativity Innovation and Design thinking Course Syllabus

Course Code : IDT151

L:1Hrs., T:0Hrs., P:0Hrs., Per week

Total Credits : 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)

UNIT3. 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) innovativenation, (9) innovation in science, and(10) innovation in engineering.
- Large groups hands-on projects
- Eight-dimensional(8D) ideation method examples
- Large teams videos





Syllabus Department of Industrial Engineering

Course Code : INT151

Course : Workshop/Manufacturing Practices (Theory)

L:1Hrs., T:0Hrs., P:0Hrs.,Per week

Total Credits : 1

Course Outcomes

1. Identify the different manufacturing process commonly employed in Industry along with prevailing safety practices.
2. Identify the various tools and equipments to carry out different manufacturing processes accompanied by the inspection of the work part.

Unit-1 Fundamentals of metal cutting, single point cutting tool, fundamental mechanics of metal cutting, fitting operations, and associated measuring and marking tools

Unit-2 Introduction to pattern making for metal casting, different types of carpentry tools, measuring tools and marking tools, holding devices, different types of carpentry joints.

Unit-3 Smithy and Forging, Forging tools like chisels, hammers, types of furnaces, types of coal, Forming operations, Hot working and Cold working of metals.

Unit-4 Metal joining Process, mechanic soft welding, types of welding, soldering and brazing, types of joints

Unit-5 Introduction to foundries, Metal Casting, types of sand, Introduction to Molding tools & casting process.

Unit-6 Introduction to Plastic Injection Molding

Suggested Text Book

1. "Elements of Workshop Technology" Hajra S.K, Choudhury A. K , Roy Nirjhar Vol. I and Vol .II, Media Promoters and Publishers Private Ltd. Mumbai.

Reference Books

1. Kalpakjian S. and Schmid S. "Manufacturing Engineering and Technology" 4th Edition, Pearson India Education 2008
2. Roy A. and Lind berg, "Process and Materials of Manufacture" 4th Edition, Prentice Hall India 1998.





Syllabus Department of Industrial Engineering

Course Code : INP151

Course : Workshop/Manufacturing Practices Lab (Practical)

L:0Hrs.,T:0Hrs.,P:2Hrs.,Per week

Total Credits : 1

Laboratory Outcomes

On the completion of the course the students shall be able to;

1. Recognize the different manufacturing process commonly employed in the Industry
2. Make the components using required manufacturing process, inspection methods while practicing the requisite safe type cautions

Contents

1. Fitting Practice
2. Welding and Soldering Practice
3. Pattern Making Practice
4. Metal Casting Practice
5. Smithy and Forging Practice
6. Machining Practice
7. Plastic Molding Process
8. Glass Cutting Process

Suggested Text Book

1. "Elements of Workshop Technology" Hajra S.K, Choudhury A.K , Roy Nirjhar Vol. I and Vol .II, Media Promoters and Publishers Private Ltd Mumbai.

Reference Books

1. Kalpak Jain S. and Schmid S. "Manufacturing Engineering and Technology"4th Edition, Pearson India Education 2008
2. Roy A. and Lindberg, "Process and Materials of Manufacture", Prentice hall India 1998.





Syllabus for B. E. Semester I / II Dept of Humanities

Course Code : HUT151

Course : English

L: 2 Hrs.T:0 Hrs.P:0 Hrs. Per week

Total Credits : 2

Course Objectives

The main objective of the subject is to enhance the employability skills of engineering students as well as 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 skills 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 Heasley. Cambridge University Press. 2006.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press





**Syllabus for B.E. Semester I
Humanities and Social Sciences including Management Courses**

Course Code : HUP151

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per week

Course : English Lab

Total Credits : 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





III Semester
Department of Information Technology

Course Code : ITT251

Course : Object Oriented Programming

L: 2 Hrs., T: 0 Hrs., P: 0 Hrs., Per week

Total Credits : 02

Course outcomes

Upon completion of course, students will be able to

1. Understand the necessity of object oriented Programming features like encapsulation, data hiding and abstraction etc.
2. Analyze a problem statement and suggest appropriate object oriented concepts applicable to solve the problem.
3. Apply the concept of class, inheritance, interfaces, streams and exception handling to solve real life problems.
4. Write object oriented based solution for the given problem statement.
5. Implement data structures using object oriented programming.
6. Understand 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.

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.

Unit IV

Interfaces and Exception handling: Concept of an abstract class. Concept of an interface. Implementation of an interface. Exception and exception handling mechanisms. Study of exception handling mechanisms in object-oriented languages

Unit V

Streams: Introduction to streams, use of stream classes. Implementation of data structures like linked lists, stacks, queues, trees, graphs, hash table etc. using object oriented programming languages.



Unit VI

Introduction to modeling techniques like UML, Basics of multithreaded programming, networking, Applet and Servlet.

Text Books

1. The Complete Reference: Java 2: Herbert Schildt
2. Arnold Ken, Gosling J, "The Java Programming Language" 5 edition, MGH, AddisonWesley
3. Matt Weisfeld, "The Object-Oriented Thought Process", Pearson

Reference Books

1. Cox Brad, "Object-Oriented Programming: An Evolutionary Approach", Addison-Wesley
2. Design Patterns By Erich Gamma, Pearson Education





III Semester
Department of Information Technology

Course Code : ITP251

Course : Object Oriented Programming Lab

L: 0 Hrs. T: 0 Hrs. P: 4 Hrs. Per week

Total Credits : 02

Minimum 10 Practicals based on Course Outcomes

Upon completion of course, students will be able to

1. Apply object-oriented concepts to solve the real life problems.
2. Write object-oriented programs in Java Language for the given problem statement.
3. Implement extensible and reusable programs.
4. Implement data structures using object oriented programming and will be able to make use of design patterns.
5. Create UML Diagrams using tools.
6. Document the lab work in the form of lab report.





III Semester
Department of Information Technology

Course Code : ITT252

Course : Data Structures

L: 3 Hrs., T: 0 Hrs., P: 0 Hrs., Per week

Total Credits : 03

Course Outcomes

Upon completion of the course, student will be able to

1. Understand important concepts of algorithm, complexity theory and design aspects of Algorithm.
2. Communicate about algorithm efficiency and recognize a better solution.
3. Understand the basic concepts of Linear Data Structures like Arrays and Link List, their representation in memory and applications in real life problems.
4. Appreciate the concept of dynamic memory location, its utilization and implementation.
5. Understand and analyze different Searching / Sorting Algorithms, their advantages and disadvantages and selection of appropriate algorithm as per the data given.
6. Demonstrate ability to apply knowledge of dynamic data structures like link lists, trees and graphs, formulate the problem and devise an algorithm.

Unit I

Introduction to Algorithms: Concept of data types, Algorithm and its features. Analysis of Algorithms, Asymptotic notations, Features of structured program, Recursion, Top-down and Bottom-up programming techniques, Divide& Conquer strategy.

Unit II

Arrays : Introduction, Memory Representation, Introduction to Stacks& Queues and basic operations. Use and Implementation of array in useful 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 list and basic operations on them. Representation of array based structures using link lists.

Classical Applications of linked list : Polynomial addition, Equivalence relation and Generalized lists.

Unit IV

Sorting & Searching Methods: Purpose and types: Internal and External sorting, Study, Comparison and implementations of Bubble sort, Exchange sort, Insertion sort, Selection sort, Merge sort, Quick sort Heap sort and Radix sort.



Study, Comparison and implementations of Searching Methods: Sequential, Binary, Indexed search, Hashing techniques and Collision-handling mechanisms

Unit V

Trees: Purpose, types, definition and terminologies. Concept and memory representation of a binary tree. Application of trees: Tree traversal techniques, Threaded binary trees, Binary search tree and Heap tree. Use, concept and operations on Multi-way trees: B-Trees and B + Trees.

Unit VI

Graphs and their applications: Purpose, types, definition and terminologies. Implementation in memory.

Application of Graphs: Traversal using Depth-first and Breadth-first search techniques, Minimum Cost Spanning Trees: Concept and implementation using Prim's and Kruskal's algorithms and Computation of Shortest Path using Dijkstra's algorithm.

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-EEE.
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.





III Semester
Department of Information Technology

Course Code : ITP252

L: 0 Hrs., T: 0 Hrs., P: 4 Hrs., Per week

Course : Data Structures Lab

Total Credits : 02

Minimum 10 Practicals based on the course ITT 252

Course outcomes

Upon completion of the course, student will be able to

1. Appreciate and practice structured programming
2. Formulate the problem, devise an algorithm and transform in to code.
3. Analyze and communicate the time and space complexities of given algorithm.
4. Write optimal programs.
5. Implement linear and non linear data structures for solving real world problems.
6. Document laboratory work in the form of lab report.





III Semester Department of Information Technology

Course Code : ITT253

Course : Digital Circuits and Fundamental of Microprocessor

L: 2 Hrs., T: 1 Hrs., P: 0 Hrs., Per week

Total Credits : 03

Course Outcomes

1. Upon completion of the course, students will be able to
2. Understand the fundamental concepts and techniques used in digital electronics.
3. Understand and examine the structure of various number systems and its applications in digital design.
4. Understand, analyze and design various combinational circuits.
5. Understand, analyze and design various sequential circuits using storage elements.
6. Identify timing problems in digital design.
7. Describe 8085 architecture and use its instruction set for writing Assembly Language programs.

Unit I

Introduction to digital systems: Logic and Boolean Algebra, Number Systems, Logic Gates & Truth Tables, Demorgan's law, Minimization of combinational circuits using Karnaugh maps up to five variables, Quine - McCluskey minimization technique.

Unit II

Building Blocks of Digital System: Multiplexers, Demultiplexer, Encoders, Decoders, Code Converters, Adders, Sub tractor.

Unit III

Storage Elements: Flip-flops and latches: D, T, S/R, J/K & J/K Master Slave flip-flops, Conversion of one type of F/F to another. Sequential circuit Analysis-Input equations, state table, analysis and design.

Unit IV

Counters: Counters, asynchronous and synchronous-design using state and excitation tables. Registers & Shift registers.

Unit V

Microprocessor 8085: Introduction to p 8085, Addressing modes, Instruction set, Programming of p 8085.

Unit VI

Memory Mapping, Timing Diagrams, Interfacing of 8255 and 8257 with 8085.

Text Books

1. Digital Logic Design: M. Mano, 2nd Edition.
2. Modern Digital Electronic: R. P. Jain, 4th Edition.
3. 8 bit Microprocessor: Ramesh Gaonkar.

Reference Books

1. Fundamental of Digital Electronics: A. Anand Kumar.
2. Digital circuit & design: A. P. Godse.
3. 8 bit microprocessor & controller: V. J. Vibhute, 5th Edition.





III Semester
Department of Information Technology

Course Code : ITP253

Course : Digital Circuits and Fundamental of Microprocessor Lab

L: 0Hrs., T: 0 Hrs., P: 4 Hrs., Per week Total Credits : 02

Minimum 10 Practicals based on the course ITT 253

Course Outcomes

1. Upon completion of the course, students will be able to
2. Design combinational circuits.
3. Design sequential circuits.
4. Design basic memory elements using flip-flops.
5. Write 8085 Assembly Language Programs.





III Semester

Department of Information Technology

Course Code : ITP254

Course : IT Workshop Lab

L: 0 Hrs., T: 0 Hrs., P: 4 Hrs., Per week

Total Credits : 02

Course Outcomes

Upon completion of the course, students will be able to

1. Understand the architecture and use of Linux operating system.
2. Effectively use different services provided by Linux operating system.
3. Automate tasks and write simple programs using shell scripts.
4. Use tools for debugging, testing and maintaining programs.
5. Use Net Beans IDE for program development.

Linux Operating System

- Introduction and history of Linux OS
- Basic commands
- File system and file handling commands
- User ,Group management commands
- Process handling commands
- Package management
- Shell and shell script
- Introduction to using different tools for identification of possible errors in C program: gdb, concept of “core dump”, backtracking using “bt”, using “info” to dump all registers, creating watch list/watch variables.

IDE for Project Development: Net Beans IDE

- Introduction
- Understanding environment settings
- Creation of Project
- Compilation of Project

Text Books

1. Unix and Shell Programming – B. M. Harwani , OXFORD University Press.

Reference Books

1. Linux Administration : A Beginner's Guide – Wale Soyinka , McGraw Hill Publication
2. Unix Concepts and Applications – Sumitabha Das, McGraw Hill Publication





III Semester
Department of Information Technology

Course Code : MAT252

Course : Linear Algebra & Statistics

L: 0 Hrs., T: 0 Hrs., P: 4 Hrs., Per week

Total Credits : 02

Course Outcomes

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

1. Computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, eigen values and eigen vectors, orthogonality and diagonalization.
2. Visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems and view solutions, especially in and, as well as conceptually extend these results to higher dimensions.
3. To prepare the background of students to pursue statistical theory or methodology and analyze data in any stream of computer science and information technology.

Module 1 (10-Lectures) :

Vector Space; Sub spaces; Linear Dependence/Independence; Basis; Dimension; Linear transformation; Range Space and Rank; Null Space and Nullity; Rank nullity theorem, Matrix Representation of a linear transformation; Linear Operators on R_n and their representation as square matrices; Invertible linear operators; Inverse of a non-singular matrix.

Module 2 (8-Lectures):

Eigen values and eigenvectors of a linear operator; Inner Product Spaces, Norm; Ortho normal Sets, Gram Schmidt ortho gonalisation process; projections, positive definite matrices, and Singular Value Decomposition.

Module 3 (13-Lectures):

Review of Discrete and continuous random variable, joint probability function, Introduction to stochastic process, random walk, stationary and auto regressive process, transition probability Matrix, Discrete time Markov chain, Continuous time Markov chain.

Module 4 (6-lectures) :

Hypothesis testing for sampling distributions of means, proportions, sum and differences of means and proportions for large and small samples.

Text Books

1. Hoffman and Kunze : Linear Algebra, Prentice Hall of India, New Delhi
2. Gilbert Strang : Linear Algebra And Its Applications (Paperback) , Nelson Engineering (2007)
3. M.R. Spiegel : Theory and Problems of probability and statistics :,2nd ed :, Schaum series



Reference Books

1. Seymour Lipschutz et al: Linear Algebra, 3rd ed: Schaum series.
2. V. Krishnamoorthy et al : An introduction to linear algebra , Affiliated East West Press, New Delhi
3. P. G. Bhattacharya, S. K. Jain and S.R. Nagpaul : First course in Linear Algebra, Wiley Eastern Ltd., New Delhi
4. K. B. Datta : Matrix and Linear Algebra, Prentice Hall of India, New Delhi
5. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
6. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.





III Semester

Department of Information Technology

Course Code : HUT254

Course : Technical Communication

L: 3 Hrs., T: 0 Hrs., P: 0 Hrs., Per week

Total Credits : 03

Course Outcomes

1. Students will understand the process and types of communication.
2. Students will understand the objectives of technical communication and role of audience in effective communication.
3. Students will learn basic grammar rules, develop technical writing skills and produce effective workplace documents.
4. Students will understand the process of research writing and develop skills to write documents for higher studies.
5. Students will develop skills to enhance visual appeal of documents.
6. Students will understand strategies for effective oral communication for professional needs.

Unit 1 Technical communication

Definition, Barriers of Communication, Objectives of technical communication, Producing the product, Audience recognition and involvement.

Unit 2. Technical Writing

Process of Technical Writing, Types of Technical Writing Letters: Job application, Job Description and Resume, Sales, enquiry, complaint, order, follow-up letters, Organizational announcement, Minutes of the Meetings. Reports: Trip, Progress, Incident, Investigative, Feasibility/Recommendation reports

Unit 3. Grammar and Editing

Functional Grammar: Punctuations, Mechanics, Active/ Passive, Transformation of sentences

Unit 4. Orientation in Research

Writing proposals, SOP, writing articles for journals and conferences, abstract and executive summary, thesis writing

Unit 5. Preparation of Documents

Visual appeal: Document design, graphics, tables, poster presentations User manuals, Brochures, Fliers

Unit 6. Effective Oral Communication

Non- Verbal Communication, Public speaking, Presentations, Group Discussion and Interviews

Text Books

1. Gerson and Gerson, "Technical Communication: Process and Product", 2018, Pearson
2. Meenakshi Raman and Sangeeta Sharma, "Technical Communication: Principles and Practice", 2015, Oxford University Press

Reference Books

1. S. Kumar and Pushplata, "Communication Skills", 2016, Oxford University Press
2. C. Muralikrishna and Sunita Mishra, "Communication Skills for Engineers", 2016, Pearson
3. Andrea Rutherford, "Basic Communication Skills for Technology", 2012, Pearson
4. Barun K Mitra, "Effective Technical Communication: A Guide for Scientists and Engineers", 2006, Oxford





III Semester

Department of Information Technology

Course Code : CHT251

Course : Environment Science

L :2 Hrs.,T : 0 Hrs.,P: 0 Hrs., Per week

Total Credits : 00

Course Outcomes

On successful completion of the course, the students:

1. Will get sufficient knowledge regarding different types of environmental pollutions, their causes, detrimental effects on environment and effective control measures.
2. Will realize the need to change an individual's outlook, so as to perceive our environmental issues correctly, using practical approach based on observations and self learning.
3. Will become conversant with recent waste management techniques such as E-wastes, its recycling and management.
4. Will gain knowledge about the modes for sustainable development, importance of green energy and processes.
5. Will be able to identify and analyze environmental problems as well as risks associated with these problems and greener efforts to be adopted, to protect the environment from getting polluted.

Principle of contaminant behaviour and recent trends in environmental pollution control I- Air pollution and its control techniques : (4lectures)

Contaminant behaviour in the environment, Air pollution due to SO_x, NO_x, photochemical smog, Indoor air pollution

Natural pathways for degradation: Carbon cycle, Sulphur cycle, Nitrogen cycle, Oxygen cycle.

Factors responsible for altering the composition of atmosphere (deforestation, burning of fossil fuels, industrial and vehicular emissions, CFCs).

Techniques to control Air pollution, ambient air quality and continuous air quality monitoring, Control measures at source, Kyoto Protocol, Carbon Credits.

II- Noise pollution and its control techniques: (2 lectures)

Introduction to noise pollution and its causes Noise pollution control: Recent advances in noise pollution control and benefits.

III- Soil pollution and its control techniques: (5 lectures)

Soil pollution: Soil around us, Soil water characteristics, soil pollution.

Solid waste management: Composting, vermi culture, landfills, hazardous waste treatment, bio remediation technologies, conventional techniques (land farming, constructed wetlands), and phyto remediation.



Degradation of xenobiotics in environment: Petroleum hydrocarbons, pesticides, heavy metals

IV- Water pollution and its control techniques: (8 lectures)

Major sources of water pollution: Eutrophication, acid mine drains, pesticides and fertilizers, dyeing and tanning, marine pollution, microplastics

Techniques to control water pollution: Conventional waste water treatment-types of sewage, sewerage system, alternative systems, primary, secondary and tertiary processes including aerobic and anaerobic techniques, safe disposal. Treatment schemes for waste water from dairy, textile, power plants, pharmaceutical industries, and agro based industries such as rice mills

V- E-wastes (2 lectures)

Introduction, types of e-wastes, environmental impact, e-waste recycling, e-waste management rules.

VI- Environmental Sustainability: Role of Green technology (5 lectures)

Concept of green technologies, categories, goals and significance, sustainability

Green energy, green chemistry, challenges to green technology, advantage and disadvantages of green processes, Eco mark certification- its importance and implementation

VII- Different government initiatives(2lectures)

National ambient air quality standard 2009, Swacchbharat abhiyan, National afforestation program and Act- 2016, National river conservation plan, Formation of National Green Tribunal

Books Suggested

1. Benny Joseph, Environmental Studies, Mc Graw Hill Education (India) Private Limited
2. B. K. Sharma, Environmental Chemistry, Goel Publishing House, Meerut
3. PAarne Vesilind, J. Jeffrey Peirce and Ruth F. Weiner, Environmental Pollution and Control, Butter worth - Heinemann
4. D. D. Mishra, S. S. Dara, A Textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd. Sultan Chand & Company.
5. Shree Nath Singh, Microbial Degradation of Xenobiotics, Springer-Verlag Berlin Heidelberg
6. P. T. Anastas & J. C. Warner, Green Chemistry: Theory & practice, Oxford University Press
7. P. Thangavel & Sridevi, Environmental Sustainability: Role of Green technologies, Springer publications.





IV Semester

Department of Information Technology

Course Code : ITT255

Course : Discrete Mathematics

L : 2 Hrs., T : 1Hrs., P : 0 Hrs., Per week

Total Credits : 03

Course Outcomes

Upon completion of the course, students will be able to

1. Demonstrate knowledge of Set theory and its applications in reallife.
2. Analyze discrete data structure such as sets, relations and mathematical logic.
3. Show understanding of Algebraic structures.
4. Apply the algebraic structures in solving different problems.
5. Demonstrate understanding of generating functions and solving recurrences.

Unit I

Relation and Function: Basic concepts of Set theory, Power set, some operations on Sets, Venn diagram, some basic set identities, Cartesian products. Properties of binary relation in a set, Relation matrix and the graph of the relation, Partition and covering of a set. Equivalence relations, Compatibility relations, Compositions of binary relations. Definition and composition of functions, inverse functions and characteristic function of a set.

Unit II

Mathematical Logic: Statement and notations, connectives, Negation, conjunction, disjunction, conditional & biconditional, statement formulas & truth tables. Tautologies, equivalence of formulas, Duality law, Tautological implications. Normal Forms -Principal disjunctive and principal conjunctive normal forms. Theory of inference for statement calculus. Theory of inference for predicate calculus.

Unit III

Algebraic Structures: Semigroups, monoids -(definition and examples), Group definitions and examples, Cyclic group, permutation groups, subgroups and homomorphism, cosets and Lagrange's theorem and Normal subgroup.

Unit IV

Rings and field: Ring (definition and examples), sub-rings, Ring homomorphism, ideals and Quotient rings, polynomial rings. Finite field, Galoisfield, Integral domain.



Unit V

Lattice theory and Boolean Algebra: Lattices as partially ordered set, Definitions and examples, some properties of Lattices, Lattices as algebraic system, sub lattices, direct product, homomorphism, some special Lattices. Boolean Algebra: Definitions and examples, Application of Boolean Algebra to switching circuits.

Unit VI

Advanced counting Techniques: Pigeonhole principle, Generating functions, Binomial identities using generating functions, Solutions of Recurrence relations using generating functions.

Text Books

1. Combinatorial Mathematics: C. L. Liu & D. P. Mohapatra, 4th edition, Tata McGraw Hill.
2. Discrete Mathematics and Its Applications, Kenneth Rosen, 7th Edition, Tata McGraw Hill.
3. Discrete Mathematical Structures with Applications to Computer Science: J. P. Tremblay and R. Manohar, Tata McGraw-hill.

Reference Books

1. Discrete Mathematics: Babu Ram, Pearson Publication.
2. Discrete Mathematics: Kolman, Busby & Ross, Pearson Publication





IV Semester
Department of Information Technology

Course Code : ITT256

Course : Computer Organization and Architecture

L:3Hrs. T:0Hrs., P:0Hrs. Per week

Total Credits : 03

Course Outcomes

Upon completion of the course, student will be able to

1. Describe the role, organization and interaction of different hardware units of a computer system and understand instruction set.
2. Design adder, sub tractor, multiplication and division circuits and apply it for signed and unsigned numbers represented as integers and floating point.
3. Design memory system and analyze its performance.
4. Understand different bus structures and designs of control unit.
5. Describe different techniques for handling I/O.
6. Apply design techniques to enhance performance using pipelining and analyze it.

Unit I

Basic Structure of Computer Hardware & Software: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU- registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Introduction to 8086.

Unit II

Data Representation and Arithmetic: Number representation, Addition of positive numbers, Logic design of fast adders, Addition & subtraction, Arithmetic & branching conditions, Multiplication of positive numbers, Signed operand multiplication, Fast multiplication, Integer division, Floating point numbers & operations, IEEE standard.

Unit III

Processing Unit: Some fundamental concepts, bus architecture, execution of complete instruction, hardwired control, micro programmed control, microinstruction format, microinstruction sequencing.

Unit IV

Memory System Design: Semiconductor RAM memories, Memory system considerations, Semiconductor ROM memories, Multiple-module memories and interleaving, Cache memories, mapping functions, replacement algorithms.



Unit V

I/O Interfacing: Input-output organization, I/O mapped I/O and memory mapped I/O, Direct Memory Access, interrupts and interrupts handling mechanisms, device identification, vectored interrupts, interrupt nesting, I/O interfaces, synchronous vs. asynchronous data transfer, I/O channels, USB

Unit VI

Pipelining: RISC philosophy, pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, multiple execution units, performance considerations, basic concepts in parallel processing & classification of parallel architectures.

Text Books

1. Computer Organization: Carl Hamacher, Z Vranesic, S Zaky , 5th Edition, MGH.
2. Structured Computer Organization: Tanenbaum A.S, 4th Edition, PHI.

Reference Books

1. Computer Architecture & Organization: J.P.Hayes, 3rd Edition MGH.
2. Computer Organization and Architecture: Designing for Performance, William Stallings, 8th Edition, PHI.





IV Semester
Department of Information Technology

Course Code : ITP256

Course : Computer Organization and Architecture Lab

L:0Hrs ,T:0Hrs., P:2Hrs. Per week

Total Credits : 01

Minimum 10 Practicals based on course ITT 256

Course Outcomes

Upon completion of course, students would be able to

1. Understand and write assembly language programs.
2. Design register array and RAM using simulator.
3. Designing instructions using microinstructions.
4. Design new machine from existing machine using simulator.
5. Understand the representations of Integer and Floating point numbers.





IV Semester
Department of Information Technology

Course Code : ITT257

Course : Software Engineering

L:3 Hrs.,T:0Hrs.,P:0Hrs.,Per week

Total Credits : 03

Course Outcomes

Upon completion of course, students would be able to

1. Identify different software development process models for projects.
2. Evaluate best estimation regarding cost, time and effort of the project and also identify different risk associated with project.
3. Apply different graphical tools like DFD, Flowchart for presenting their project.
4. Determine Quality Assurance parameters and respective methodologies.
5. Evaluate Software design fundamentals for software building.
6. Determine best testing methodology to test their project for required output.

Unit I : Introduction to Software Engineering, Software Myths, Software Engineering a Layered Technology, Software Process Framework, Software Process Models, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, Agile Development: Agility, XP (Extreme Programming), Other Agile process models.

Unit II: Risk management - Risk strategies, Software risks, Risk identification, Risk refinement, RMMM Software project estimation and planning, Decomposition techniques, LOC and FP estimation, Effect estimation, Identification, Projection, Assessment, Management and monitoring, Software re engineering, Requirement analysis, Tasks, Analyst, Software prototyping, Specification, Principles, Representation and the software requirements specification.

Unit III : UML diagrams for designing: Use case Diagram, Sequence diagram, Activity diagram, Data Flow Diagram, ER Diagram, Class Diagram and their usage. Case studies.

Unit IV: Quality Management - Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Review, Statistical Software Quality Assurance, Software Reliability, Change Management - Software Configuration Management, SCM Repository, SCM Process

Unit V : Software design fundamentals- process, fundamentals, Effective modular Design, Data flow oriented design, Transform analysis, Transaction analysis, Design heuristics, Object oriented- design, concepts, methods, Refining operations, Program components and interfaces, Implementation detail design, User interface design, Human factors, Human computer interface design, guidelines, standards, Case study.



Unit VI : Software quality assurance, Software quality factors, Quality metrics, Halstead's S/W science, Software testing - techniques, fundamentals, White box testing, Black box testing, Validation testing, System testing, Debugging software maintenance maintainability, Maintenance tasks.

Text Books

1. Software Engineering: Roger S. Pressman, 7th Edition, TMH.
2. Software Engineering, Principles and Practices: Rajesh Narang, MGH.

Reference Books

1. Software Engineering: Kassem A. Saleh, India Edition, Cengage Learning.
2. Software Engineering: Schach, Special Indian Edition, TMH.





IV Semester
Department of Information Technology

Course Code : ITP257

L:0 Hrs.,T:0Hrs.,P:4Hrs.,Per week

Course : Software Engineering Lab

Total Credits : 02

Minimum 8 Practicals based on the course ITT 257

Course Outcomes

Upon completion of course, students would be able to

1. Build different software development process for projects.
2. Determine different risks and can apply different estimation method for the project.
3. Associate with Rational Rose Software (IBM-RSA) to create different UML Diagrams.
4. Define different testing strategies and can recall best testing strategy to be applied.

Group activity : Mini Project Designing & Prototype





IV Semester
Department of Information Technology

Course Code : ITT258

Course : Design and Analysis of Algorithms

L:3 Hrs.,T:0Hrs.,P:0Hrs.,Per week

Total Credits : 03

Course Outcomes

Upon completion of course, students would be able to

1. Understand and appreciate the fundamental needs of algorithms and reason for their analysis
2. Analyze the time and space complexity of various algorithms
3. Know the standard algorithm design techniques
4. Apply different algorithm design techniques for problem solving and know when to apply which technique
5. Design efficient algorithms for various computing problems
6. Know the limitations on time complexity of algorithms for problem solving

Unit I

Mathematical foundations, Summation of arithmetic and geometric series, Asymptotic notations for analysis of algorithms, Recurrence relations, Amortized analysis and application. Review of Basic Tree and Graph Traversal and Search Techniques.

Unit II

Divide and Conquer: basic strategy. Case studies of Binary Search, Quick sort, Merge sort and Matrix operations. Other applications.

Greedy method basic strategy: Case studies of Job Sequencing problem, Minimum Cost Spanning Trees and Single Source Shortest path.

Unit III

Dynamic Programming: basic strategy. Concept of Multistage Graphs. Case studies of All Pairs Shortest Path Algorithm, Optimal Binary Search Trees, Traveling Salesman Problem, Longest Common Subsequence Problem and its variations. Other applications.

Unit IV

Backtracking: basic strategy. Case studies of n-Queen's problem, Graph Coloring Problem, Hamiltonian Cycles. Other applications.

Unit V

Branch and Bound: basic strategy. Implementations of some of the above problems using Branch and Bound Technique. Other applications.



Unit VI

Non-deterministic algorithms, NP-hard and NP-complete problems, Decision and Optimization problems, Graph based problems on NP Principle. Introduction to Approximation algorithms.

Text Books

1. Introduction to Algorithms: Thomas H. Cormen et.al, 2nd Edition, MIT Press.
2. Fundamentals of Computer Algorithms: Horowitz, Sahani, Rajsekharam, 2nd Edition, Computer Science Press .
3. Fundamentals of Algorithms : Brassard, Bratley, 1st Edition. Prentice Hall India.

Reference Books

1. Foundations of Algorithms: Dr. S. R. Sathe, 1st Edition Penram Publications.
2. The Design and Analysis of Algorithms: Dexter C. Kozen, Springer.





IV Semester
Department of Information Technology

Course Code : ITP258

Course : Design and Analysis of Algorithms Lab

L:0 Hrs.,T:0Hrs.,P:4Hrs.,Per week

Total Credits: 02

Minimum 10 Practicals based on the course ITT 258

Course Outcomes

Upon completion of course, students would be able to

1. Describe the functional requirements of algorithms for solving the problems
2. Understand the importance of optimal and standard ways of implementation
3. Demonstrate the knowledge of complexity, compare and analyze the algorithms
4. Demonstrate the knowledge of different programming paradigms
5. Apply different paradigms to solve well known problems





IV Semester
Department of Information Technology

Course Code : HUT255

L:3 Hrs.,T:0Hrs.,P:0Hrs.,Per week

Course : Organizational Behaviour

Total Credits : 03

Course Outcomes

Upon completion of the course, students would be able to

1. Understand fundamentals of Organizational behaviour.
2. Understand the role and significance of values and motivation at workplace.
3. Become aware of individual differences and its impact at workplace.
4. Handle stress effectively at workplace.
5. Work effectively in a professional group, as a team member or a leader.
6. Develop the capacity of conflict resolution.

Unit I: Fundamentals of Organizational Behaviour :

Nature, Scope, Definition and Goals of Organizational Behaviour; Fundamental Concepts of Organizational Behaviour; Models of Organizational Behaviour; Emerging aspects of Organizational Behaviour.

Unit II: Values and Motivation :

Nature, role and importance of perception, attitude and values at work place. Concept and Theories of Motivation: Maslow's Need Hierarchy Theory McGregor's Theory 'X' and Theory 'Y', Johari Window, Left-Right brained people

Unit III: Identifying and Measuring Individual Differences in Job:

Individual differences in personality: Big five personality factor, Self Esteem, Locus of Control and Goal Orientation. Individual Differences in Cognitive Moral Development; Abilities and Skills: Aptitude and Emotional Intelligence, Persuasive Communication, PAC concept

Unit IV: Work Stress :

Meaning and definition of stress: Symptoms of Stress: Individual Level, Group Level, Organizational Level, Stressors, Extra Organizational Stressors, Effect of stress- Burnouts, Stress Management- Individual Strategies, Organizational strategies; Employee Counseling.

Unit V: Group Behaviour and Leadership

Nature of Group, Types of Groups, Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of effective Leaders, Use of Leadership Matrix.



Unit VI: Conflict in Organization :

Nature of Conflict, Process of Conflict; Levels of Conflict- Intra personal, Interpersonal, Sources of Conflict, Effects of Conflict, Conflict Resolution, Meaning and types of Grievances and Process of Grievances Handling.

Reference Books

1. Robbins, Stephen, "Organizational Behaviour" Tata Mac Graw Hill Publishing Co. Ltd
2. Ajzen, I.&Fishbein, M.(1980).Understanding Attitudes and Predicting Social Behaviour. Englewood Cliffs, N.J.:PrenticeHall.
3. Eysenck, H. J.(1982).QuotedinPersonality,GeneticsandBehaviour,NewYork, Prager,1.
4. Schultz, D.P.&Schultz, S. E.(1990). Psychology and Industry Today: An Introduction Industrial and Organisational Psychology, 5thed., N.Y. : Macmillan.
5. Miner, J. P. (1992).IndustrialOrganisationalPsychology,N.Y.: McGrawHill.
6. McCormick, E. J.&Tiffin, J. Industrial Psychology, PrenticeHall, Latest Edition.
7. Hellriegel, D., Slocum, J.W. Jr. & Woodman, R.W. (2001). Organisational Behaviour, 9th Ed., South-Western College Publishing.
8. Newstrom. J. W, (2007) Organizational Behaviour and Human Behaviour at Work, 12th ed; Tata McGraw Hill Publishing Company Limited, New Delhi.





IV Semester
Department of Information Technology

Course Code : HUT252

L:2 Hrs.,T:0Hrs.,P:0Hrs.,Per week

Course : Indian Traditional Knowledge

Total Credits : 00 (Audit Course)

Course Outcomes

Students will have increased ability to understand the importance and application of:

1. Indian Knowledge system and its scientific approach
2. Indian philosophical tradition
3. Indian artistic tradition.
4. Traditional knowledge and protection of nature
5. The legality and its importance for the protection of Indian traditional knowledge

Syllabus

1. **Basic Structure of Indian Traditional Knowledge** : Vedas, Upavedas, Vedang, Upadang, scientific approach
2. **Ecology and Indian Traditional Knowledge** : Meaning, role, case studies
3. **Intellectual Property Rights and Indian traditional Knowledge** : Meaning, role in protection of Indian traditional knowledge, cases studies
4. **Indian Philosophical traditions** : Nyay, Sankaya, Yog, Mimansa, Jainism, Buddhism, Sikhism, and other approaches
5. **Indian Artistic Traditions** : Chitrakala, Murtikala, Vastukala, Sangeet, Sthpatya, Nrityaevam Sahitya, case studies

Reference Material

1. R R Gaur, Rajeev Sangal, G P Bagaria, Human Values and Professional Ethics (Excel Books, New Delhi, 2010)
2. V. Sivaramakrishanan (ed.), Cultural Heritage of India – Course material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
3. Swami Jitatman and, Modern Physics and Vedant, Bharatiya Vidya Bhavan
4. Swami Jitatman and, Holistic Science and Vedant, Bharatiya Vidya Bhavan
5. S.C. Chatterjee and D. M. Datta, An introduction to Indian Philosophy, University of Calcutta, 1984
6. Pramod Chandra, Indian Arts, Howard University Press, 1984
7. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987





IV Semester

Department of Information Technology

Course Code : ITT299-1

L:3 Hrs.,T:0Hrs.,P:0Hrs.,Per week

Open Elective-I: Linux Fundamentals

Total Credits : 03

Course Outcomes

Upon completion of course, students would be able to

1. Understand Linux Architecture, different Linux installation and Linux commands.
2. Effectively use Linux Environment using shell, file system, scripts, filters and program development tools
3. Perform user, group management, package management through commands
4. Perform storage management and failure recovery through commands.
5. Automate tasks and write simple programs using shell scripts.

Unit - I

History of Linux OS, Architecture of Linux OS, Linux Distributions, Installation of Linux OS

Unit - II

Introduction to terminal, Basic commands, File system, File handling commands, process and process management commands, VI editor.

Unit - III

Users and Group management- Creation, Updating, Deletion of user and group, Commands – password, Shadow, user add, user mod, user del, group add, group mod, group del.

Unit - IV

Package Management - Introduction to package manager, function of package manager, Package management commands – rpm, yum.

Unit - V

Storage management- Types of storages, creating partitions using fdisk command, Logical volume management (LVM), Creating file system, mounting file system.

Unit - VI

Shell and Shell script.

Text Book

1. Unix and Shell Programming – B. M. Harwani, OXFORD University Press.

Reference Books

1. Linux Administration : A Beginner's Guide – Wale Soyinka , McGraw Hill Publication
2. Unix Concepts and Applications – Sumitabha Das, McGraw Hill Publication





IV Semester
Department of Information Technology

Course Code : ITTM41

L:3 Hrs.,T:1Hrs.,P:0Hrs.,Per week

Course : Python for Everybody

Total Credits : 04

Course Outcomes

Upon completion of course, students will be able to

1. Understand why Python is a useful scripting language for developers.
2. Learn how to design and program Python applications.
3. Write loops and decision statements in Python.
4. Write functions and pass arguments in Python.

Unit - I

Introduction: Why Program, Hardware Overview, Python as a Language,

Unit - II

Installing and Using Python: Installing Python and Writing A Program, Writing Paragraphs of Code, Doing the "Hello World" Assignment

Unit - III

Variables and Expressions: Declaring variables, working with data types and variables, working with numeric data, working with string data, Expression

Unit - IV

Conditional Code and Decision: Conditional Statements, Defining and writing decision statements, Illustrative programs

Unit - V

Functions: Define and use functions and modules, recursive functions, Illustrative programs

Unit - VI

Loops and Iteration: Loops and iteration, defining loops, working with recursion, Illustrative programs

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

Reference Books

1. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010





V Semester

Department of Information Technology

Course Code : ITT351

Course : Operating Systems

L:03 Hrs, T: 0 Hrs, P: 0 Hrs. Per week

Total Credits : 03

Course Outcomes

Upon completion of course, Students will be able to

1. Describe the role of Operating Systems and their types.
2. Use the concept of a process, thread and scheduling algorithms.
3. Demonstrate the concept of process synchronization in real life problems.
4. Analyze the occurrence of Deadlock and handle it.
5. Differentiate and apply various memory management techniques in real life problems.
6. Recognize the concept of file system, Disk Scheduling, protection and security.

Unit I

Introduction, Services provided by OS, System programs and System Calls - brief discussions of evolution of OS Multiprogramming systems, Time sharing, Real time systems, Multiprocessor system - and distributed systems: a brief overview of issues.

Unit II

Processes and 3 levels of scheduling, process control block and context switch, goals of scheduling and different scheduling algorithms, threads: user-level and kernel level.

Unit III

Process cooperation and synchronization, mutual exclusion, the critical section problem, semaphores, classical inter-process communication problems.

Unit IV

Deadlocks and strategies for handling them: Deadlock characterization, Deadlock prevention, Deadlock avoidance, Deadlock Detection and Recovery, Combined approach to deadlock handling.

Unit V

Memory management techniques, contiguous and non-contiguous, paging and segmentation, translation look-aside buffers (TLB) and overheads, virtual memory and demand paging, page faults and instruction restart, problems of large address spaces, page tables and page replacement algorithms, miscellaneous issues.



Unit VI

File systems, disk space management and space allocation strategies, directory structures, disk arm scheduling strategies.

Protection and security: protection and security issues, cryptographic techniques

Text Books

1. Operating System Concepts: Silberchatz & Galvin, 6th Edition, Addison Wesley.
2. Operating Systems: Internals and Design Principles, William Stallings, 5th Edition, Pearson Education.

Reference Books:

1. Operating System by Concept & Design: Milan Milenkovic, 2nd Edition, MGH.
2. Operating System: Madnick & Donovan, 1st Edition, MGH.
3. Modern Operating Systems: Tanenbaum 2nd Edition, PHI.





**V Semester
Department of Information Technology**

Course Code : ITP351

L:0 Hrs, T: 0 Hrs, P: 4 Hrs. Per week

Course : Operating Systems Lab

Total Credits : 02

Course Outcomes

Upon completion of the course the students will be able to

1. Defend the appropriate algorithm for designing CPU scheduler for the given operating system.
2. Demonstrate programs consisting of cooperating processes.
3. Execute program for deadlock avoidance.
4. Execute the programs for memory management.
5. Demonstrate virus programs and their countermeasures.





V Semester
Department of Information Technology

Course Code : ITT352

Course : Formal Languages and Automata Theory

L:03 Hrs, T: 0 Hrs, P: 0 Hrs. Per week

Total Credits : 03

Course Outcomes

At the end of the course students will be able to

1. Design Finite automata for real life problems.
2. Understand concepts of grammars and formal languages.
3. Analyze the problem and apply appropriate computational model to solve it.
4. Understand the concepts of undecidable problems.
5. Understand the concepts of recursive function theory.

Unit I

Introduction: Strings, Alphabet, Language, Operations, Finite state machine, Definitions, Finite automation model (FA), Acceptance of strings and languages, Non-deterministic finite automation, Deterministic finite automation, Equivalence between NFA & DFA, Conversion of NFA into DFA, Minimization of FSM, Equivalence between two FSM's, Two Way finite automata, Myhill-Nerode Minimization theorem, Moore & Mealy machines.

Unit II

Regular Expressions: Regular sets, Regular expressions (RE), Identity rules, Manipulation of regular expressions, Equivalence between RE and FA, Pumping lemma, Closure properties of regular sets, Regular grammars (RG), Right linear and Left linear grammars, Equivalence between regular linear grammar and FA, Interconversion between RE and RG.

Unit III

Grammars: Context-free grammar, Derivation trees, Chomsky normal form, Greibach normal form, Push down Automata, Definition, Model, Acceptance of CFL, Equivalence of CFL & PDA, Interconversion, Enumeration of properties of CFL.

Unit IV

Push down automata (PDA): Non determinism, acceptance by two methods and their equivalence between PDA and CFG, closure and decision properties of CFLs.

Unit V

Turing machine: variants, recursively enumerable set; recursive sets TM as a computer function, decidability and solvability, Halting Problem, Post correspondence Problems (PCP) and unsolvability of ambiguity problem of CFGs, Church's hypothesis.



Unit VI

Computable Functions: Partial, total, constant functions, Primitive Recursive Functions, Bounded Minimization, Regular function, Recursive Functions.

Text Books

1. An Introduction to Formal Languages and Automata: Peter Linz, 3rd Edition, Narosa Pub.
2. Theory of Computer Science: K. L. P. Mishra & N. Chandrasekaran, PHI.
3. Theory of Computation: Michael Sipser, India Edition, Cengage Learning.

Reference Books

1. Introduction to Languages and the Theory of Automata: John C. Martin, 3rd Edition, MGH
2. Introduction to Automata Theory, Languages and Computation: J. E. Hopcroft, Rajeev Motwani, 2nd Edition, Pearson Education.





V Semester
Department of Information Technology

Course Code : ITT353

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs per week

Course : Computer Networks

Total Credits : 03

Course Outcomes:

At the end of the course students will be able to

1. Understand the hardware and software aspects of networking.
2. Apply the layered functionality for solving networking related issues.
3. Analyze the protocols w.r.t their performance at different layers.
4. Apply different algorithms in each layer of network architecture.
5. Design TCP/IP based networking systems for solving real world problems.

Unit I

Introduction: Network hardware, Network software, Protocol hierarchies, Design issues for layers. The ISO-OSI reference model, TCP/IP model.

Physical Layer: Issues, Transmission Impairments, Data Rate Limits, Performance. Bandwidth Utilization: Multiplexing, Transmission Media: Guided and Unguided.

Unit II

Data Link Layer - Design issues, Services, Error Detection and Correction, Data Link Control, Elementary Data Link Layer protocols.

The Medium Access Sub Layer: Multiple Access Protocols, IEEE standards: Ethernet (802.3), Wireless LAN (802.11).

Unit III

Network Layer: Design issues, Comparison of Virtual Circuit and Datagram subnets, Routing algorithms, Congestion control algorithms, Congestion control in Virtual Circuit subnets.

Unit IV

IPv4 Addressing, Datagram forwarding in IP4, Subnetting, CIDR Notation. Address Translation (ARP), Host Configuration (DHCP), Error Reporting (ICMP), Introduction to IPv6.

Unit V

Transport layer: Services, Addressing, Establishing and Releasing a connection, Flow control/buffering, Multiplexing and Crash recovery. Congestion control and Quality of Service. Introduction to UDP and TCP.



Unit VI

Application Layer: Name Service (DNS) application, Introduction to Electronic Mail System and World Wide Web.

Text Books

1. Computer Networks: Andrew Tanenbaum, 4th Edition, PHI.
2. Data Communication and Networking: Behrouz Forouzan, 4th Edition, TMH.
3. Computer Networks and Internet: Douglas Comer, 5th Edition, PHI.

Reference Books

1. Introduction to Data Communications and Networking: Wayne Tomasi, 1st Edition, Pearson Education.
2. Computer Networks: A systems approach: Larry. L. Peterson, Bruce. S. Davie, 3rd Edition, Morgan Kaufmann publishers.





V Semester
Department of Information Technology

Course Code : ITP353

L: 0 Hrs, T: 0 Hrs, P: 4 Hrs per week

Course : Computer Networks Lab

Total Credits : 02

A total of 8-10 Practical's, based on course ITP353, would be conducted using simulation tools such as Wire shark, Cisco Packet Tracer and Programming.

Course Outcomes

At the end of the course students will be able to

1. Demonstrate the functionality of various software and hardware components of networking.
2. Differentiate and demonstrate various algorithms at different layers.
3. Configure different devices like routers, host machines for setting up a network.
4. Use different networking tools like Wire shark and Network Visualizer.





V Semester

Department of Information Technology

Course Code : HUT354

Course : Managerial Economics

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs per week

Total Credits : 03

Course Outcomes

1. Students will understand and apply the basic knowledge of Economics to take managerial decisions.
2. Students will understand various concepts of demand and supply.
3. Students will apply various theoretical concepts of Utility, Indifference curve and revealed preference to take decisions related to consumer behaviour.
4. Students will be able to carry analysis of process of production and cost.
5. Students will be able to evaluate various forces impacting price and output in different markets.
6. Understanding and recalling the concepts and issues of macroeconomics will enable the students to discharge their duties effectively as managers.

Unit I: Nature and scope of Managerial Economics

Introduction: Meaning of Managerial Economics, Managerial Economics and Economic Theory, Types of business decisions, Managerial decision process, Firm as an agent of production, business and social responsibility.

Unit II: Demand and Supply

Demand: Meaning of Demand, determinants of demand, types of demand, Law of demand, Movements and shifts of demand curve, Elasticity of demand, types of elasticity of demand, Measurement of elasticity of demand, application of elasticity of demand.

Supply: Concept of supply and its use in business, Distinction between Supply and Stock, Law of supply, Movements and shifts of supply curve, Elasticity of supply, types of elasticity of supply, factors that determine elasticity of supply, Measurement of elasticity of supply.

Unit III: Theory of Consumer Behaviour

Nature of Human wants, Marginal Utility Analysis, Indifference Curve Analysis, Revealed preference theory of demand.

Unit IV: Theory of Production and cost

Meaning of Production, factors of Production, Law of variable proportions, Economies and Diseconomies of scale.

Theory of Cost: Cost Analysis and Cost Concepts.



Unit V: Price and output Determination in Different Markets

Meaning of Market, types of market, Price and output determination under different market forms.

Unit VI: Macroeconomics for management

Concepts and issues: Consumer Price Index, Wholesale Price Index, BOP, Current and Capital account, GDP, GNP, PI, Inflation, Business cycles, Monetary policy

Text Books

1. Ahuja H.L., (2017) Managerial Economics, Analysis of managerial Decision making, S. Chand and company Limited, New Delhi, 9th ed.
2. Dwivedi D.N., (2015). Managerial Economics, Vikas publishing house Pvt. Ltd, Nodia, 8th ed.

Reference Books

1. Mankiw G., (2008) Principles of Economics (Kindle Edition) South Western Cengage Learning, Nodia 6th ed.
2. Salvatore, D., (2007) Managerial Economics. London: Oxford University Press, 6th ed.





V Semester

Department of Information Technology

Course Code : ITT354-1

Elective –I : Advance Data Structures

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs. Per week

Total Credits : 03

Course Outcomes

At the end of the course students would be able to

1. Demonstrate the concepts of algorithm design and complexity theory.
2. Exhibit an understanding of application of Link List and Binary search trees.
3. Analyze all types of Binary trees and Multi-ways tree.
4. Implement hash tables, including collision avoidance and resolution schemes.
5. Apply various Text processing techniques.
6. Gain familiarity with skip lists.

Unit I

Performance of algorithms: Space and Time complexity, Asymptotic notations. Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.

Unit II

Introduction to Data Structures: Link lists: Single, doubly and Circular linked list, Stack and Queue, Binary search tree (BST): Insertion and deletion of nodes in BSTs, Querying a BST, AVL Tree

Unit III

Multi-way Search Trees: B Tree, B+ Trees. Red-Black Trees: Insertion and all Rotations, deletion and all Rotations, Complexity Analysis of all operations, Comparison between AVL tree and RB tree, Binary heap, Binomial Heaps: insertion and deletion of elements, finding maximum and minimum element. Fibonacci Heaps: insertion and deletion of elements, finding maximum and minimum element.

Unit IV

Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

Unit V

Text Processing: String Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.



Unit VI

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists

Text Books

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, Introduction to Algorithms, MIT Press.
2. A V Aho, J. D Ullman and J. E Hopcroft, Data Structures and Algorithms, Addison Wesley.
3. E. Horowitz, S. Sahni and S. Rajasekeran, Fundamentals of Computer Algorithms, University Press

Reference Books

1. E. Horowitz, S. Sahni and S. Anderson-Freed, Fundamental of data Structure in C, W.H. Freen Co.
2. Data Structures & Program Design in C: Robert Kruse, G. L. Tondo and B. Leung PHI-EEE.
3. Aaron M. Tenenbaum, Y. Langsam, Moshe J. Augenstein, Data Structures Using C.





V Semester (Elective - I)

Department of Information Technology

Course Code : ITT354-2

Elective –I: Web Technologies

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs Per week

Total Credits : 03

Course Outcomes

At the end of the course students will be able to

1. Design, develop and organize the web pages into website for different domains.
2. Apply the concepts of Socket and CGI.
3. Design and develop static and dynamic web pages using HTML.
4. Develop XML document for Internet and use it in HTML pages.
5. Create dynamic web site using PHP and MySQL language.

Unit I

Basic tools of Internet accesses: email, ftp, www. Standard use for www documents on Internet: HTTP, MIME, SGML, DTD, URL.

HTML Programming: Tags, Special Characters, Heading, Paragraph, List, Images, Tables, Forms, Hyperlinks, Cascading style sheet (CSS).

Unit II

Sockets: Connections, domains, Types and protocols (sockets), Different routines for socket programming. Creating and closing sockets, Socket communication.

CGI: Understanding CGI, CGI Environmental variables, CGI Applications. XML : XML Basics , DTD , XML processor, XML namespaces.

Unit III

Introducing PHP and MySQL: History, Features, and architecture. Learning PHP: Using variables, Statements, and Operators. Using conditional statements and loops.

Unit IV

Using Arrays and Custom functions: Using Arrays to Group Related Values. User defined function: Defining and Invoking Functions, Using arguments and return values, Defining global and local variables, Importing function definitions.

Unit V

String and regular expression: Determining length, Comparing strings Manipulating string case, Padding and striping a string. Counting characters and words.



Using Files, Sessions, cookies: Reading and Writing Files, Managing sessions and Using session variables, Storing data in Cookies.

Unit VI

Learning MySQL: Understanding RDBMS, Using MySQL command line client. Using PHP with MySQL: Managing database connection, performing queries, Processing result sets. Validating user input: Setting constraints at the database layer, Validating input at the application layer.

Text Books:

1. The Complete Reference HTML & XHTML :Thomas Powell, 3rd Edition, TMH.
2. PHP and MySQL : Vikram Vaswani, 1st Edition ,MGH
3. XML in action web technology: William J. Pardi, 1st Edition, PHI.
4. CGI Programming on the World Wide Web : Shishir Gundavaram , 1st Edition , O' oReilly Associates

Reference Books

1. PHP 5 / MySQL Programming for the Absolute Beginner: Andy Harris, 1s edition, THOMSON Publication
2. MYSQL : The Complete Reference : Vikram Vaswani, 1st Edition, TMH
3. www.php.net





V Semester (Elective - II)

Department of Information Technology

Course Code : ITT398-1

Open Elective –II: Python Programming

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs Per week

Total Credits : 03

Course Outcomes

1. To understand the basic concepts in Python programming.
2. Learn how to write , debug and execute Python program.
3. Understand and demonstrate the use of advanced data types such as tuples, dictionaries and
4. List.
5. To design solutions for real time problems using object oriented concepts in Python.
6. Use and apply the different libraries available in python

Unit I

Introduction to Python Programming, History of Python, its features, Scope of Python, Downloading and installing Python, Python code execution process, run a simple program on Python interpreter and IDLE.

Unit II

The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages; Illustrative programs.

Unit III

Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation. Illustrative programs

Unit IV

Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Illustrative programs

Unit V

Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling, inheritance, polymorphism, operator overloading (`_eq_`, `_str_`, etc); exception handling, try block. Illustrative programs

Unit VI

Installing and Exploring different python libraries used in Graphical User Interface designing (tkinter), database connectivity using Python (pymysql), Illustrative programs .

Text Books

1. Fundamentals of Python: First Programs Author: Kenneth Lambert Publisher:Course
2. Technology, Cengage Learning, 2012 ISBN-13: 978-1-111-82270-5
3. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

Reference Books:

1. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010





V Semester (Open Elective - II)
Department of Information Technology

Course Code : ITT398-2

Open Elective –II: Client Server Computing and Applications

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs, Per week

Total Credits: 03

Course Outcomes

Upon completion of course, students will be able to

1. Recognize and describe the working of Computer Networks, Client server computing.
2. Illustrate reference models with layers, protocols and interfaces.
3. Summarize functionalities of different Layers.
4. Combine and distinguish functionalities of different Layers.
5. Model the Client- Server computing using different media.
6. Apply client –server computing in real life application development.

Unit I

The business opportunity driving forces, major issues in information technology right sizing - review of host and non-distributed computing. Basis of distributed computing decomposition approaches layers vs tiers.

Unit II

Networking, Types of network, Basis of client / server computing components. Benefits, Evaluation of Client-server computing, Client / server computing approaches, applications development, cost implementation. TCP/IP Protocol suit.

Unit III

Open System Standards For Client/Server Computing:

Understanding Client / Server computing, Dispelling the Myths, Obstacles Upfront and Hidden Open system and standards, Factors for success. Socket programming and socket API.

Two Tier Computing:

Introduction client Tier, Hardware and Software requirements operating system services, Types of Client Server -Tier, Types of Server-Eight layers of Software.

Unit IV

Three-Tier Computing:

Introduction and comparison of two and three tier- Client side, server side and middleware side, Hardware and Software requirements, Transaction servers, TP lite Vs TP Heavy. CGI scripting.



Middleware:

Hardware and Software requirements, Network connectivity, Types of Middleware, Data Base middleware Standards.

Unit V

Multi Tier Computing:

Overview, Benefits, Disadvantages, Components, Tier separations and interaction

Thin Client Computing:

Introduction to computing models – Comparison, Components, environments.

Unit VI

Front End Tools:

Overview, The Client components, Essential features of a front end tools. Case Studies Account and Financial system, Sales automation and courseware system.

Text Books

1. Dawana Travis Dewire, "Client/Server Computing", Tata McGraw -Hill Publishing Company Limited, New Delhi, 2003.
2. Patrick Smith and Steve Guengesich, "Client/Server Computing", Prentice Hall of India, New Delhi, 2002.

References

1. Robert Orfali, Dan Harkey and Jeri Edwards, "Essential Client/Server Survival Guide", Galgotia Publications, New Delhi, 2001.
2. Joel P Kaster, "Understanding Thin Client/Server Computing", Prentice Hall of India, New Delhi, 2001.
3. Jein Edwards, "3 tier Client/server at Work", Wiley Computer Publishing, USA, 1999.
4. Ashhofaiol Tomy Martin, "Building N - tier Applications with COM and VB 6.0", Wiley Computer Publishing, Singapore, 1999.
5. Travis Derive D, "Second - generation Client/Server Computing" McGraw Hill, New Delhi, 1997.
6. Karen Watterson, "Client/Server Technology for "Managers " Addition -Wesley, USA, 1996.
7. Larry J Vaughn, "Client/Server System Design and implementation", Mc Graw Hill inc, USA, 1995





V Semester
Department of Information Technology

Course Code : ITTM51

Course : Object Oriented Programming in Java

L: 3 Hrs, T: 1 Hrs, P: 0 Hrs Per week

Total Credits : 04

Course Outcomes

Upon completion of course, students will be able to

1. Understand the necessity of object oriented Programming features like encapsulation, abstraction etc.
2. Implement programs based on if-else, switch and loop structure.
3. Apply the concept of class, inheritance to solve real life problems.
4. Write object oriented based solution for the given problem statement.
5. Implement data structures using object oriented programming.

Unit I

Introduction to Object Oriented Programming: Basic concepts and features of Object Oriented Programming like abstraction and encapsulation.

Unit II

Data types, Operators and Control Statements: Different Data Types in Java, Type Conversion and Casting, Operators, Conditionals and Loops in Java.

Unit III

Arrays and Classes in Java: Arrays, Types of Arrays, Class Fundamentals, Declaring Objects.

Unit IV

Methods and Constructors in Java: Introducing Methods, Default Constructor and Parameterized Constructor, Passing objects as Parameters, Returning Objects, Method Overloading and Constructor Overloading.

Unit V

Inheritance: Derived Class declaration, Types of Inheritance, Member Accessibility, Method Overriding, Concept of abstract class, Run time Polymorphism.

Unit VI

Streams: Introduction to Streams, Working with Streams, Implementation of data structures like arraylist, linked list using Object Oriented Programming Languages.



Text Books

1. The Complete Reference: Java 2: Herbert Schildt, 5th Edition, Tata McGraw-Hill
2. Arnold Ken, Gosling J, "The Java Programming Language", Addison Wesley
3. Matt Weisfeld, "The Object-Oriented Thought Process", Pearson

Reference Books

1. Cox Brad, "Object –Oriented Programming: An Evolutionary Approach", Addison –Wesley
2. Core and Advanced Java, Black Book, dreamtech press.





VI Semester
Department of Information Technology

Course Code : ITT356

Course : Information Security

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs. Per week

Total Credits : 03

Course Outcomes

Upon completion of the course, students would be able to

1. Gain familiarity with different types of attacks and defenses against them.
2. Apply knowledge of Mathematics required for cryptography.
3. Develop an understanding of conventional and modern ways of providing information security.
4. Understand and analyze various standard security protocols.
5. Get acquainted with the concept of Blockchain

Unit I

Types of Attacks and Software Vulnerabilities, Mathematics of Cryptography

Unit II

Classical Ciphers, Modern Block ciphers: DES, Triple DES, Blowfish, AES and modes of operation, Asymmetric key ciphers: RSA, Rabin, ElGamal

Unit III

Message Integrity and Authentication: Requirements of Hash functions and MAC, Algorithms: MD5, SHA-1, Whirlpool, HMAC..

Digital Signatures: Algorithms: RSA, ElGamal, Schnorr, DSS, Attacks, variations and applications.

Unit IV

Key Management: Symmetric key distribution, Symmetric key agreement, Public key distribution.

Entity Authentication: Password based, Challenge Response protocols, Zero knowledge protocols, Biometrics.

Unit V

Security at Application layer: PGP, SET

Security at Network layer: IPSec Security at

Transport layer: SSL and TLS

Unit VI

System Security: Buffer overflow and malicious software, Intrusion detection system, Fire walls. Introduction to Block chain: Concepts, Private Vs Public Block chain, Various consensus mechanisms.



Text Books

1. Cryptography & Network Security: Behrouz A. Forouzan, Debdeep Mukhopadhyay, 3rd Edition MGH.
2. Cryptography & Networks Security Principles & Practice: William Stallings, 5th Edition, Pearson Education.

Reference Books

1. Network Security and Cryptography: Bernard Menezes, 1st Edition, Cengage Learning.
2. NPTEL videos on the course Block chain Architecture Design and Use cases.





VI Semester
Department of Information Technology

Course Code : ITT357

Course : Compiler Design

L: 3 Hrs. T: 0 Hrs, P: 0 Hrs, Per week

Total Credits : 03

Course Outcomes

At the end of the course, student will

1. Understand the terminology translator, compiler and Interpreter and exhibit working of different phases of compiler.
2. Understand the concepts of different parsing techniques and their issues and apply this parsing techniques to programming language.
3. Understand the concepts syntax directed translation and semantic analysis and apply it .
4. Describe the concept of storage management, symbol table management, error handling and error recovery techniques.
5. Understand and evaluate different Code optimization techniques.
6. Understand and apply the techniques to generate target code in terms of speed and space.

Unit I

Introduction to Compilers: Compilers and Translators, Phases of compilation and overview, cross compiler, Bootstrapping, Design of Lexical analyzer, study of Lex / Flex.

Unit II

Syntax Analysis: Specification of syntax of programming languages using CFG, Top-down parser technique, design of LL (1) parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR, CLR parsers. Study of Yacc / Bison.

Unit III

Syntax directed translation: Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate code notations: postfix, syntax tree, TAC. Using SDTS for translation of expression, controls structures, declarations, procedure calls, and Array reference.

Unit IV

Storage allocation & Error Handling: Run time storage administration, stack allocation, symbol table management, Error detection and recovery in scanning and parsing phase.



Unit V

Code optimization: Analysis of code using basic blocks, Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, Loop invariant computation, Induction variable removal, Elimination of Common sub expression.

Unit VI

Code generation: Problems in code generation, Simple code generator, Register allocation and assignment, Code generation from DAG, Peephole optimization.

Text Books

1. Principal of Compiler Design : Alfred V. Aho & Jeffery D. Ullman, Narosa Pub.
2. Compilers: Principles, Techniques and Tools: A. Aho, Ravi Sethi, Jeffrey D. Ullman, Addison - Wesley Pub.

Reference Books

1. Compiler Design : O. G. Kakde, 4th Edition, University Science Press.
2. Principles of Compiler Design : V. Raghavan, MGH.





VI Semester
Department of Information Technology

Course Code : ITP357

L: 0 Hrs, T: 0 Hrs, P: 4 Hrs, Per week

Course : Compiler Design Lab

Total Credits : 02

Practical's would be conducted based on the syllabus of ITT357

Course Outcomes

On completion of course, students would be able to

1. Design Finite Automata
2. Design and Implement scanner for the programming language.
3. Design and implement parsers.
4. Use Lex tool for Scanner design
5. Use Yacc / Bison for parsers
6. Study various code optimization techniques and Implement it.





VI Semester
Department of Information Technology

Course Code : ITT358

Course : Database Management System

L: 2 Hrs, T: 1 Hrs, P: 0 Hrs, Per week

Total Credits : 03

Course Outcomes

At the end of the course students will be able to

1. Identify various data models, their advantages and disadvantages along with characteristics and architecture of DBMS.
2. To learn and practice DDL and DML queries.
3. Design good database.
4. Describe various file organizations and indexing techniques.
5. Defend optimal query processing.
6. Demonstrate knowledge of various concurrency and recovery techniques.

Unit I

Introduction to database systems: Overview, File systems Vs DBMS, Various data models, Levels of abstraction, Structures of DBMS, Relational model, Relations and Integrity constraints, Relational algebra.

Unit II

SQL-basics, SQL query, Nested queries, Aggregate operators, Embedded SQL, Dynamic SQL, Security, Views

Unit III

Database design: Overview of database design, ER model, Features of ER model, Conceptual design using ER model, Scheme refinement and normal forms, Scheme refinement, Use of decompositions, Functional dependencies, Multi-valued dependencies

Unit IV

File organization: Storage media, Buffer management, Record and page formats, File organizations, various kinds of indexes and external sorting.

Unit V

Query optimization and evaluation: Introduction to query processing, Selection operation, Projection operation, Join operation, Set operation and Aggregate operation, Relational query optimization, Translating SQL queries, estimating the cost, Relational algebra equivalence.



Unit VI

Concurrency control and recovery: Concepts of transaction, Transactions and schedules, Lock based concurrency control, Lock management, specialized locking techniques, Concurrency control without locking, Crash recovery, Introduction to crash recovery, Log recovery, Check pointing.

Text Books

1. Database Systems Concepts - Henry Korth & Others, 6th Edition, TMH.
2. Fundamental of database system - Elmasiri, Navathe & Gupta, 4th Edition, Pearson Education.

Reference Books

1. Raghu Ramakrishnan and Johannes Gehrke; "Database Management Systems"; Third Edition; Tata McGraw Hill Publication, 2003.
2. C.J. Date; "Database in Depth – Relational Theory for Practitioners"; O`Reilly Media, 2005.





**VI Semester
Department of Information Technology**

Course Code : ITP358

Course : Database Management System Lab

L: 0 Hrs, T: 0 Hrs, P: 4 Hrs Per week

Total Credits : 02

Course Outcomes

At the end of the course, students will be able to

1. Understand concept of DML and DDL commands.
2. Master the basics of SQL and construct queries using SQL.
3. Learn and practice various functions and clauses in SQL,
4. Apply the concept of index and transaction on database.
5. Understand and practice the concept of PL/SQL





VI Semester (Elective - II)
Department of Information Technology

Course Code : ITT359-01

Elective-II: IT Infrastructure Services

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs, Per week

Total Credits : 03

Course Outcomes

At the end of the course, students will be able to

1. Identify, compare and install Linux distributions as per requirement.
2. Configure GRUB loader services, manage, schedule the system and user processes.
3. Manage the users and groups on system.
4. Apply the concept of Package management,
5. Apply the concept of LVM for dynamic storage management and do failure recovery.
6. Configure important services like FTP, DNS, MAIL and WEB.
7. Perform Backup and recovery in Linux using backup and recovery tools.

Unit I

Introducing Linux: History, Linux distribution, Linux basics: Linux Vs Microsoft Windows, Linux Basic commands, Linux file system, File handling commands, file permission, Users and groups:

Working with Users and Groups.

Unit II

Startup and services: Services and Processes, GRUB boot loader, Managing services, Networking and Firewalls: Introduction to Network and Networking, General Network troubleshooting.

Unit III

Package Management: Introduction to Package management, Package Management commands, Storage management: Storage basics, Logical volume management, Recovering from failure.

Unit IV

Infrastructure services: NTP, DNS, Mail services: Configuring email, Configuring IMAP and POP3 Virtual domain and Users.

Unit V

Web services: Apache web Server, File and print sharing: File sharing with Samba and NFS, Managing documents, Print servers.

Unit VI

Backup and Recovery: Disaster recovery planning, Backup process, Network backups, Using Rsync, Using Bacula.

Text Books

1. Linux Administration: A Beginner's Guide, Seventh Edition, by Wale Soyinka, McGraw Hill Publications
2. Pro Linux System Administration: James Turnbull, Peter Lieverdink and Dennis Matotek, Ap Publication

Reference Books

1. Linux - The Complete Reference, TMH Publication





VI Semester (Elective - II)
Department of Information Technology

Course Code : ITT359-02

Elective-II: Mobile Application Development

L: 3 Hrs, T: 0 Hrs, P: 0 Hrs, Per week

Total Credits : 03

Course Outcomes

At the end of the course students will be able to

1. Analyze the different aspects of Mobile apps development.
2. Design and develop mobile apps using android as development platform with key focus on user experience design, native data handling and background tasks and notifications.
3. Apply the concepts of native hardware, location awareness, graphics and multimedia in building real world applications.
4. Apply techniques of software testing and review
5. Perform testing signing, packaging and distribution of mobile apps.

Unit I

Getting started with Mobility: Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development.

Unit II

Building blocks of mobiles apps: App user interface designing –mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity-state and life cycle, interaction amongst activities. App functionality beyond user interface – Threads, Async task, Services – States and life cycle, Notification, Broadcast receivers, Telephony and SMS APIs.

Unit III

Native data handling: On device file I/O, shared preferences, Mobile databases such as SQLite, and enterprise data access (via Internet/Internet)

Unit IV

Sprucing up mobile apps: Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback and record, location awareness and native hardware access (sensors such as accelerometer and gyroscope)

Unit V

Testing of Mobile App: Different levels of testing, different types of testing, Static Testing types, Dynamic Testing types, Debugging mobile apps , Test automation of mobile apps, JUnit for Android.



Unit VI

Publishing Mobile Apps: Robotium, Monkey Talk ,Taking apps to market, Versioning, signing and packaging mobile apps, distributing apps on mobile market place, Localization, Prework for publishing app

Text Books

1. Mobile Apps Development : Anubhav Pradhan , Anil V. Deshpande, 1st Edition, Wiley India
2. Android Application Development all in one for Dummies - Barry Burd, 1st Edition, John Wiley & Sons.
3. Foundations of Software Testing: Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black, 2nd Revised Edition, Cengage Learning

Reference Books

1. Teach Yourself Android Application Development 24 Hours- Lauren Darcy, 1st Edition, Pearson.





VI Semester (Open Elective - III)
Department of Information Technology

Course Code : ITT399-1 (Self Study)
L: 3 Hrs, T: 0 Hrs, P: 0 Hrs, Per week

Open Elective-III: Cyber Security and Laws
Total Credits : 03

Course Outcomes

Upon completion of the course, students would be able to

1. Differentiate between various security threats and computer attacks.
2. Assess the current cyber security landscape.
3. Appraise the interrelationships among elements that comprise a modern security system.
4. Critique the current legal and regulatory environment as it applies to cyber security.

Unit I

Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats, Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, Need for a Comprehensive Cyber Security Policy, A global perspective on cybercrimes.

Unit II

Cyber stalking, Phishing, virus and worms, keyloggers and spywares, Trojan horses and backdoors, Steganography, DoS attacks, SQL injection, Buffer Overflow, Attacks on wireless networks, attacks on mobile/cell phones, security challenges posed by mobile devices.

Unit III

Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Security Protocols: PGP, IPSec and SSL

Unit IV

Cyber security: Organizational Implications- Web Threats for Organizations: The Evils and Perils, security and Privacy Implications from Cloud Computing, Social Media Marketing: Security Risks and Perils for Organizations, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Best Practices for Organizations

Unit V

Cyber security: The Legal Perspective – Legal landscape around the world, The Indian context of Cyber laws, The Indian IT act and amendments, cybercrimes and punishments.

Computer Forensics: Digital forensics science, Cyber forensics and digital evidence, digital forensics life cycle, forensics of email, network forensics, challenges in computer forensics.



Unit VI

Cybercrime and Cyber terrorism: Social, Political, Ethical and Psychological Dimensions, Intellectual Property in the Cyberspace, The Ethical Dimension of Cybercrimes, The Psychology, Mindset and Skills of Hackers and Other Cybercriminals, Sociology of Cybercriminals, Information Warfare: Perception or An Eminent Reality?

Cybercrime: Real-Life Examples, Mini-Cases, Illustrations of Financial Frauds in Cyber Domain, Digital Signature-Related Crime Scenarios, Digital Forensics Case Illustrations

Text and Reference books

1. Cyber security: Nina Godbole, Sunit Belapure, Wiley
2. Information Security and Cyber Laws: Sanjeev Kumar Sharma, Ankur Shree Aggarwal, Anuradha Tyagi
3. Fundamental of Cyber Security: Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed.





**VI Semester
Department of Information Technology**

Course Code : ITP361

L: 0 Hrs, T: 0 Hrs, P: 4 Hrs, Per week

Course : Project - I

Total Credits : 02

Course Outcomes

Upon completion of the course, students would be able to

1. Demonstrate skills to work in a team.
2. Identify the area of project work and perform requirement analysis.
3. Select appropriate hardware and software tools for implementation.
4. Defend the project work through seminars and viva voce.
5. Develop project report.





VI Semester
Department of Information Technology

Course Code : ITTM61

L: 3 Hr, T: 1 Hr, P: 0 Hr, Per week

Course : Web Design for Everybody

Total Credits: 04

Course Outcomes

1. At the end of the course students will be able to
2. Understand the basic Internetworking concept and technologies
3. Create web pages using HTML.
4. Plan, design and publish websites.
5. Write PHP scripts to handle HTML forms
6. Create PHP programs that use various PHP library functions, and that can work with files.

Unit I

Introduction, Network hardware, LAN, MAN, WAN, Network topologies: Bus, Star and Ring. Basic tools of Internet accesses: Email, FTP, WWW etc, Internet Protocol- HTTP, FTP, SNMP, Email protocols –SMTP, POP3, IMAP, MIME

HTML Programming: Tags, Special Characters, Heading, Paragraph, creation of List.

Unit II

Tables in HTML: Creation of tables, Including Images in Web Pages: Image Tag, Image mapping, Frames in HTML, creation of Forms, Introduction to Cascading style sheet (CSS).

Unit III

Introducing PHP and MySQL: History, Features, and architecture. Learning PHP: Using variables, Statements, and Operators. Using conditional statements.

Unit IV

Understanding and using different loops- for, while, do while. Understanding and using Arrays: Using Arrays to Group Related Values.

Unit V

User defined function: Defining and Invoking Functions, Using arguments and return values, Defining global and local variables, Importing function definitions.

String and regular expression: Determining length, Comparing strings Manipulating string case, Padding and stripping a string. Counting characters and words.



Unit VI

Using Files, Sessions, cookies: Reading and Writing Files, Managing sessions and Using session variables, Storing data in Cookies.

Text Books

1. The Complete Reference HTML & XHTML : Thomas Powell, 3rd Edition, TMH.
2. PHP and MySQL : Vikram Vaswani, 1st Edition ,MGH

Reference Books

1. PHP 5 / MySQL Programming for the Absolute Beginner: Andy Harris, 1st Edition Thomson Publication
2. Web Design: A Beginners Guide: Wendy Willard, 2nd Edition, MGH.
3. www.php.net



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