w.e.f. 2014-15

VR14

INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTIONS

B. Tech.

Department of Information Technology

(B. Tech. IT Programme Accredited by NBA)

VELAGAPUDI RAMAKRISHNA SIDDHARTHA ENGINEERING COLLEGE

(An Autonomous, ISO 9001:2008 Certified Institution)

(Approved by AICTE, Accredited by NAAC with 'A' Grade, Affiliated to JNTUK, Kakinada)

(Sponsored by Siddhartha Academy of General & Technical Education)

Kanuru, Vijayawada

Andhra Pradesh - 520007, INDIA.

INSTITUTE VISION

To nurture excellence in various fields of engineering by imparting timeless core values to the learners and to mould the institution into a Centre of academic excellence and advanced research.

INSTITUTE MISSION

To impart high quality technical education in order to mould the learners into globally competitive technocrats who are professionally deft, intellectually adept and socially responsible. The institution strives to make the learners inculcate and imbibe pragmatic perception and proactive nature so as to enable them to acquire a vision for exploration and an insight for advanced enquiry.

DEPARTMENT VISION

To provide excellent information technology and computer science education by building strong teaching and research environment.

DEPARTMENT MISSION

To offer high quality graduate and post graduate programs in information technology and computer science education and to prepare students for professional career or higher studies. The department promotes excellence in teaching, research, collaborative activities and positive contributions to society.

PROGRAM EDUCATIONAL OBJECTIVES (B.TECH IN IT)

PEO 1: Excel in Professional Career and / or higher education by acquiring knowledge in mathematical, computing and engineering principles.

PEO 2: Analyse real life problems, design computing systems appropriate to its solutions that are technically sound, economically feasible and socially acceptable.

PEO 3: Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adopt to current trends by engaging in life learning.

PROGRAM OUTCOMES

PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 - 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.

PO3 - 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.

PO4 - 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.

PO5 - Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 - 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.

PO7 - 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.

PO8 - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 - Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 - 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.

PO11 - 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 multidisciplinary environments.

PO12 - Lifelong 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.

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I/IV B.Tech. Scheme of Instruction and Examination – VR14

Group-B (CSE, ECE and IT)
Semester I

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA1101	Linear Algebra and Differential Equations	4	1		4	30	70	100
2	14PH1102	Engineering Physics	3	1		3	30	70	100
3	14CS1103	Introduction to Computing	2			2	30	70	100
4	14HS1104	Technical English and Communication Skills	2		2	2	30	70	100
5	14EE1105	Basics of Electrical Engineering	2			2	30	70	100
6	14ME1106	Basics of Mechanical Engineering	2			2	30	70	100
7	14ME1107	Engineering Graphics	2		6	5	30	70	100
8	14PH1151	Engineering Physics Lab			3	2	30	70	100
9	14CS1152	Basic Computing Lab			3	2	30	70	100
			17	**2**	**14**	**24**	**270**	**630**	**900**

Semester II

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA1201	Calculus	4	1		4	30	70	100
2	14CH1202	Engineering Chemistry	3	1		3	30	70	100
3	14CS1203	Programming in C	3	1		3	30	70	100
4	14CE1204	Basics of Civil Engineering	2			2	30	70	100
5	14HS1205	Professional Ethics	2			2	30	70	100
6	14EC1206	Basics of Electronics Engineering	2			2	30	70	100
7	14ME1207	Mechanics for Engineers	4	1		4	30	70	100
8	14CH1251	Engineering Chemistry Lab			3	2	30	70	100
9	14CS1252	C Programming Lab			3	2	30	70	100
10	14ME1253	Workshop Practice			3	2	30	70	100
			20	**4**	**9**	**26**	**300**	**700**	**1000**

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks

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II/IV B.Tech. Scheme of Instruction and Examination – VR14

Semester III

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA1301	Complex Analysis and Numerical Methods	4	1		4	30	70	100
2	14IT3302	Discrete Mathematical Structures	3	1		3	30	70	100
3	14IT3303	Data Structures	4			4	30	70	100
4	14IT3304	Operating Systems	4	1		4	30	70	100
5	14IT3305	Computer Organization	3	1		3	30	70	100
6	14IT3351	Data Structures Lab			3	2	30	70	100
7	14IT3352	Operating Systems Lab			3	2	30	70	100
8	14HS1353	Communication Skills Lab			2	2	30	70	100
9	14IT3354	Internet Programming Lab			3	2	30	70	100
			18	**4**	**11**	**26**	**270**	**630**	**900**

Semester IV

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14MA1401	Probability & Statistics	4	1		4	30	70	100
2	14IT3402	Database Management Systems	4			4	30	70	100
3	14IT3403	Design and Analysis of Algorithms	4	1		4	30	70	100
4	14HS1404	Environmental Studies	3			3	30	70	100
5	14IT3405	OOPS using JAVA	4	1		4	30	70	100
6	14IT3451	Database Management Systems Lab			3	2	30	70	100
7	14IT3452	Java Programming Lab			3	2	30	70	100
8	14IT3453	Web Programming Lab			3	2	30	70	100
			19	**3**	**9**	**25**	**240**	**560**	**800**

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks

*Environmental Studies should be preferably offered in this semester, if it is not possible due to the requirements of the program the same may be offered only during the even semesters in the following years.

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III/IV B.Tech. Scheme of Instruction and Examination – VR14

Semester V

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14IT3501	Software Engineering	3	2		4	30	70	100
2	14IT3502	Data Warehousing & Mining	4			4	30	70	100
3	14IT3503	Web Programming and Development	3	1		3	30	70	100
4	14IT3504	Computer Networks	4			4	30	70	100
5	14IT2505	Institutional Elective	4			4	30	70	100
	14IT2505A	Data Structures							
	14IT2505B	Web Programming							
	14IT2505C	Java Programming							
	14IT2505D	Data Base Management Systems							
6	14IT5506	Independent Learning (MOOCS)				2	30	70	100
	14IT5506A	Python Programming							
	14IT5506B	Cyber Laws & IPR							
	14IT5506C	Entrepreneurship Development							
	14IT5506D	Agile Planning for Software Products							
	14IT5506E	Any other MOOCS Course							
7	14IT3551	Data Warehousing & Mining Lab			3	2	30	70	100
8	14IT3552	Web Programming and Development Lab			3	2	30	70	100
9	14IT3553	Computer Networks Lab			3	2	30	70	100
			18	**3**	**9**	**27**	**270**	**630**	**900**

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III/IV B.Tech. Scheme of Instruction and Examination – VR14

Semester VI

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14IT3601	Artificial Intelligence	3	1		3	30	70	100
2	14IT3602	Big Data	4	1		4	30	70	100
3	14IT3603	Internet of Things (IOT)	4	1		4	30	70	100
4	14IT3604	Network Security	3	1		3	30	70	100
5	14IT4605	Program Elective – I	3			3	30	70	100
	14IT4605A	A: Distributed Systems							
	14IT4605B	B: Dot Net Programming							
	14IT4605C	C : Ethical Hacking							
	14IT4605D	D: R Programming for Data Science							
	14IT4605E	E: Computer Vision							
	14IT4605F	F : Aptitude Related Analytical Skills							
	14IT4605G	Industry Need Based							
6	14IT3651	Big Data Lab			3	2	30	70	100
7	14IT3652	IOT Lab			3	2	30	70	100
8	14IT3653	Mobile Application Development Lab			3	2	30	70	100
9	14IT5654	Term Paper		2		2	30	70	100
			17	**6**	**9**	**25**	**270**	**630**	**900**

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Semester VII

S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14IT3701	Cloud Computing	3	1		3	30	70	100
2	14IT3702	Machine Learning	4	1		4	30	70	100
3	14IT3703	Cyber Security	4	1		4	30	70	100
4	14HS1704	Engineering Economics and Finance (Institutional Core)	3			3	30	70	100
5	14IT4705	Program Elective - II	3			3	30	70	100
	14IT4705A	A: Business Intelligence							
	14IT4705B	B: Design Patterns							
	14IT4705C	C: Mobile Computing							
	14IT4705D	D: Software Project Planning and Management							
	14IT4705E	E: Theory of Automata and Formal Languages							
	14IT4705F	F: Simulation and Modelling							
	14IT4705G	G: Industry need based							
6	14IT3751	Cloud Computing Lab			3	2	30	70	100
7	14IT3752	Cyber Security Lab			3	2	30	70	100
8	14IT6753\ 14IT6754	Internship \ Industry offered Course				2		100	100
9	14IT5754	Mini Project			3	2	30	70	100
			17	**3**	**9**	**25**	**240**	**660**	**900**

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks
* Two credits may be added either in 6^{th} or 7^{th} semester.

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Semester VIII

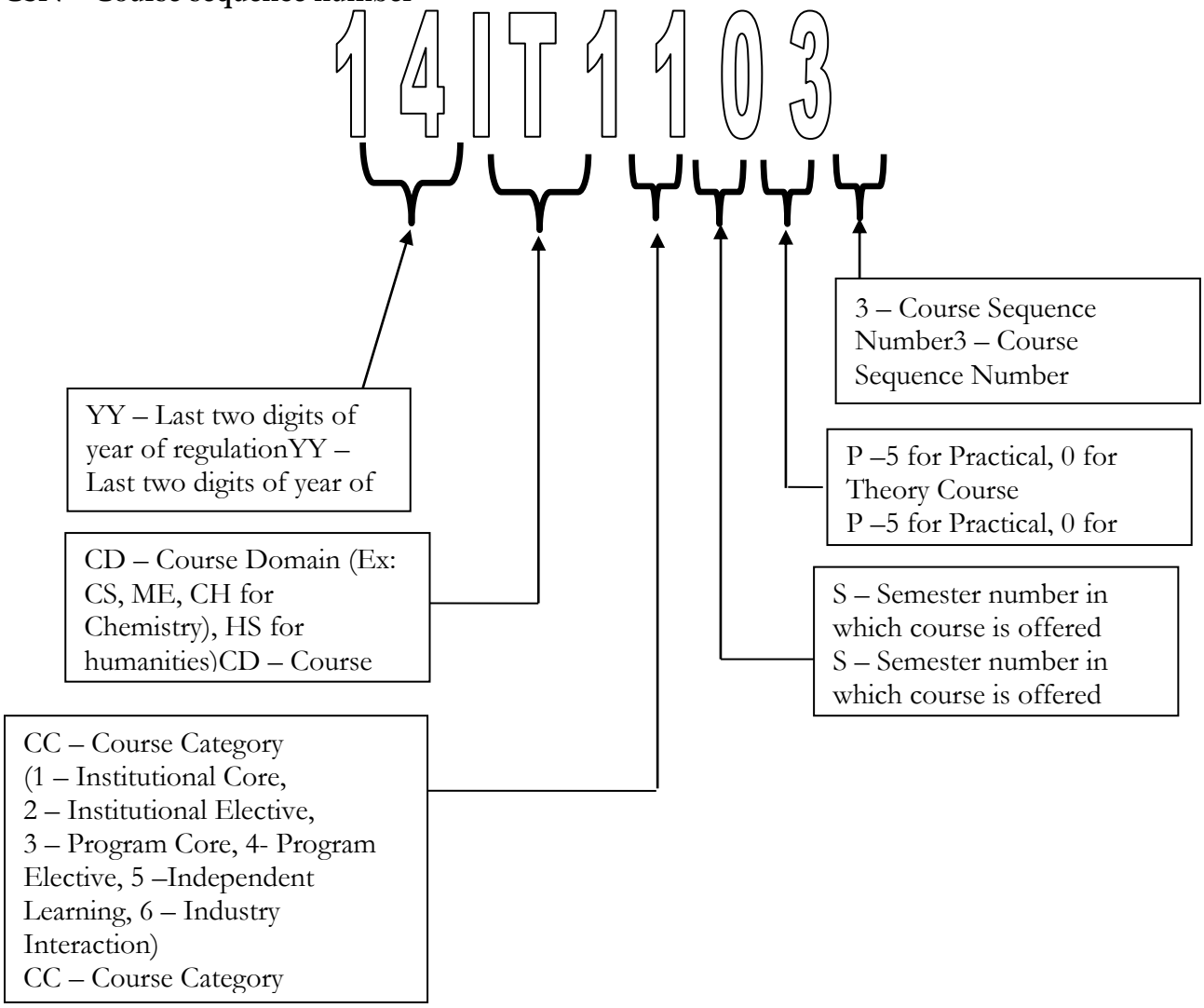
S.No	Sub. Code	Subject Title	L	T	P	C	CE	SE	T
1	14IT3801	Software Testing Methodologies	4			4	30	70	100
2	14IT4802	Program Elective - III	3			3	30	70	100
	14IT4802A	A: Information Retrieval Systems							
	14IT4802B	B: High Performance Computing							
	14IT4802C	C: Wireless Networks							
	14IT4802D	D: Software Reliability							
	14IT4802E	E: Soft Computing							
	14IT4802F	F: Research Process and Methodology							
	14IT4802G	G: Industry need based							
3	14IT4803	Program Elective - IV	3			3	30	70	100
	14IT4803A	A: Natural Language Processing							
	14IT4803B	B: Privacy Preserving							
	14IT4803C	C: E-Market Place							
	14IT4803D	D: Software Metrics and Quality Management							
	14IT4803E	E: Semantic Web and Social Networks							
	14IT4803F	F: Pattern Recognition							
	14IT4803G	G: Network Management Systems							
4	14IT3851	Software Testing Tools Lab			3	2	30	70	100
5	14IT5852	Major Project		3	9	10	30	70	100
			10	**3**	**12**	**22**	**150**	**350**	**500**

L – Lecture, T – Tutorial, P – Practical, C – Credits, CE - Continuous Evaluation, SE - Semester-end Evaluation, T – Total Marks

Course Numbering Scheme:

Y Last but one digit of Year	Y Last digit of Year	CD 1st letter	CD 2nd letter	CC	S	P	CSN

YY – Last two digits of year of regulation (Ex: 14)
CD – Course Domain (Ex: CS for CSE, CH for Chemistry), HS for Humanities)
CC – Course Category (1 – Institutional Core, 2 – Institutional Elective, 3 – Program Core, 4 - Program Elective, 5 – Independent Learning, 6 – Industry Interaction)
S – Semester number in which course is offered
P – 5 for Practical, 0 for Theory Course
CSN – Course sequence number



14MA1101 –LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	Fundamentals of Matrices, Integration and Differentiation	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Understand the concept of eigen values and eigen vectors and able to reduce a quadratic form to canonical form.
CO2	Able to solve the linear differential equations by using appropriate methods.
CO3	Able to form Partial Differential equations and solve Partial Differential equations.
CO4	Understand the concepts of Laplace Transforms and able to apply to solve Differential Equations, Integral Equations by Transform method.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1		1	3							
CO2	3	3		1	3							
CO3	3	3		1	3							
CO4	3	3		1	3							

Course Content

UNIT I:

Linear Algebra: Rank of a Matrix, Elementary transformations, Inverse of a matrix (Gauss Jordan Method) Consistency of Linear System of Equations, Linear Transformations, Vectors, Eigen Values, Properties of Eigen Values, Cayley– Hamilton Theorem (Without Proof),Reduction to Diagonal Form, Reduction of quadratic form to canonical form , Nature of a Quadratic Form, Complex Matrices.

UNIT II:

Differential Equations of First Order: Formation of a Differential Equation, Solution of a Differential Equation, Linear Equations, Bernoulli's Equation, Exact Differential Equations, Equations Reducible to Exact Equations, Orthogonal Trajectories, Newton's Law of Cooling, Rate of Decay of Radio-Active Materials.

Linear Differential Equations of Higher Order: Definitions, Operator D, Rules for Finding the Complimentary Function, Inverse Operator, Rules for finding Particular Integral, Working Procedure to Solve the Equation.

UNIT III:

Linear Dependence of Solutions, Method of Variation of Parameters, Equations reducible to Linear Equations With Constant Coefficients: Cauchy's Homogeneous Linear Equation, Legendre's Linear equation, Simultaneous linear differential equations with constant coefficients.

Partial Differentiation: Total Derivative, Change of Variables, Jacobians.

Partial Differential Equations: Introduction, Formation of Partial Differential Equations, Solutions of a Partial Differential Equations, Equations Solvable by Direct Integration, Linear Equations of First Order.

UNIT IV:

Laplace Transforms: Introduction, Definition, Conditions for Existence, Transforms

	of Elementary Functions, Properties of Laplace Transforms, Transforms of Periodic Functions, Transforms of Derivatives, Transforms of Integrals, Multiplication by tn, Division by 't', Evaluation of Integrals by Laplace Transforms, Inverse Transforms, Method of Partial Fractions, Other Methods of Finding Inverse, Convolution Theorem, Application to Differential Equations, Unit Step and Unit Impulse Functions.
Text books and Reference books	**Text Book:** [1]. B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, 2012. **Reference Books:** [1]. Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons. [2]. Peter V.O.Neil, "Advanced Engineering Mathematics", Thomson, Canada. [3]. R.K.Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishers. [4]. N.P.Bali, Manish Goyal, "A Text Book of Engineering Mathematics", LaxmiPublications(P) Limited. [5]. B.V.Ramana, "A text book of mathematics", Tata MC Graw Hill.
E-resources and other digital material	[1]. mathworld.wolfram.com [2]. http://www.nptel.iitm.ac.in

14PH1102–ENGINEERING PHYSICS

Course Category:	Institutional Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	-	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the differences between classical and quantum mechanics and learn about statistical mechanics
	CO2	Understand various properties and applications of magnetic & dielectric materials and the theory of super conductivity
	CO3	Analyse and understand semiconductor technology and various types of lasers & optical fibers
	CO4	Understand the fabrication of nanomaterials, carbon nanotubes and their applications in various fields

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3			1								1
CO2	3		1									3
CO3	3											3
CO4	3		1				1					3

Course Content

UNIT I:

Quantum Mechanics: Dual nature of light, Matter waves and Debroglie's hypothesis, G.P.Thomson experiment, Heisenberg's uncertainty principle and its applications (Non existence of electron in nucleus, Finite width of spectral lines), Classical and quantum aspects of particle, One dimensional time independent Schr¨odinger's wave equation, physical significance of wave function, Particle in a box (One dimension).

Statistical Mechanics: Phase space, Differences between Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (qualitative), Fermi-Dirac probability function, Fermi energy level.

UNIT II:

Magnetic properties: Magnetic permeability, Magnetization, Origin of magnetic moment, Classification of magnetic materials -dia, para, ferro magnetic materials, Hysteresis curve.

Dielectric properties: Fundamental definitions: Dielectric constant, Electric polarization, Polarizability, Polarization vector, Electric displacement, Electric susceptibility, **Types of Polarization:** Electronic, Ionic, Orientation, Space charge polarization, Internal fields in solids (Lorentz method), Clausius-Mossotti equations, Frequency dependence of polarization, Ferroelectrics and their applications.

Superconductivity: Introduction, Critical parameters, Flux quantization, Meissner effect, Types of Superconductors, BCS theory, Cooper pairs, London's equation penetration depth, high temperature super conductors, Applications of superconductors.

UNIT III:

	Semiconductor Physics : Classification of materials based on energy diagram, Fermi level in Intrinsic and extrinsic semiconductors ,Carrier drift and Carrier diffusion, Generation and recombination process (qualitative), Hall Effect. **Lasers :** Spontaneous emission, Stimulated emission, Population inversion, Solid state (Ruby) laser, Gas (He-Ne) laser, Semiconductor (Ga-As) laser, Applications of lasers. **Fiber optics :** Propagation of light through optical fiber, Types of optical fibers, Numerical aperture, Fiber optics in communication and its advantages.
	UNIT IV: **Nanotechnology:** Basic concepts of Nanotechnology, Nano scale, Introduction to nano materials, Surface to volume ratio, General properties of Nano materials,Fabrication of nano materials: Plasma Arcing, Sol-gel, Chemical vapour deposition, **Characterization of nano materials:** AFM, SEM, TEM, STM, MRFM, Carbon nano tubes: SWNT, MWNT, Formation of carbon nanotubes: Arc discharge, Laser ablation, Properties of carbon nano tubes, Applications of CNT's & Nanotechnology.
Text books and Reference books	**Text Books:** [1]. M.N. Avadhanulu & P.G. Kshirsagar, "A text of Engineering Physics", S.Chand publications. [2]. P.K. Palanisamy, "Applied Physics", Scitech Publishers. **Reference Books:** [1]. R.K.Gaur and S.L.Gupta, "Engineering Physics", Dhanpatrai publishers. [2]. S.O. Pillai, "Solid State Physics", New age international publishers. [3]. M.R. Srinivasan, "Engineering Physics", New age international publishers. [4]. M.Armugam, "Engineering Physics", Anuradha publishers.
E-resources and other digital material	[1]. http://www.light and matter.com/bk4.pdf [2]. http://www.ifw-resden.de/institutes/itf/members/helmut/sc1.pdf [3]. http://www.microscopy.ethz.ch/history.htm [4]. http://nptel.ac.in/courses.php?disciplineId=115 [5]. http://aph.huji.ac.il/courses/2008 9/83887/index.html [6]. http://freevideolectures.com/Course/3048/Physics-of-Materials/36

14CS1103- INTRODUCTION TO COMPUTING

Course Category:	Programme Core	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	2-0-0
Prerequisites:	---	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the changes in hardware and software components.
	CO2	Analysis input and output devices, different types of memories.
	CO3	Classify different functions of operating system and the types of operating systems
	CO4	Understand types of networks and most common ways of transmitting data via networks and internet.
	CO5	Know the basics of computerized data bases and data base management system
	CO6	Identify the ways in which a program can work towards a solution by using some processes and tools.
	CO7	Develop algorithms and prepare flow charts to simple mathematics and logical problems

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1										
CO2	1	1										
CO3	3	3	1	3								
CO4	3	3	3									
CO5	3	3										
CO6	3	3										
CO7	3				3							

Course Content

UNIT I: Exploring Computers and their uses: Overview: Computers in our world, The computer defined, Computers for individual users, Computers for organizations, Computers in society, Why are computers so important.

Looking inside the computer system Overview: Detecting the ultimate ma-chine, The parts of a computer system, The information processing cycle, Essential computer hardware: processing devices, memory devices, Storage devices, System software, Application software, Computer data, and Computer users.

Input and Output devices: Overview: Input devices and output devices, various types of input/output devices.

UNIT II:

Transforming data into information: Overview: The difference between data and information, How computers represent data, How computers process data, Machine cycles, Memory, Factors effecting processing speed, The computer's internal clock, The Bus, Cache memory.

Types of storage devices: Overview: An ever-growing need, Categorizing storage devices, Magnetic storage devices-How data is stored on a disk, How data is organized on a magnetic disk, How the operating system finds data on a disk, Diskettes, hard disks, Removable high-capacity magnetic disks, Tape drives, Op-tical storage devices, Solid-state storage devices, Smart cards, Solid-state disks. **Operating systems basics**: Overview, The purpose of operating systems, Types of operating systems, Providing a user interface.

	Networking Basics: Overview, Sharing data anywhere, anytime, The uses of a network, Common types of networks, Hybrid networks, How networks are structured, Network topologies and protocols, Network media, Network hardware
	UNIT III: **Data Communications:** Overview, The local and global reach of networks, Data communications with standard telephone lines and modems, Modems, uses for a modem, Using digital data connections, Broad band connections, Wireless net-works. **Productivity Software:** Overview: Software to accomplish the work of life, Acquiring software, Commercial software, Freeware and public domain software, Open-source software, Word processing programs, Spreadsheet programs, Presentation programs, Presenting information managers. **Database management Systems**: Overview, The mother of all computer applications, Databases and Database Management Systems, Flat-File and Relational Database Structure, DBMS, Working with a database.
	UNIT IV: **Programming languages and the programming process:** Overview, The keys to successful programming, The evolution of programming languages, World wide web development languages, The Systems development life cycle for programming. **Creating Computer programs: Overview**: What is a computer program, Hard-ware/Software interaction, Code, machine code, programming languages, Compilers and interpreters, planning a computer program, How programs solve problems, Purpose of flowcharts and algorithms, flow chart symbols, drawing flow charts, developing algorithms.
Text books and Reference books	**Text Books:** [1]. Peter Norton, "Introduction to Computers", sixth Edition, Tata McGraw Hill, 2006 [2]. Reema Thareja, "Computer Fundamentals and C Programming", 2012
E-resources and other digital material	[1]. Lecture Series on Computer Organization by Prof. S. Raman, Department of Computer Science and Engineering, IIT Madras, https://www.youtube.com/watch?v=leWKvuZVUE8 [2]. Lecture Series on Data Communication by Prof. A. Pal, Department of Computer Science Engineering, IIT Kharagpur. https://www.youtube.com/watch?v=sG6WGvzmVaw

14HS1104 - TECHNICAL ENGLISH AND COMMUNICATION SKILLS

Course Category:	Programme Core	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	2-0-2
Prerequisites:	Basic understanding of the language skills ,viz Listening, Speaking, Reading and Writing, including Sentence construction abilities	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Be proficient in administrative and professional compilation skills including web related communication
	CO2	Attain practice in Interpersonal Communication, in addition to standard patterns of Pronunciation
	CO3	Be aware of the elements of functional English for authentic use of language in any given academic and/or professional environment
	CO4	Enhance Reading skills, along with a wide range of Vocabulary
	CO5	Acquire competence in Technical communication sills

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1			1		1	1	3	1	1	3	1	1
CO2			1		1	3	3	3	3	3	1	1
CO3	1				1	3	3	3	3	3	3	3
CO4		3	3	3	1	3	3	3	3	3	3	3
CO5	1	1	3	3		3	3	3	3	3	3	3

Course Content

UNIT I:

Professional Writing Skills

Professional Letter- Business, Complaint, Explanation and Transmittal

Essay Writing- - Descriptive, Reflective and Analytical-

Administrative drafting and correspondence –Memos, Minutes and Web notes

UNIT II:

Interpersonal Communication Skills

Communicative Facet- Speech acts- Extending Invitation, Reciprocation, Acceptance, Concurrence, Disagreeing without being disagreeable Articulation-oriented Facet-Phonetic Transcription using IPA symbols with Vowel and Consonant charts

UNIT III:

Vocabulary and Functional English

1. A basic List of 500 words – Over view
2. Verbal analogies, Confusibles, Idiomatic expressions and Phrasal Collocations
3.Exposure through Reading Comprehension- Skimming, Scanning, Understanding the textual patterns for tackling different kinds of questions and Taming Regression
4.Functional Grammar with special reference to Concord, Prepositions and Pronoun-referent analysis-

UNIT IV:

Technical Communication skills:

1.Technical Proposal writing
2.Technical Vocabulary- a representative collection will be handled
3.Developing Abstract

	4.Introduction to Executive summary 5.Technical Report writing(Informational Reports and Feasibility Reports)
Text books and Reference books	**Text Books:** [1]. TM Farhathullah, "Communication skills for Technical Students", I Edition, Orient Longman, 2002 [2]. Krishna, "English Language Communication Skills", I Edition, Duvvuri Publications, 2008 [3]. B.S .Sarma, "Structural Patterns & Usage in English", IV Edition, Poosha Series, 2008 [4]. Eclectic Learning materials offered by the Department **Reference Books:** [1]. Randolph Quirk, "Use of English", Longman, I Edition (1968) Reprinted 2004. [2]. Thomson A.J & A.V, Martinet, "Practical English Grammar", III Edition Oxford University Press,2001 [3]. Thomas Eliot Berry, "The most Common Mistakes in English", TMH, First Paper Back 1971, (reprinted) 2010. [4]. John Langan, "College Writing Skills", McGraw Hill, IX Edition, 2014. [5]. Selinkar, Larry et al, "English for Academic and Technical Purposes", I edition, Newbury House Publishers, 1981 [6]. Martin Cutts, "Oxford guide to Plain English", 7th Impression Oxford University Press, 2011 [7]. V.Sethi and P.V. Dhamija, "A Course in Phonetics and Spoken English", II Edition, PHI, 2006
E-resources and other digital material	[1]. www.britishcouncil.org/learning-english-gateway.htm up dated 2014 [2]. pdfstuff.blogspot.com/2013/.../the-oxford-guide-to-english-usage-pdf.ht. [3]. www.cambridgeapps.org/ up dated 2014

14EE1105 – BASICS OF ELECTRICAL ENGINEERING

Course Category:	Institutional Core	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	2-0-0
Prerequisites:	14PH1102- Engineering Physics	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Analyze electric circuit fundamentals
CO2	Understand the basic concepts of Electromagnetism.
CO3	Analyze the basic concepts of electric machines
CO4	Understand measuring instruments & utilization concepts.

Contribution of Course Outcomes towards achievement of Program Outcomes(1–Low,2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3										
CO2	3	3										
CO3	1											
CO4	1											

Course Content

UNIT I:

DC circuits: Definitions of work, power, energy and torque; Ohms law; Kirchhoff's laws; Series-parallel resistive circuits; Star-delta transformation;

AC circuits: Generation of sinusoidal signal ; RMS, Average values, Form factor, Peak factor

UNIT II:

Magnetic effect of an electric current; cross and dot conventions; concept of m.m.f., flux, flux density, reluctance, permeability and field strength; Self and Mutual inductances; Fleming's left hand rule; Faradays laws of electromagnetic induction, statically and dynamically induced e.m.f.,

UNIT III:

D.C. Machines: classification of dc machines; Principle of motor and generator; back emf; Torque of a dc machine; Load characteristics of shunt, series motors

AC Machines: Classification of ac machines; Production of rotating field; Constructional features – principle of operation; Torque-slip characteristics;

UNIT IV:

Measuring Instruments: Classification of instruments; Principle of operation of moving-coil and moving-iron instruments; – Dynamometer –type watt meter

Utilization: Principles of resistance and induction heating – principles of electrical traction – speed time characteristics

Text books and Reference books

Text Books:

[1]. I.J.Nagrath and Kothari , "Theory and problems of Basic Electrical Engineering", Prentice-Hall of India Pvt. Ltd

Reference Books:

[1]. Dr. K. Uma Rao, Dr. A. Jayalakshmi, "Basic Electric Engineering", Pearson Publications.

[2]. T.K. Nagasarkar and M.S. Sukhja, "Basic Electric Engineering", Oxford University press.

E-resources and otherdigital material

14ME1106-BASICS OF MECHANICAL ENGINEERING

Course Category:	Programme Core	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	2-0-0
Prerequisites:	Knowledge of Mathematics, Physics, Chemistry at Intermediate Level	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basic manufacturing methods and power transmission in mechanical engineering
	CO2	Attain basic knowledge of simple stress and strain
	CO3	Realize the importance of energy and identify various sources of energy
	CO4	Understand the principle of operation of different I.C. engines and their applications
	CO5	Describe the performance of different types of refrigeration systems

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium,3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3			1			3					
CO2	1			1	3							
CO3	3			1								
CO4	3			3			3					
CO5	1			3			3					

Course Content

UNIT I:

Manufacturing Methods : Casting: Principles of Casting, Advantages & disadvantages, Applications of casting, Green sand moulds(7)

Lathe : Description, Main components , Basic operations performed on a Lathe (Turning, Taper turning, Thread cutting, Drilling)(3)

Welding : Types : Equipments, Principles of Gas Welding and Arc Welding, Applications, Advantages & disadvantages of welding, Brazing & Soldering(5)

UNIT II:

Simple STRESS and STRAIN: Stress and Strain, definitions, Elasticity, Hooke's Law, Relation between elastic constant (5)

Transmission : Belt Drives Introduction, Types, Length of Open Belt drive and cross belt drive, Velocity ratio and difference between open belt drive & Cross belt drive, Power transmission by belts (10)

UNIT III:

Energy Resources Introduction, Energy Scenario, Classification of Energy Resources, Conventional Energy Resources : working principle of Steam power plant, Nuclear Power plant (6)

Non-conventional Energy Resources : Working principle of Solar Power plant, Wind power plant, Geo-Thermal and OTEC plant (9)

UNIT IV:

Internal Combustion Engines Introduction, Classification, Main components of an I.C. engine, Working principle of Two Stroke and Four Stroke Petrol and Diesel engine (8)

	Refrigeration: Introduction, Classification, Types of Refrigeration, Units of Refrigeration, C.O.P., working of vapour compression refrigeration system, applications of refrigeration (7)
Text books and Reference books	**Text Books:** [1]. T.S. Rajan, "Basic Mechanical Engineering" 3rd Edition, New Age International Ltd, First Reprint, 1999 [2]. R.S. Khurmi & J.K. Gupta, "Machine Design" Eurasia Publications House, 2005 [3]. T.J. Prabhu & V. Jaiganesh, S.Jebaraj, "Basic Mechanical Engineering" , SCI Tech Publications (India) Pvt. Ltd. **Reference Books:** [1]. R. Rudramoorthy, "Thermal Engineering", 4th Reprint 2006, Tata Mc-Graw Hill Publishing Company Ltd, New Delhi,2003 [2]. R.K. Rajput, "Manufacturing Process", Firewall media, 2007 [3]. P.K. Nag, "Power Plant Engineering" Tata Mc Graw Hill Publishing Company Ltd, New Delhi,2011
E-resources and other digital material	[1]. www.engliblogger.com/mechanical/mechan [2]. www.indiastudychannel.com/resources [3]. www.result.khatana.net/2010/07/ge2152 [4]. www.scribd.com/doc/15653381/basic-mech

14ME1107- ENGINEERING GRAPHICS

Course Category:	Institutional Core	**Credits:**	5
Course Type:	Theory and Practice	**Lecture-Tutorial-Practice:**	2-0-6
Prerequisites:	-	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Represent various Conics and Curves
	CO2	Construct Plain and Diagonal Scales.
	CO3	Draw Orthographic projections of Lines, Planes, and Solids
	CO4	Construct Isometric Scale, Isometric Projections and Views and also convert Pictorial views to Orthographic Projections.
	CO5	Draw Sectional views of the Solids.
	CO6	Understand Development of surfaces and their representation.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3		3							3		
CO2	3		3							3		
CO3	3		3							3		
CO4	3		3							3		
CO5	3		3							3		
CO6	3		3							3		

Course Content

UNIT I:

General: Use of Drawing instruments, Lettering - Single stroke letters, Dimen- sioning, Representation of various type lines - Geometrical Constructions. Scales: Construction and use of plain and diagonal scales.

Conic Sections: conic sections - general construction method for ellipse, parabola and hyperbola. Special methods for conic sections.

Curves: Curves used in Engineering practice - Cycloid, Involute of circle.

UNIT II:

Method of Projections: Principles of projection - First angle projection and third angle projection of points and straight lines.

Projection of Planes: Projections of planes of regular geometrical lamina.

* Introduction to Auto CAD software, drawing different two dimensional and three dimensional views.

* **2 D Objects :** Triangles, Square, Rectangle, Pentagon, Hexagon, Circle and Ellipse.

UNIT III:

Projections of Solids: Projections of simple solids such as Cubes, Prisms, Pyramids, Cylinders and Cones - axis inclined to one of the reference plane.

Sections of Solids: Sections of solids such as Cubes, Prisms, Pyramids, Cylinders and Cones. True shapes of sections. (Limited to the Section Planes perpen- dicular to one of the Principal Plane).

* **3 D Objects :** Prisms, Pyramids, Cylinder and a Cone.

* Sectional view of a Prism, Pyramid, Cylinder and a Cone in simple position

	UNIT IV: **Development of Surfaces:** Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones. **Isometric Projections:** Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only). Introduction to Isometric Projections to Orthographic Projections. * Isometric View of Prism, Pyramid, Cylinder and a Cone and also simple 3 Dimensional Objects. * These topics are only for internal assessment.
Text books and Reference books	**Text Books:** [1]. N.D. Bhatt & V.M. Panchal, "Elementary Engineering Drawing", Charotar Publishing House, Anand, 49th Edition, 2006. [2]. DM Kulkarni, AP Rastogi, AK Sarkar, "Engineering Graphics with Auto CAD", PHI Learning Private Limited, Delhi. Edition , 2013 **Reference Books:** [1]. Prof. K. L. Narayana & Prof. P. Kannaiah, "Text Book on Engineering Drawing", Scitech publications (India) Pvt. Ltd., Chennai 2nd Edition, fifth reprint 2006. [2].K. Venugopal, "Engineering Drawing and Graphics + Auto CAD", New Age International, New Delhi.
E-resources and other digital material	[1]. http://www.youtube.com/watch?v=XCWJ XrkWco [2]. http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html# isodrawing [3]. http://www.slideshare.net [4]. http://edpstuff.blogspot.in

14PH1151 – ENGINEERING PHYSICS LAB

Course Category:	Institutional Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Elucidate the concepts of physics through involvement in the experiment by applying theoretical knowledge
CO2	Illustrate the basics of electro magnetism, optics, mechanics, and semi-conductors & quantum theory
CO3	Develop an ability to apply the knowledge of physics experiments in the later studies

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1			3	3								3
CO2		1			1							
CO3			3									1

Course Content

List of Experiments :

1. AC Sonometer -Verification of vibrating laws.
2. Measurement of thickness of a foil using wedge method.
3. Photo tube-Study of V-I Characteristics, determination of work function.
4. Torsional Pendulum-Rigidity modulus calculation.
5. Variation of magnetic field along the axis of a current carrying circular coil.
6. Compound pendulum-Measurement of 'g'.
7. LCR circuit-Resonance.
8. Solar cell -Determination of Fill Factor.
9. Hall effect -Study of B & I Variation.
10. Fibre Optics-Numerical aperture calculation.
11. Newton's Rings-Radius of curvature of plano convex lens.
12. Diffraction grating-Measurement of wavelength.
13. Lissajous figures- calibration of an audio oscillator.
14. B-H curves- determination of hysteresis loss.
15. Figure of merit of a galvanometer.

Text books and Reference books

Text Books:

[1]. Indu Prakash & Rama Krishna, "A text book of practical physics", 25th ed., Kitab Mahal Publishers, Allahabad, 2003.

[2]. J.C.Mohanty & D.K.Mishra, "University Practical Physics", Ist ed., Kalyani Publishers, 1990.

[3]. D.P.Khandelwal, "A laboratory manual of Physics", Ist ed.,Vani educational books,1991.

[4]. Dr.Y.Aparna & Dr.K.Venkateswara Rao, "Laboratory manual of engineering physics", Ed.1., VGS Publications, 2010.

E-resources and other digital material	[1]. http://plato.stanford.edu/entries/physics-experiment/[2] [2]. http://www.physicsclassroom.com/The-Laboratory[3] [3]. http://facstaff.cbu.edu/~jvarrian/physlabs.html

14CS1152 – BASIC COMPUTING LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Design & develop basic software's (Application and System software)
	CO2	Attain basic knowledge on hardware (I/O devices, Mother board, processor etc...)
	CO3	Understand and Apply MS Office tools

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1										
CO2	1	3	3									
CO3	3	3	3	3								

Course Content

CYCLE – I : Word Processing, Presentations and Spread Sheets

1. Word Processing:
   (a) Create personal letter using MS Word.
   (b) Create a resume using MS Word.
2. Spread Sheets:
   (a) Create a worksheet containing pay details of the employees.
   (b) Create a worksheet which contains student results.
   (c) Create a worksheet importing data from database and calculate sum of all the columns.
3. Presentations:
   (a) Create a presentation using themes.
   (b) Save, edit, print and import images/videos to a presentation.
   (c) Adding animation to a presentation.
4. MS Access:
   (a) Create simple table in MS Access for results processing.
   (b) Create a query table for the results processing table.
   (c) Create a form to update/modify the results processing table.
   (d) Create a report to print the result sheet and marks card for the result.

CYCLE – II : Hardware Experiments

1. Identification of System Layout: Front panel indicators & switches and Front side & rear side connectors. Familiarize the computer system Lay-out: Marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards. Install Hard Disk. Configure CMOS-Setup. Partition and Format Hard Disk.
2. Install and Configure a DVD Writer or a Blu-ray Disc writer.
3. Install windows operating system and check if all the device (graphics, sound,

	network etc.) drivers are installed. 4. Install Linux operating system and check the working of all devices (graph-ics, sound, network etc.) in the computer. 5. Assemble a Pentium IV or Pentium Dual Core Pentium Core2 Duo system with necessary peripherals and check the working condition of the PC. 6. PC system layout: Draw a Computer system layout and Mark the positions of SMPS, Mother Board, FDD, HDD, and CD-Drive/DVD-Drive add on cards in table top / tower model systems. 7. Mother Board Layout: Draw the layout of Pentium IV or Pentium Dual core or Pentium Core2 DUO mother board and mark Processor, Chip set ICs. RAM, Cache, cooling fan, I/O slots and I/O ports and various jumper settings. 8. Configure BIOS setup program to change standard and advanced settings to troubleshoot typical problems. 9. Install and configure Printer/Scanner/Web cam/Cell phone/bio-metric de-vice with system. Troubleshoot the problems
	CYCLE – III 1. Prepare an Ethernet/UTP cable to connect a computer to network switch. Crimp the 4 pair cable with RJ45 connector and with appropriate color code. 2. Manually configure TCP/IP parameters (Host IP, Subnet Mask and De-fault Gateway) for a computer and verify them using IPCONFIG com-mand. Test connectivity to a server system using PING command. 3. Creating a shared folder in the computer and connecting to that folder using Universal Naming Convention (UNC) format. (Ex: computername sharename) 4. Configure a computer to connect to internet (using college internet set-tings) and troubleshoot the problems using PING, TRACERT and NET-STAT commands. 5. Using scan disk, disk cleanup, disk Defragmenter, Virus Detection and Rectifying Software to troubleshoot typical computer problems. 6. Configure DNS to establish interconnection between systems and describe how a name is mapped to IP Address
E-resources and other digital material	[1]. Numerical Methods and Programing by Prof.P.B.Sunil Kumar, Depart-ment of Physics, IIT Madras. https://www.youtube.com/watch?v=zjyR9e-N1D4&list=PLC5DC6AD60D798FB7 [2]. Introduction to Coding Concepts Instructor: Mitchell Peabody View the complete course: http://ocw.mit.edu/6-00SCS11

14MA1201 – CALCULUS

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	Fundamentals of calculus, vectors and geometry.	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the concept of mean value theorems and apply them to expand functions as Taylors series and determine curvatures.
	CO2	Able to test the convergence of infinite series, tracing of the curves.
	CO3	Understand the concept of multiple integrals and apply them to evaluate areas and volumes.
	CO4	Apply the concepts of calculus to scalar and vector fields and establish the relation between the line ,surface and volume integrals.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1		3	3							
CO2	3	1		3	3							
CO3	3	3		3	3							
CO4	3	3		3	3							

Course Content

UNIT I:

Differential Calculus: Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylors Theorem, Maclaurin's Series, Taylor's Theorem for Function of Two Variables, Curvature, Radius of Curvature.

UNIT II:

Asymptotes, Curve Tracing, Maxima and Minima of Function of Two Variables, Lagrange's Method of undetermined Multipliers.

Sequence and Series: Convergence of series – Comparison test – D'Alembert's Ratio test – Cauchy's Root Test – Alternating series – Absolute convergence – Leibnitz's Rule.

UNIT III:

Integral Calculus: Double Integrals, Change of Order of Integration, Double Integrals in Polar Coordinates, Area Enclosed by Plane Curves, Triple Integrals, Volumes of Solids, Change of Variables.

Special Functions: Beta Function, Gamma Function, Relation between Beta and Gamma Function, Error Function or Probability Integral.

UNIT IV:

Vector Calculus: Scalar and Vector Point Functions, Del Applied to Scalar point Functions, Gradient, Del Applied to Vector point Functions, Physical Interpretation of Divergence, Del Applied Twice to Point Functions, Del Applied to Products of Point Functions, Integration of Vectors, Line Integral, Surface Integrals, Green's Theorem in The Plane (without Proof), Stokes's Theorem (without proof), Volume Integral, Gauss Divergence Theorem (without proof), Irrotational Fields.

Text books and Reference books	**Text Book:** [1]. B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, 2012. **Reference Books:** [1]. Kreyszig, " Advanced Engineering Mathematics ", 8th Edition, John Wiley & Sons. [2]. Peter V.O.Neil, " Advanced Engineering Mathematics ", Thomson, Canada. [3]. R.K.Jain and S.R.K.Iyengar, " Advanced Engineering Mathematics ", 3rd Edition Narosa Publishers. [4]. N.P.Bali, Manish Goyal, " A Text Book of Engineering Mathematics ", LaxmiPublications(P) Limited. [5]. B.V.Ramana, " A text book of mathematics ", Tata MC Graw Hill.
E-resources and other digital material	[1]. mathworld.wolfram.com [2]. http://www.nptel.iitm.ac.in

14CH1202-ENGINEERING CHEMISTRY

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	Knowledge of Chemistry at Intermediate level	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	**Upon successful completion of the course, the student will be able to:**	
	CO1	Analyze various water treatment methods and boiler troubles
	CO2	Apply the knowledge of different phases in materials, working principle of electrodes and batteries and their application in chemical and other engineering areas.
	CO3	Evaluate corrosion processes as well as protection methods and apply the principles of UV-visible spectroscopy in chemical analysis.
	CO4	Apply the knowledge of nature of polymeric materials for their application in technological fields and of fuels for their conservation.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium,3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1				3								
CO2	1											
CO3					3							
CO4			1									

Course Content

UNIT I:

Water technology-I: Sources and impurities of water, WHO standards - Water treatment for drinking purpose - sedimentation, coagulation, filtration, various methods of disinfection and concept of break-point chlorination - Desalination of brakish water - principle and process of electrodialysis and reverse osmosis.

Water technology-II: Boiler troubles - scales, sludges, caustic embrittlement and boiler corrosion – causes, disadvantages and prevention, Internal conditioning methods – phosphate, calgon and sodium aluminate – External treatment methods – zeolite and ion-exchange methods.

UNIT II:

Phase rule: Concept of phase, component, degree of freedom, Gibb's phase rule definition - phase equilibrium of one component – water system - phase equilibrium of two-component system – sodium chloride-water system and silver-lead system – advantages, limitations and application of phase rule.

Electrochemistry: Calomel electrode, silver-silver chloride electrode and glass electrode, determination of pH using glass electrode - Electrochemical energy systems - Zinc-air battery, Lead-acid battery, Ni-Cd battery, $Li_xC/LiCoO_2$ battery – Advantages of lithium batteries.

UNIT III:

Corrosion science: Introduction – chemical and electrochemical corrosion – electrochemical theory of corrosion – corrosion due to dissimilar metals, galvanic series – differential aeration corrosion – cathodic protection, anodic protection, corrosion inhibitors – types and mechanism of inhibition – principle and process of electroplating and electroless plating.

Instrumental techniques of analysis: Introduction of spectroscopy – interaction of

	electromagnetic radiation with matter - UV-visible spectroscopy: Frank-Condon principle – types of electronic transitions. Lambert-Beer's law, numericals (simple substitution) – Instrumentation - single beam UV-visible spectrophotometer - applications-qualitative analysis, quantitative analysis, detection of impurities and determination of molecular weight.
	UNIT IV: **Polymer technology:** Polymerization – Addition and condensation, thermoplastics and thermosettings - conducting polymers – examples, classification-intrinsically conducting polymers and extrinsically conducting polymers- mechanism of conduction of undoped, p-doped and n-doped polyacetylenes – applications of conducting polymers, Fibre reinforced plastics (FRP) - composition and applications. **Fuel technology:** Fuels – classification, calorific value, coal – proximate analysis and ultimate analysis, Petroleum – refining, concept of knocking, octane number and cetane number, flue gas analysis by Orsat's apparatus and numericals based on combustion
Text books and Reference books	**Text Book:** [1]. P.C. Jain , "Engineering Chemistry", 15th edition, Dhanpat Rai Publishing Company (P) Limited, New Delhi. **Reference Books:** [1]. S.S. Dara, "A text book of Engineering Chemistry", 10th edition, S. Chand & Company Limited, New Delhi. [2]. Shashi Chawla, "A text book of Engineering Chemistry", Dhanpat Rai & Company Pvt. Ltd., New Delhi. [3]. Sunita Rattan, "A Textbook of Engineering Chemistry", First edition, S.K. Kataria & Sons, New Delhi,2012. [4]. B.S. Bahl, G. D. Tuli and Arun Bahl, "Essentials of Physical Chemistry", S. Chand and Company Limited, New Delhi. [5]. Y.Anjaneyulu, "Text book of Analytical Chemistry", K. Chandrasekhar and Valli Manickam, Pharma Book Syndicate, Hyderabad. [6]. O. G. Palanna, "Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
E-resources and other digital material	[1]. http://www.cip.ukcentre.com/steam.htm [2]. http://corrosion-doctors.org/Modi;es/mod-basics.htm [3]. http://chemwiki.ucdavis.edu/Analytical_Chemistry.htm [4]. http://teaching.shu.ac.uk/hwb/chemistry/tutorials/molspec/uvvisabl.htm [5]. http://www.prenhall.com/settle/chapters/ch15.pdf

14CS1203-PROGRAMMING IN C

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	14CS1103-Introduction To Computing	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the programming terminology and implement various c-tokens & input-output statements to solve simple problems
	CO2	Able to compare and differentiate various looping & branching constructs and apply the best looping structure for a given problem
	CO3	Interpret and implement the need of arrays and structure/union to store homogeneous and heterogeneous groups of data
	CO4	Understand pointers and implement the programs to directly access memory locations
	CO5	Identify the necessity of modularity in programming and design various function types
	CO6	Contrast the need of using files in programming and implement file operations

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3										
CO2			3	3								
CO3	1	1	3	3								
CO4	3	3	3	3								
CO5	1	1	3	3							3	
CO6	1	1	1	3							3	

Course Content

UNIT I:

Structure of a C Program: Expressions, Precedence and Associatively, Evaluating Expressions, Type Conversion, Statements, Sample Programs.

Selection: Logical Data and Operators, Two -Way Selection, Multiway Selection, More Standard Functions.

UNIT II:

Repetition: Concept of a Loop Loops In C, Loop Examples, Recursion, The Calculator Program.

Arrays: Concepts, Using Array in C, Inter-Function Communication, Array Applications, Two Dimensional Arrays, Multidimensional Arrays.

Functions: Functions in C, User Defined Functions, Inter Function Communication, Standard Functions, and Scope.

Strings: String Concepts, C Strings, String Input/output Functions, Arrays of Strings, String Manipulation Functions, String- Data Conversion.

UNIT III:

Pointers: Introduction, Pointers For Inter Function Communications, Pointers to Pointers, Compatibility, Lvalue and Rvlaue.

Pointer Applications: Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an

	Array toa Function, Memory Allocations Functions, Array Of Pointers. **Text Input/output**: Files, Streams, Standard Library Input/Output Functions, Formatting Input/output Functions and Character Input/output Functions.
	UNIT IV: **Enumerations**: The Type Definition (Typedef), Enumerated Types: Declaring an Enumerated Type, Operations on Enumerated Types, Enumeration Type Conversion, Initializing Enumerated Constants, Anonymous Enumeration: Constants, Input/output Operators. **Structures:** Structure Type Declaration, Initialization, Accessing Structures, Operations on Structures, Complex Structures, Structures and Functions, Sending the Whole Structure, Passing Structures Through Pointers. **Unions:** Referencing Unions, Initializers, Unions and Structures, Internet Ad-dress, Programming Applications.
Text books and Reference books	**Text Book(s):** [1]. Behrouz A. Forouzan & Richard F. Gilberg , "Computer Science A Structured Programming Approach using C", Third Edition, , CENGAGE Learning, 2007 **Reference Books:** [1]. Balagurusamy, "Programming in ANSI C", 4ed.: TMH, 2009 [2]. B. Gottfried, "Programming with C" (Schaum's Outlines) Tata Mcgraw-Hill. [3]. Kernighan and Ritchie, "The C programming language", Prentice Hall. [4]. Venugopal, et al., "Programming with C", TMH. [5]. A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, "DataStructures Using C", PHI/Pearson education

14CE1204-BASICS OF CIVIL ENGINEERING

Course Category:	Institutional Core	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	2-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Attain basic knowledge on civil engineering materials and civil engineering structures.
	CO2	Attain basic knowledge on sub-structure and super structure of a building.
	CO3	Attain basic knowledge on principles of surveying, various types of surveying and various types of transportation systems.
	CO4	Attain basic knowledge on water supply, sewage.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3											
CO2	3											
CO3	3											
CO4	3											

Course Content

UNIT I:

Building Materials: Introduction - Civil Engineering - Materials: Bricks - composition - classifications - properties -uses. Stone - classification of rocks - quarrying - dressing - properties -uses. Timber - properties -uses -ply wood. Cement - grades -types - properties -uses. Steel - types - mild steel - medium steel - hard steel - properties - uses - market forms. Concrete - grade designation - properties - uses.

UNIT II:

Building Components: Building - selection of site - classification - components. Foundations -functions - classifications - bearing capacity. Flooring - requirements - selection - types - cement concrete marble - terrazzo floorings. Roof - types and requirements.

UNIT III:

Surveying And Transportation: Surveying - objectives - classification - principles of survey. Transportation - classification - cross section and components of road - classification of roads. Railway - cross section and components of permanent way - functions. Water way - docks and harbor - classifications - components. Bridge - components of bridge.

UNIT IV:

Water Supply And Sewage Disposal: Dams - purpose - selection of site - types - gravity dam (cross section only). Water supply - objective - quantity of water - sources - standards of drinking water - distribution system. Sewage - classification - technical terms - septic tank - components and functions.

Text books and Reference books

Text books :

[1]. Raju .K.V.B, Ravichandran .P.T, "Basics of Civil Engineering", Ayyappa Publications, Chennai, 2012.

	[2]. Rangwala .S.C, "Engineering Materials", Charotar Publishing House, Anand, 2012. [3]. M.S.Palanichamy, "Basic Civil Engineering", Tata McGraw-Hill Publishing Company limited. **Reference Books :** [1]. Dr. K.N. Duggal, "Elements of Environmental Engineering", S. Chand and company LTD, Ram Nagar, New Delhi. [2]. R.Srinivaas, Chartor Publishing House, Arand, 2012
E-resources and other digital material	[1]. ncees.org/exmas/fe-exma/ [2]. www.aboutcivil.com/

14HS1205-PROFESSIONAL ETHICS

Course Category:	Institutional Core	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	2-0-0
Prerequisites:	Knowledge about Morals and Values	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Known the Moral autonomy and uses of Ethical theories.
	CO2	Understand Morals Honesty and Character.
	CO3	Understand about Safety, Risk and Professional Rights.
	CO4	Known the Ethics regarding Global issues like Environment, Computer and Weapons Development.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1											
CO2								3				
CO3										1		
CO4			3									

Course Content

UNIT I:

Engineering Ethics: Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy - Models of Professional Roles - theories about right action - Self-interest - customs and religion- uses of ethical theories.

UNIT II:

Human Values: Morals, Values and Ethics - Integrity- Work Ethic - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment -Empathy - Self-Confidence - Character - Spirituality.

UNIT III:

Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study, Safety, Responsibilities and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT IV:

Global Issues: Multinational corporations- Environmental ethics- computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics (Specific to a particular Engineering Discipline).

Text books and Reference books

Text Books:

[1]. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill,

	New York, 1996. [2]. Govindarajan M, Natarajan S, Senthil Kumar V. S., "Engineering Ethics", Prentice Hall of India, New Delhi, 2004. **Reference Books:** [1]. Baum, R.J. and Flores, A., eds. "Ethical Problems in Engineering, Center for the study of the Human Dimensions of Science and Technology", Rensellae Polytechnic Institute, Troy, New York, 1978. [2]. Beabout, G.R., Wennemann, D.J., "Applied Professional Ethics: A Developmental Approach for Use with Case Studies", University Press of America Lanham, MD, 1994,175 pp
E-resources and other digital material	[1]. http://www.professionalethics.ca/ [2]. http://ethics.tamu.edu/ [3]. http://en.wikipedia.org/wiki/Professional_ethic

14EC1206-BASICS OF ELECTRONICS ENGINEERING

Course Category:	Programme Core	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	2-0-0
Prerequisites:	-	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Gain knowledge about the fundamentals of electronic components, devices, transducers
	CO2	Understand and apply principles of digital electronics
	CO3	Get familiarity about basic communication systems

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1											
CO2	3											
CO3	1											

Course Content

UNIT I:

Electronic Components: Passive components – resistors, capacitors & inductors (properties, common types, I-V relationship and uses).

Semiconductor Devices: Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell, photocouplers)

UNIT II:

Transducers: Transducers - Instrumentation – general aspects, classification of transducers, basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers – piezoelectric and thermocouple.

UNIT III:

Digital Electronics: Number systems – binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

UNIT IV:

Communication Systems: Block diagram of a basic communication system – frequency spectrum - need for modulation - methods of modulation - principles of AM, FM, pulse analog and pulse digital modulation – AM / FM transmitters & receivers (block diagram description only)

Text books and Reference books

Text Books:

[1]. Thyagarajan. T, Sendur Chelvi. K. P, Rangaswamy. T. R, "Engineering Basics: Electrical, Electronics and Computer Engineering", New Age International, Third Edition, 2007.

[2]. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education, 2013.

	[3]. G.K.Mithal, "Radio Engineering", 20th Edition, Khanna Publishers, , 2011. **Reference Books:** [1]. Somanathan Nair. B, Deepa. S. R, "Basic Electronics", I.K. International Pvt. Ltd., 2009. [2]. S. Salivahanan, N.Suresh Kumar & A. Vallavaraj, "Electronic Devices & Circuits", 2nd Edition, Tata Mc Graw Hill,2008.
E-resources and other digital material	[1]. http://www.nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC-ELECTRONICS/ home_page.htm [2]. http://nptel.ac.in/video.php?subjectId=117102059

14ME1207-MECHANICS FOR ENGINEERS

Course Category:	Institutional Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	Basic Knowledge of Mathematics and Physics	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Construct free body diagrams and develop appropriate equilibrium equations
CO2	Locate Centroids and simplify the system of forces and moments to equivalent systems
CO3	Analyze the systems with friction
CO4	Determine the kinematic relations of particles
CO5	Apply equations of motion to particle motion
CO6	Analyze motion of a particle using principle of energy and momentum methods

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1										
CO2	3											
CO3		3										
CO4	3											
CO5	3	3										
CO6		3										

Course Content

UNIT I:

Concurrent Forces in a Plane: Principles of statics, Force, Addition of two forces: parallelogram Law – Composition and resolution of forces – Constraint, Action and Reaction. Types of supports and support reactions. Free body diagram, Equilibrium of concurrent forces in a plane – Method of projections – Moment of a force, Varignon's Theorem, Method of moments.

Parallel Forces in a plane: Introduction, Types of parallel forces, Resultant, couple, Resolution of Force into force and a couple, General case of parallel forces in a plane.

Centroids: Determination of Centroids by integration method, Centroids of composite plane figures.

UNIT II:

General Case of Forces in a Plane: Composition of forces in a plane – Equilibrium of forces in a plane.

Friction: Introduction, Classification Of Friction, Laws Of dry Friction, Co-Efficient Of Friction, Angle Of Friction, Angle Of Repose, Cone Of Friction, Wedge Friction.

Kinematics of rectilinear translation: Introduction, Displacement, Velocity, Acceleration (uniform).

UNIT III:

Kinetics of rectilinear translation: Equations of motion, dynamic equilibrium, D'Alemberts principle-related problems

Work and energy principle, conservation of energy.

Impulse and momentum: principle of impulse and momentum, conservation of linear momentum.

Impact-direct, central impact, coefficient of restitution, elastic and plastic impact, loss of kinetic energy during impact, energy and momentum.

	UNIT IV: **Kinematics of curvilinear translation:** Introduction, components of velocity and acceleration, Normal and Tangential acceleration, Motion of projectiles **Kinetics of curvilinear translation:** D'Alemberts principle, rectangular components, Normal and Tangential components, work-energy principle
Text books and Reference books	**Text Books:** [1]. S.Timoshenko & D.H.Young, "Engineering Mechanics",McGraw Hill International Edition (For Concepts and Symbolic Problems). [2]. A.K.Tayal, "Engineering Mechanics Statics and Dynamics", Umesh Publications,Delhi, (For numerical problems using S.I.System of units) **Reference Books:** [1]. Beer and Johnson ,"Vector Mechanics for Engineers Statics and Dynamics", Tata McGraw Hill publishing company, NewDelhi. [2]. SS Bhavikatti and KG Rajasekharappa, "Engineering Mechanics". [3]. K.Vijaya Kumar Reddy and J.Suresh Kumar, "Singer's Engineering Mechanics: Statics and Dynamics", Third Edition SI Units, BS Publications
E-resources and other digital material	[1]. http://openlibrary.org/books/OL22136590M/Basic _engineering_mechanics [2]. http://en.wikibooks.org/wiki/Engineering_Mechanics [3]. http://nptel.iitm.ac.in/video.php?courseID=1048 [4]. http://imechanica.org/node/1551 [5]. http://emweb.unl.edu/

14CH1251-ENGINEERING CHEMISTRY LAB

Course Category:	Institutional Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	Knowledge of Chemistry Practicals at Intermediate level	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Analyze quality parameters of water samples from different sources.
	CO2	Perform quantitative analysis using instrumental methods.
	CO3	Apply the knowledge of mechanism of corrosion inhibition, metallic coatings and photochemical reactions.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1				3								
CO2					1							
CO3		1										

Course Content

List of Experiments:

1. Determination of total alkalinity of water sample
2. Determination of chlorides in water sample
3. Determination of hardness of water sample
4. Determination of available chlorine in bleaching powder
5. Determination of copper in a given sample
6. Estimation of Mohr's salt – Dichrometry
7. Estimation of Mohr's salt – Permanganometry
8. Determination of zinc in a given sample
9. Conductometric determination of a strong acid using a strong base
10. pH metric titration of a strong acid vs. a strong base
11. Determination of corrosion rate of mild steel in the absence and presence of an inhibitor
12. Chemistry of Blue Printing
13. Colorimetric determination of potassium permanganate
14. Preparation of Phenol-Formaldehyde resin
15. Spectrophotometry

Text books and Reference books

Reference Books:

[1]. S.K. Bhasin and Sudha Rani, "Laboratory Manual on Engineering Chemistry", 2nd edition, Dhanpat Rai Publishing Company, New Delhi.

[2]. Sunitha Rattan, "Experiments in Applied Chemistry", 2nd edition, S.K. Kataria & Sons, New Delhi.

E-resources and other digital material

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14CS1252-C PROGRAMMING LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand basic Structure of the C-PROGRAMMING, declaration and usage of variables
	CO2	Develop an algorithm for solving a problem
	CO3	Exercise conditional and iterative statements to inscribe C programs
	CO4	Exercise user defined functions to solve real time problems
	CO5	Inscribe C programs using Pointers to access arrays, strings and functions
	CO6	Inscribe C programs using pointers and allocate memory using dynamic memory management functions
	CO7	Exercise user defined data types including structures and unions to solve problems
	CO8	Exercise files concept to show input and output of files in

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3										
CO2	3	3										
CO3			3	3								
CO4	1	1	3	3							3	
CO5	3	3	3	3								
CO6	3	3	3	3								
CO7	1	1	3	3								
CO8	1	1	3	3							3	

Course Content

CYCLE - I:Programming constructs and control structures

1. Introduction to C programming :
   (a) Use of Turbo C IDE
   (b) The Structure of a C Program
   (c) Writing C Programs
   (d) Building an Executable Version of a C Program
2. Data Types and Variables:
   (a) Data Types
   (b) Operands, Operators
   (c) Arithmetic Expressions
3. Branching and Selection:
   (a) Simple-if
   (b) Nested-if
4. Control statements:
   (a) Break
   (b) Continue
   (c) Go to
5. Looping constructs-I
   (a) While

	(b) Do-while (c) Case control structure: Switch 6. Looping constructs-II (a) Simple for (b) Nested for 7. Arrays (a) Single dimensional arrays (b) Multi dimensional arrays 8. Strings (a) Declaration and initialization of string variables (b) Reading & Writing strings (c) String handling functions (d) Operations performed on strings without using string handling functions
	CYCLE - II: Advanced programming constructs 1. Concept of user defined functions (a) With arguments and no return value (b) Without arguments and no return value (c) Without arguments and return value (d) With arguments and return value 2. File handling operations (a) FILE structure (b) Opening and closing a file, file open modes (c) Reading and writing operations performed on a file (d) File Pointers: stdin, stdout and stderr (e) FILE handling functions: fgetc(), fputc(), fgets() and fputs() functions 3. Pointers (a) Uses of Pointers (b) Passing Arrays and Pointers as a function arguments (c) Pointers to Character Strings 4. User defined data types (a) Type-def (b) Enumeration 5. Structures (a) Declaring and accessing structure members (b) Passing of structure as a function argument 6. Unions (a) Referencing Unions (b) Difference between structure and union
E-resources and other digital material	[1]. Prof.P.B.Sunil Kumar, "Numerical Methods and Programming", Department of Physics, IIT Madras https://www.youtube.com/watch?v=zjyR9e-N1D4& list=PLC5DC6AD60D798FB7 [2]. Mitchell Peabody, "Introduction to Coding Concepts", http://ocw.mit.edu/6-00SCS11

14ME1253-WORKSHOP PRACTICE

Course Category:	Institutional Core	**Credits:**	2
Course Type:	Practice	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	-	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	To model and develop various basic prototypes in the Carpentry trade such as Lap Joint, Lap Tee Joint, Dove Tail Joint, Mortise and Tenon Joint, and Cross Lap Joint
	CO2	To develop various basic prototypes in the trade of Welding such as Lap Jont, Lap Tee Joint, Edge Joint, Butt Joint and Corner Joint
	CO3	To develop various basic prototypes in the trade of Tin Smithy such as Saw Edge, Wired Edge, Lap Seam, Grooved Seam and Funnel Preparations
	CO4	To understand various basic House Wiring techniques such as Connecting One lamp with one switch, Connecting two lamps with one switch, Connecting a Fluorescent tube, Staircase Wiring, Godown Wiring

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3									1	
CO2	1	3									1	
CO3	1	3									1	
CO4	1	3									1	

Course Content

I. Carpentry : To Make the following Jobs with Hand Tools:

a. Lap Joint.
b. Lap Tee Joint.
c. Dove Tail Joint.
d. Mortise and Tenon Joint.
e. Cross Lap Joint.

II. Welding :To Make the following Jobs using Electric Arc Welding Process / Gas Welding.

a. Lap Joint.
b. Tee Joint.
c. Edge Joint.
d. Butt Joint.
e. Corner Joint.

III. **Tin Smithy:** To do Sheet Metal Operations with Hand Tools:

a. Saw Edge.
b. Wired Edge.
c. Lap Seam.
d. Grooved Seam.
e. Funnel.

IV. House Wiring:

	a. To connect one lamp with one switch. b. To connect two lamps with one switch. c. To connect a fluorescent Tube. d. Stair case wiring. e. Godown Wiring.
Text books and Reference books	**Text Book:** [1]. Kannaiah P. & Narayana K. C., "Manual on Workshop Practice", Scitech Publications, Chennai, 1999.
E-resources and other digital material	-

14MA1301-COMPLEX ANALYSIS & NUMERICAL METHODS

Course Category:	Institutional Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	Algebra of Complex numbers, convergence of infinite series, theory of equations	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Determine analytic and non analytic functions and understand the concept of complex integration
	CO2	Analyze Taylor and Laurent series and evaluation of real definite integrals using residue theorem and understand the concept of transformations.
	CO3	Solve Algebraic and transcendental, system of equations and understand the concept of polynomial interpolation.
	CO4	Understand the concept of Numerical differentiation and integration. Solve initial and boundary value problems numerically.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1										
CO2	3	1										
CO3	3	1		1	1							
CO4	3	1		1								

Course Content

UNIT I:

Complex Analysis: Introduction, continuity, Cauchy-Riemann equations. Analytic functions, Harmonic functions, Orthogonal systems, Complex integration, Cauchy's integral theorem, Cauchy's integral formula

UNIT II:

Taylor's series, Laurent's series, Zeros and singularities. Residue theorem, calculation of residues, evaluation of real definite integrals (by applying the residue theorem).

Standard transformations: Translation - Magnification and Rotation – Invertion and reflection - Bilinear transformation.

UNIT III:

Numerical Methods: Solution of Algebraic and Transcendental Equations : Introduction, Newton - Raphson method, Solution of simultaneous linear equations – Gauss Elimination Method - Gauss - Seidel iterative method.

Interpolation: Introduction, Finite Differences – Forward, Backward, Central Differences, Symbolic Relations, Differences of a polynomial, Newton's formulae for interpolation, Central difference interpolation formulae –Gauss's, Sterling's, Bessel's formulae Interpolation with unequal intervals – Lagrange's and Newton's Interpolation formulae.

UNIT IV:

Numerical Differentiation And Integration : Finding first and second order differentials using Newton's formulae. Trapezoidal rule, Simpsons 1/3 Rule, Simpsons $3/8^{th}$ Rule.

Numerical Solutions of Differential Equations: Taylor's series method Picard's

	method. Euler's method, Runge - Kutta method of 4th order, Boundary value problems, Solution of Laplace's and Poisson's equations by iteration.
Text books and Reference books	**Text Book(s):** [1]. B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition Khanna Publishers, 2012. **Reference Books:** [1]. Krezig, "Advanced Engineering Mathematics", 8th Edition, JohnWiley & Sons.2007, [2]. R.K.Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishers. [3]. N.P.Bali, Manish Goyal, "A Text book of Engineering Mathematics", 1st Edition, Lakshmi Publications (P) Limited, 2011 [4]. H.K.Das, Er. RajnishVerma, "Higher Engineering Mathematics", 1st Edition, S.Chand& Co., 2011. [5]. S. S. Sastry, "Introductory Methods of Numerical Analysis", PHI , 2005.
E-resources and other digital material	[1]. Faculty.gvsu.edu/fishbacp/complex/complex.html. [2]. nptelvideolectures/iitm.ac.in

14IT3302-DISCRETE MATHEMATICAL STRUCTURES

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	Truth tables, Sets and Relations, Permutations& combinations	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Analyzation of propositional calculus and first order logic.
	CO2	Examining the basic and advanced counting techniques.
	CO3	Classification of relations and digraphs and their applications.
	CO4	Classification of graphs and their applications.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3		1	3	1						
CO2	3	3		1	3	3	1		3			3
CO3	3	3			1	1						
CO4	3	3		1	3	1			3			

Course Content

UNIT I: Propositional calculus:

Fundamentals of logic: Propositions, Connectives, Propositional functions, Truth Tables, Tautology

Contradiction, Logical equivalences, Normal forms, Logical inferences, Methods of proof of an implication.

First order logic: Predicate, Quantifiers, and Rules of inference for Quantified propositions.

UNIT II: Counting techniques

Basics of counting: Sum and product rules, Indirect counting, One to One Correspondence, Combinations and permutations, Enumerating Combinations and Permutations with and without repetitions.

Advanced counting techniques: Generating function of sequences, Recurences relations, Solving recurrences relations – substitution- Generating functions-The method of characteristic roots.

Solution of Inhomogeneous recurrences relations.

UNIT III:

Relations and Digraphs: Relations and basic graphs, Special properties of binary relations, Equivalence relation, Partially ordered sets, Hasse diagrams, Lattices, Operations on relations, Paths and closures, Directed graphs and Adjacency matrices, Transitive closure, Warshall's algorithm.

UNIT IV:

Graph theory: Introduction(graphs, subgraphs, circuits, trees) Sum of degrees theorem, Isomorphism and sub graphs, planar graphs, Euler's formula, Multi graphs and Euler's circuits, Hamiltonian graphs, Grin-berg's theorem, Graph coloring, Chromatic numbers.

Text books and Reference books

Text Book(s):

[1]. J.L.Mott,Kandel,Baker, "Discrete Mathematics for Computer Scientists & Mathematicians"

	Reference Books: [1]. Trembly&Manohar, "Discrete Mathematical structures with applications to computer science". [2]. Rosen, "Discrete Mathematics and its Applications", TMH. [3]. Malik &Sen Thomson "Discrete Mathematical Structures: Theory and applicatons"
E-resources and other digital material	[1]. mathforum.org/discrete/discrete.html [2]. video lectures:.nptel.iitm.ac.in

14IT3303-DATA STRUCTURES

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites:	14CS1103- Introduction to Computing 14CS1203- Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand stack, queue and linked list abstract data types.
	CO2	Analyze and select appropriate abstract data type to solve a given problem.
	CO3	Understand insert and delete operations on binary, binary search, AVL and B trees.
	CO4	Analyze Insertion Sort, Shell Sort, Heap Sort, Merge Sort and Quick Sort algorithms.
	CO5	Understand searching and Collision resolution techniques in hashing.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3- High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1			3								
CO2		1	3	3								
CO3			3	3								
CO4			3	3	1						1	
CO5	1	1	3	3	1						1	

Course Content

UNIT I:

Basic Concepts: Overview: system life cycle. Algorithm Specification, Data Abstraction, Performance Analysis- Space complexity, Time complexity.

Stacks and Queues: Stacks, stacks using dynamic arrays, queues. Evaluation of expressions: Infix to Postfix, Evaluating postfix expressions. Towers of Hanoi problem, Applications of queues.

Linked lists: Singly Linked Lists and Chains, Representing Chains in C, linked stacks and queues

UNIT II:

Polynomials: Polynomial representation, adding polynomials, Circular List representation of polynomials, Doubly Linked List.

Trees: Introduction. **Binary Trees:** Properties of binary trees, binary tree representations. Binary Tree Traversals: In order, Pre order, Post order, level order traversal.

Binary Search Trees: Definition, searching a Binary Search Trees (BST), Insertion into a binary search tree, Deletion from a binary search tree.

UNIT III:

Efficient Binary Search Trees: AVL trees- definition, rotations, insertion.

Efficient Multi Search Trees: Introduction to m-way Search Trees, B Trees-insertion in to a B tree, deletion from a B tree.

Heaps: Priority queues, Definition of max heap, insertion into a max heap, deletion from a max heap.

	UNIT IV: **Graphs:** The graph abstract data type: Introduction, definitions, Graph Representations: Adjacency Matrix, Adjacency List. Elementary Graph Operations: Depth First Search, Breadth First Search **Sorting:** Insertion Sort, Shell Sort, Heap Sort, Merge Sort, Quick Sort. **Searching:** Linear search, Binary Search **Hashing:** General idea, Hash Functions, separate chaining, open addressing, rehashing, extendable hashing.
Text books and Reference books	**Text Book(s):** [1]. Horowitz Sahni and Anderson-Freed, "Fundamentals of Data Structures in C", 2nd edition, Universities Press, 2011. [2]. Mark Allen Weiss, "Data structure and Algorithm Analysis in C", 2nd edition, Addison Wesley Publication, 2010. **Reference Books:** [1]. YedidyahLangsam, Moshe J. Augenstein and Aaron M. Tenenbaum, "Data Structures using C and C++", 2nd edition, Pearson Education, 1999. [2]. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with Applications", 2nd edition, McGraw Hill, 2008.
E-resources and other digital material	[1]. Prof. Naveen Garg: IIT Delhi, (12, may, 2015). Data Structures and Algorithms [Nptel]. Available: http://nptel.ac.in/ [2]. Erik Demaine, (12, may, 2015). Advanced Data Structures [MIT-OpenCourseWare]. Available: http://ocw.mit.edu/

14IT3304-OPERATING SYSTEMS

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	14CS1103- Introduction to computing	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	**Upon successful completion of the course, the student will be able to:**	
	CO1	Understand the basic principles of operating systems.
	CO2	Implement CPU Scheduling & Disk Scheduling algorithms.
	CO3	Analyze the mechanisms used for process synchronization, deadlock prevention and deadlock detection.
	CO4	Implement Paging, Segmentation and Virtual Memory Management Techniques.
	CO5	Understand the file structure, access methods and directory structure mplementation.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3											
CO2	3	1							1			
CO3	1	1							1			
CO4	1	1										
CO5	1											

Course Content

UNIT I:

Introduction: Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations.

Operating-System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls**.**

Processes: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.

UNIT II:

Threads: Overview, Multithreading Models, Thread Libraries, Threading Issues.

CPU Scheduling: Basic Concepts, Scheduling Criteria , Scheduling Algorithms, Thread Scheduling ,Multiple-Processor Scheduling , Real-Time CPU Scheduling.

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors

UNIT III:

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing.

UNIT IV:

File System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

	Implementing File Systems: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery. **Mass-Storage Structure:** Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management.
Text books and Reference books	**Text Book(s):** [1]. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, "Operating System Concepts", 8thed, John Wiley &Sons (Asia) Pvt.Ltd, 2012. **Reference Books:** [1]. Dhananjay M. Dhamdhere, "Operating Systems: A Concept-Based Approach", 3ed, McGraw-Hill Education India Pvt. Ltd, 2010 [2]. William Stallings, "Operating System: Internals and Design Principles", 6 ed, 2009 [3]. Andrew S. Tanenbaum, "Modern Operating Systems", 3 ed, PHI, 2008. [4]. C. Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Co,1998.
E-resources and other digital material	[1]. Video Lectures on "Operating Systems" by Prof. P.K. Biswas Available: http://www.satishkashyap.com/2013/02/video-lectures-on-operating-systems-by.html [2]. P.J.K. and U. Berkeley 20 January Deadlock/CPU Scheduling.Available: http://freevideolectures.com/Course/2398/Operating-Systems-and-SystemProgramming-Fall-2009/10# [3]. C. Franklin and D. Coustan. 20 January). Memory Management Available: http://computer.howstuffworks.com/operating-system7.htm

14IT3305-COMPUTER ORGANIZATION

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	14CS1103- Introduction to computing	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basics of internal organization and architecture of a Digital computer.
	CO2	Understand the concepts of micro programmed control mechanism.
	CO3	Apply algorithms to compute arithmetic operations.
	CO4	Understand the Memory and I/O organization.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1										
CO2	1	1										
CO3	2											
CO4		1										

Course Content

UNIT I:

Register Transfer and Micro-Operations: Register Transfer Language, Register Transfer, Bus and memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instruction, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic.

UNIT II:

Micro Programmed Control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC)

UNIT III:

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point Arithmetic operations.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

UNIT IV:

Input-Output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor, Serial Communication.

Standard I/O Interfaces: PCI Bus, USB

Text books and Reference books

Text Book(s):

[1]. M. Moris. Mano, "Computer Systems Architecture", 3rd edition, Prentice Hall India, 2007.

	Reference Books: [1]. V.Carl Hamachar, "Computer Organization", McGraw Hill Edition, Fifth edition, 2011 [2]. J.P.Hayes, "Computer Architecture and Organization" TMH, Intenational Second Revised Edition, 1998 [3]. William Stallings, "Computer Organization and Architecture", Ninth Edition, Pearson/PHI, 2013 [4]. Andrew S. Tanenbaum, "Structured Computer Organization", Fifth Edition, PHI/Pearson, 2009
E-resources and other digital material	[1]. Video lectures by Prof. S. Raman, IIT Madras: http://www.myopencourses.com/subject/computer-organization-1 [2].P. S. Raman. Lecture Series on Computer Organization: https://www.youtube.com/playlist?list=PL1A5A6AE8AFC187B7

14IT3351-DATA STRUCTURES LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14CS1103- Introduction to Computing 14CS1203- Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand and Implement stack, queue and linked list abstract data types.
	CO2	Analyze and select appropriate abstract data type to solve a given problem.
	CO3	Implement insert and delete operations on binary, binary search, AVL and B trees.
	CO4	Implement Insertion Sort, Shell Sort, Heap Sort, Merge Sort and Quick Sort algorithms

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1		1	3	3							3	
CO2			3	3								
CO3			3	3	1							
CO4		1	3	3	1							
CO5			3	3								

Course Content

Week 1 & 2: Stack using array and its applications

C program to implement the operations on stacks using arrays.

C program for converting a given infix expression to postfix form

C program for evaluating a given postfix expression

Week 3 & 4: Queue and Circular queue implementation using array

C program to implement the operations on queues using arrays.

C program to implement the operations on circular queues

Design experiment using Stacks and Queues

Week 5: Single and Double linked list

C program to implement stack operations using singly linked list.

C program to implement queue operations using singly linked list

C program to implement the operations on doubly linked list

Week 6 & 7: Circular linked list and its applications

C program to implement the operations on circular linked list.

C program for the representation of polynomials using circular linked list and for the addition of two such polynomials.

Design experiment using single/double/circular linked lists.

Week 8: Binary search tree and operations

C program to create a binary search tree operations

C program to implement tree traversal techniques using recursion.

	Week 9:AVL Tree and operations C program to perform the following operations: Insertion into an AVL-tree and Deletion from an AVL-tree. **Week 10:B-Tree and operations** C program to perform B-tree operations: Insertion into a B-tree and Deletion from a B-tree. **Week 11:Searching techniques** C program to implement linear and binary search techniques. C program to implement Fibonacci search **Week 12 & 13:Sorting techniques** Implement sorting techniques using C:Insertion Sort, shell sort, Heap Sort, Merge Sort, Quick Sort Design experiment using Searching and sorting techniques
Text books and Reference books	**Text Book(s):** [1]. Horowitz Sahni and Anderson-Freed, "Fundamentals of Data Structures in C", 2nd edition, Universities Press, 2011. [2]. Mark Allen Weiss, "Data structure and Algorithm Analysis in C", 2nd edition, Addison Wesley Publication, 2010. **Reference Books:** [1]. YedidyahLangsam, Moshe J. Augenstein and Aaron M. Tenenbaum, "Data Structures using C and C++", 2nd edition, Pearson Education, 1999. [2]. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with Applications", 2nd edition, McGraw Hill, 2008.
E-resources and other digital material	[1]. Prof. Naveen Garg: IIT Delhi, (12, may, 2015). Data Structures and Algorithms [Nptel]. Available: http://nptel.ac.in/ [2]. Erik Demaine, (12, may, 2015). Advanced Data Structures [Mit-OpenCourseWare]. Available: http://ocw.mit.edu/

14IT3352-OPERATING SYSTEMS LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14CS1103- Introduction to computing	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Install and configure Open source and Closed source Operating Systems.
	CO2	Implement filter operations and develop Shell Scripts in LINUX.
	CO3	Analyze Thread Synchronization and develop Deadlock avoidance algorithm.
	CO4	Implement CPU Scheduling, Disk Scheduling and Page Replacement algorithms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	1		1	3							3	
CO2	1	1	1	3	3						1	
CO3	1	1	3	3	3						1	
CO4	1	1	3	3	3						3	

Course Content

Week 1
Operating System installation – Closed Source & Disk Fragmentation
Operating System installation – Open Source

Week 2
Implementation of Filter Commands

Week 3
Shell Scripting using Control Structures and Functions

Week 4
Implement producer consumer problem with counting Semaphores and Mutex.

Week 5 &6
Implement the following CPU Scheduling algorithms
a) FCFS b) SJF c) Priority d) Round Robin

Week 7:
Simulate Bankers algorithm for deadlock avoidance

Week 8&9
Simulate the following page replacement algorithms

a) FIFO b) LRU c) MFU d) LFU

Week 10 & 11
Implement Disk Scheduling Algorithms.

	a) Scan b) CScan **Week 12** Demonstrate operations on multi core operating system
Text books and Reference books	**Text Book(s):** [1]. Neil Matthew, Richard Stones, "Beginning Linux Programming", Paperback, Third Edition, Wiley Publishing company, 2003. [2]. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, "Operating System Concepts". 8th ed, John Wiley & Sons (Asia) Pvt. Ltd, 2012. **Reference Books:** [1]. Dhananjay M. Dhamdhere, "Operating Systems: A Concept-Based Approach". 3ed, McGraw-Hill Education India Pvt. Ltd, 2010 [2]. William Stallings, "Operating System: Internals and Design Principles". 6 ed, 2009 [3]. Andrew S. Tanenbaum, "Modern Operating Systems". 3 ed, PHI, 2008. [4]. C. Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Co, 1998.
E-resources and other digital material	[1]. Video Lectures on "Operating Systems" by Prof. P.K. Biswas http://www.satishkashyap.com/2013/02/video-lectures-on-operating-systems-by.html [2]. P.J.K. and U. Berkeley. 20 January). Deadlock/CPU Scheduling. Available: http://freevideolectures.com/Course/2398/Operating-Systems-and-SystemProgramming- Fall-2009/10# [3]. Franklin and D. Coustan. 20 January). Memory Management http://computer.howstuffworks.com/operating-system7.htm

14HS1353-COMMUNICATION SKILLS LAB

Course Category:	Institutional Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-2
Prerequisites:	14HS1104 - Technical English & Communication skills	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Be proficient in pronunciation of speech sounds including accentuation.
	CO2	Enhance the awareness of the elements of listening comprehension.
	CO3	Develop the abilities of rational argumentation and skills of public speaking.
	CO4	Be aware of the elements of professional communication
	CO5	Be exposed to the items of various competitive exams.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1								1	1	3	1	1
CO2					1			3	3	3	1	3
CO3	3		3	3	3	3	3	3	3	3	3	3
CO4	1	1	3	3	1	3	3	3	3	3	3	3
CO5		1	3	3	1	3	3	3	3	3	3	1

Course Content

UNIT:I :Elements of Spoken Expression and processes of Listening comprehension:

- Speech Mechanism
- Articulation of vowels and consonants
- Patterns of Accentuation
- Types and processes of Listening comprehension

UNIT II: Polemics and Public Speaking:

- Group Discussion
- Pyramid Discussion
- PNI
- Seminar Talk and Power Point Presentation

UNIT III: Professional Communication:

- Self Affirmation
- Advanced Composition including Official letters and e-mail
- Résumé Preparation
- Elements of Non-Verbal Communication

UNIT IV: Life Skills and Vocabulary for Competitive Examinations:

- Select Life Skills(50)
- Select Logies, Isms, Phobias and Manias (25 each)
- Sentence Completion(50 items)
- Fundamentals of Syllogisms

Text books and Reference books

Text Book(s):

[1]. Martin Cutts, "Oxford Guide to Plain English", 7th Impression, OUP, 2011

	[2]. "Exercises in Spoken English", Prepared by Department of Phonetics and Spoken English, CIEFL, OUP, 21st Impression, 2003 **Reference Books:** [1]. Stephen R Covey, "The 7 Habits of Highly Effective people", II edition, (Pocket Books) Simon & Schuster UK Ltd, 2004 [2]. Martin Cutts, "Oxford Guide to Plain English", 7th Impression, OUP, 2011 [3]. Deborah. J. Bennett, "Logic made easy: How to know when Language Deceive you", I edition(Reprint), 2005 [4]. "Eclectic Learning Materials" offered by the Department
E-resources and other digital material	[1]. ODll Language Learner's Software, 27-6-2012 Orell Techno Systems , [2]. Visionet Spears Digital Language Lab software Advance Pro , 28-01-2015 [3]. www.natcorp.ox.ac.uk, British National Corpus, XML edition 2007.

14IT3354-INTERNET PROGRAMMING LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14CS1103- Introduction to Computing 14CS1203- Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	**Upon successful completion of the course, the student will be able to:**	
	CO1	Acquire knowledge and proficiency in basic techniques for the development of web based applications
	CO2	Design interactive web pages using HTML and Cascading Styles sheets.
	CO3	Apply the knowledge of XML fundamentals and its technology in Electronic Data Interchange

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1										
CO2					3							
CO3	1				3							

Course Content

Week 1
Fundamentals of Web pages: Basic concepts Tiers and architecture of web and types of webpages

Week 2
Develop a static web page that demonstrates basic HTML tags

Week 3
Develop web pages that demonstrate forms

Week 4
Develop web pages that demonstrate HTML tables

Week 5
Develop web pages that demonstrate internal links

Case study: Application Development using HTML5

Week 6
Develop web page to demonstrate inline, internal CSS.

Week 7
Develop web page to demonstrate external CSS.

Week 8
Develop web pages to demonstrate text shadows, backgrounds, colors, transitions

	Case study: Designing an application through web pages using HTML &CSS **Week 9** Design an XML document to structure to various applications **Week 10** Design XML Documents to create structures using DTD Design XML Documents to create structures using Schema **Case study**: Design XML Document to applications using either DTD or Schema
Text books and Reference books	**Text Book(s):** [1]. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, "Internet & World Wide Web How to Program", Prentice Hall, Fifth Edition, 2011 **Reference Books:** [1]. S. M. Grath, "XML by Example", Prentice Hall of India, 5 edition [2]. C. Bates, "Web Programming building Internet Applications", Willey Dream Tech, 3rd edition, 2006.
E-resources and other digital material	[1]. Prof. IndranilSengupta, (16,05,2015) Internet Technology. Available: http://nptel.ac.in/syllabus/syllabus.php?subjectId=106105084

14MA1401-PROBABILITY AND STATISTICS

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	Set theory, Basic probability, probability distributions.	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand various types of probability distributions and provides knowledge of modeling in the presence of uncertainties.
	CO2	Apply random phenomena of sample to develop an intuition.
	CO3	Testing of Hypothesis and Inferences concerning mean, variance and proportions.
	CO4	Analyze Quality improvement, control charts and reliability to improve Statistical skills.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3			3							
CO2	3	3			1							
CO3	3	3		3	3	3						
CO4	3	3		3	3	3						

Course Content

UNIT I:

Probability Distributions: Random Variables (discrete and continuous) , Expectation, Variance and Standard deviation of discrete random variable, Binomial distribution, Poisson distribution.

Probability Densities: Expectations, Variance and standard deviation of continuous random variables, Normal distribution, Normal approximation to the Binomial distribution, Other probability densities - Uniform distribution, Log normal distribution, Gamma distribution, Beta distribution, Weibull distribution.

Sampling Distributions: Populations and Samples- Sampling distribution of the mean (SD known and SD unknown) – Sampling distribution of the variance.

UNIT II:

Inference Concerning Means: Point Estimation- Interval Estimation – Bayesian Estimation – Test of Hypothesis – Null Hypothesis and Tests of Hypothesis – Hypothesis concerning one mean – Relation between tests and Confidence intervals – Operating characteristic curves - Inference concerning two means.

UNIT III:

Inference Concerning Variances: Estimation of variances- Hypothesis concerning one variance- Hypothesis concerning two variances.

Inference Concerning Proportions: Estimation of Proportions- Hypothesis concerning one Proportion- Hypothesis concerning several Proportions – The Analysis of r x c Tables- Goodness of fit.

UNIT IV:

The Statistical Content of Quality Improvement Programs: Quality Control- Control Charts for Measurements - Control Charts for Attributes.

	Applications to Reliability and Life Testing: Reliability - Failure – Time Distributions – The Exponential Model in Reliability.
Text books and Reference books	**Text Book(s):** [1]. Richard A. Johnson, "Probability and Statistics for Engineers", Eighth edition Prentice Hall of India **Reference Books:** [1]. R.E. Walpole, R.H.Myers&S.L.Myers, "Probability & Statistics for Engineers & Scientist", Sixth Edition, Prentice Hall of India / Pearson Education. [2]. Purna Chandra Biswal, "Probability and Statistics" , Pearson Education, Prentice Hall of India 2007. [3]. T.K.V.Iyengar, B.Krishna Gandhi, S.Ranganatham, M.V.S.S.N.Prasad, "Probability and Statistics", S.Chand.
E-resources and other digital material	[1]. probweb.berkeley.edu/teaching.html [2]. statsci.org/teaching.html [3]. video lectures.nptel.iitm.ac.in

14IT3402-DATABASE MANAGEMENT SYSTEMS

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites:	14IT3302 – Discrete Mathematical Structures 14IT3303 – Data Structures	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Transform information model into a relational database schema to implement the schema using DBMS.
	CO2	Formulate solutions to a broad range of query problems using formal and informal query languages.
	CO3	Understand the normalization theory and construct normalized databases.
	CO4	Demonstrate understanding of transaction processing, issues surrounding concurrency control and recovery.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3										
CO2		3	3	3							3	
CO3	1	3	3	3							3	3
CO4	1	3										

Course Content

UNIT I:

Overview of Data base systems: File systems vs DBMS, advantages of a DBMS, Describing and storing data in a DBMS, structure of a DBMS, People who work with databases.

Introduction to Database Design: Database Design and ER Diagrams; Entities, attributes, and Entity sets; Relationships and relationship sets ; additional features of the ER Model.

Relational Model: Introduction to the Relational Model; Integrity Constraint Over relations ; Enforcing Integrity constraints ; Querying relational data ; Logical data base Design ; Introduction to Views; Destroying / altering Tables and Views.

UNIT II:

Relational Algebra: Relational Algebra - Selection and projection, set operations, renaming, Joins, Division, Examples of Algebra Queries; Expressive Power of Algebra and Calculus.

SQL: Queries And Constraints: Form of Basic SQL Query - Examples of Basic SQL Queries ; UNION, INTERSECT, and EXCEPT; Nested Queries - Introduction to Nested Queries , Correlated Nested Queries , Set - Comparison Operators ; Aggregative Operators ; NULL values - Comparison using Null values , Logical connectivity's - AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values ; Complex Integrity Constraints in SQL.

NoSQL: An Overview of NoSQL: What NoSQL is and what it is not, Why NoSQL, List of NoSQL Databases.

UNIT III:

Schema Refinement and Normal forms: Schema refinement - Problems Caused by

	redundancy, Decompositions, Problem related to decomposition; Functional Dependencies; reasoning about FDs; Normal Forms- First, Second, Third Normal forms, BCNF; properties of decomposition - Lossless join Decomposition, Dependency preserving Decomposition; Schema refinement in Data base Design; Multi valued Dependencies - Forth Normal Form.
	UNIT IV: **Overview of Transaction Management:** ACID Properties; Transactions and Schedules; Concurrent Execution of transaction; Lock Based Concurrency Control; Performance Locking; Transaction Support in SQL. **Concurrency Control:** 2PL, Serializability, and recoverability; Introduction to Lock Management; Lock Conversions; Dealing with Dead Locks; Specialized Locking Techniques; Concurrency without Locking. **Crash Recovery:** Introduction to ARIES; the Log; Other Recovery related Structures - the Write-Ahead Log Protocol, Check pointing; recovering from a System Crash. **Security and Authorization:** Introduction to Database Security ;Access Control ; Discretionary Access Control -Grant and Revoke on Views and Integrity Constraints ;Mandatory Access Control -Multilevel Relations and Poly instantiation.
Text books and Reference books	**Text Book(s):** [1]. Raghurama Krishnan, Johannes Gehrke, "Database Management Systems", 3rd Edition, TATA McGrawHill, 2003. [2]. Gauravvaish ,"Getting Started with NoSQL"(Kindle Edition),1st edition,2007. **Reference Books:** [1]. C.J.Date , "Introduction to Database Systems", 8th edition, Pearson Education, 2004. [2]. Rob & Coronel ,"Data base Systems design, Implementation, and Management", 8th Edition,,2007. [3]. Elmasri Navrate, "Data base Management System", 3rdEdition,Pearson Education, 2005.
E-resources and other digital material	[1]. S. Sharma,(09,05,2015).Introduction to DBMS. http://www.youtube.com/watch?v=1f34MwqUhx8 [2]. P. B. Mahanty,(09,05,2015). DBMS and RDBMS. http://nptel.iitm.ac.in/video.php?courseId=1128&v=7952RsbAx2w8 [3]. ShyamalalKumawat,(09,05,2015). MYSQL.https://www.youtube.com/watch?v=XiDnK9Lq-Ng [4]. Prof.D.Janakiram,(09,05,2015). DBMS. https://www.youtube.com/watch?v=EUzsy3W4I0g&list=PL536244562840E982 [5]. Jennifer widom,(09,05,2015). Introduction to Databases https://www.youtube.com/watch?v=ShjrtAQmIVg.

14IT3403-DESIGN AND ANALYSIS OF ALGORITHMS

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	14IT3302 – Discrete Mathematical Structures 14IT3303 – Data Structures	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand asymptotic notations to Analyze the performance of algorithms.
	CO2	Identify the differences in design techniques, solve novel problems using appropriate Technique.
	CO3	Apply algorithms for performing operations on graphs and trees.
	CO4	Analyze deterministic and nondeterministic algorithms to solve complex problems.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1	1		1						1	
CO2	3	3	1		3							
CO3	3	3	3	3	3						3	
CO4	3	3			1							

Course Content

UNIT I:

Introduction: What is an algorithm, Algorithm Specification: Pseudo code Conventions, Recursive Algorithms, Performance Analysis: Space Complexity, Time Complexity, Asymptotic Notation (Big "oh", Omega, Theta, Little "oh").

Elementary Data Structures: Sets and Disjoints: Introduction, union and find operations.

Graphs: Introduction, Definitions, Graph Representations.

Techniques for Graphs: Breadth First Search and Traversal, Depth First Search and Traversal, Connected components and Spanning trees, Biconnected components and DFS.

UNIT II:

Divide and conquer: General method, Binary search, Finding the Maximum and Minimum, Merge sort, Quick sort, Strassen's matrix multiplication.

Greedy method: General method, knapsack problem, Job Sequencing with deadlines, Minimum cost spanning trees: Prim's and Kruskal's algorithms, Optimal merge patterns and Huffman codes, Single source shortest path problem.

UNIT III:

Dynamic Programming: General method, Multistage graph problem, All pairs shortest path problem, Optimal binary search trees, 0/1 knapsack problem, Travelling sales person problem.

Backtracking: General method, 8-queens problem, sum of subsets, graph coloring, Hamiltonian cycles, knapsack problem

UNIT IV:

Branch and Bound: The method: Least Cost (LC) Search, Control Abstractions for LC-Search, FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1knapsack problem:

	LC Branch and Bound solution, FIFO Branch and Bound solution, Travelling sales person problem. **NP-Hard and NP-Complete problems**: Basic concepts, non-deterministic algorithms, the classes NP Hard and NP Complete and Cook's theorem.
Text books and Reference books	**Text Book(s):** [1]. E. Horowitz, et al, "Fundamentals of Computer Algorithms", 2nd Edition, University Press(India)Pvt. Ltd, 2011. **Reference Books:** [1]. S.K.Basu, "Design Methods and Analysis of Algorithms", PHI Learning Private Limited, New Delhi, 2008 [2]. T.H.Cormen, et al, "Introduction to Algorithms", 2 ed, PHI Pvt. Ltd. / Pearson Education, 2001.
E-resources and other digital material	[1]. Prof. AbhiramRamade, (09, 05, 2015).Computer Science Department,IITBombay,Available: http://nptel.ac.in/courses/106101060/ [2]. Prof. Tim Roughgarden, (09, 05, 2015). Kleinberg and Tardos, Algorithm Design, 2005,. Available: http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms

14HS1404-ENVIRONMENTAL STUDIES

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	Concern on Conservation and Preservation of Environment	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	**Upon successful completion of the course, the student will be able to:**	
	CO1	Understand the various natural resources, analyze and explore degradation management
	CO2	Understand the Ecosystems and need of Biodiversity
	CO3	Realize and Explore the Problems related to Environmental pollution and its management
	CO4	Apply the Role of Information Technology and analyze social issues, Acts associated with Environment.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1							3	1			
CO2			1			3		3				
CO3			1			3						
CO4			1			3		3			1	

Course Content

UNIT I:

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance

Need for public awareness.

Natural Resources: Renewable and Non-renewable Resources: Natural resources and associated problems.

Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT II:

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

	Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity and Its Conservation:** Introduction, definition: genetic, species and ecosystem diversity. Biogeographical classification of India. **Value of biodiversity:** consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. **Threats to biodiversity:** habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. **Conservation of biodiversity:** in-situ and ex-situ conservation of biodiversity.
	UNIT III: **Environmental Pollution:** Definition, Causes, effects and control measures of Air pollution (b) Water pollution Soil pollution (d) Marine pollution Noise pollution (f) Thermal pollution Nuclear hazards **Solid waste management:** Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution. **Disaster management:** Floods, earthquake, cyclone and landslides
	UNIT IV: **Social Issues and the Environment:** From unsustainable to sustainable development, Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. **Environmental ethics:** Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products. **Environment Protection Act:** Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness. **Human Population and the Environment:** Population growth, variation among nations, Population explosion—Family Welfare Programme, Environment and human health, Human rights. Value education. HIV/AIDS, Women and Child Welfare, Role of Information Technology in environment and human health. **Field Work/ Case Studies {**NOT TO BE INCLUDED IN SEMESTER END EXAMS**}** Visit to a local area to document environmental assets—river/forest/grassland/hill/ mountain, Visit to a local polluted site—Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems—pond, river, hill slopes, etc.
Text books and Reference books	**Text Book(s):** [1]. Erach Bharucha, "Text book for **ENVIRONMENTAL STUDIES** for under graduate courses of all branches of higher education" –-- For University Grants Commission, University press.2004 **Reference Books:** [1]. Anjaneyulu Y, "Introduction to Environmental sciences", B S Publications PVT Ltd, Hyderabad 2004
E-resources and other digital material	[1]. Collegesat.du.ac.in/UG/Envinromental%20**Studies**_ebook.**pdf**

14IT3405-OOPS USING JAVA

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	14CS1203 – Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the concepts of object oriented programming.
	CO2	Implement Exception Handling techniques and multiple inheritance through interfaces.
	CO3	Apply thread capabilities and Collections framework.
	CO4	Develop Graphical user interface applications using Swing and Applet Components.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1									3	
CO2		1										
CO3		1	3									
CO4											3	

Course Content

UNIT I:

Fundamentals of Object Oriented Programming: Introduction, Object oriented paradigm, Basic concepts of Object Oriented Programming, Benefits of OOP, and Applications of OOP.

Introduction to Java: Java history, java features, how java differs from C and C++.

Data Types, variables and arrays: Java keywords, Primitive types, Integers, Floating-Point Types, Characters, Booleans, Variables, Type Conversion, casting and Arrays.

Classes and objects: Class fundamentals, declaring objects, assigning object reference variables, introducing methods, constructors, this keyword, Garbage collection, overloading methods, using objects as parameters, Returning objects, Recursion, static and final keywords, nested and inner classes.

String Handling: The String Constructors, String Buffer Class, String Tokenizer class.

UNIT II:

Inheritance: Inheritance basics, using super, multilevel hierarchy, method overriding, dynamic method dispatch, using abstract classes, final with inheritance.

Packages & Interfaces: Defining a package, finding package and CLASSPATH. Access protection, importing packages, Defining an interface, implementing interfaces, nested interfaces, applying interfaces, variables in interfaces.

Exception handling: Exception handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, throw, throws, finally, creating your own exception subclasses.

UNIT III:

Stream Classes: Byte Streams- InputStream, OutputStream, FileInputStream, FileOutputStream, Character Streams- Reader, Writer, FileReader, FileWriter.

Multithread Programming: The Java Thread Model, Creating a thread: Implementing Runnable, Extending Thread, creating multiple threads, Thread Priorities,

	Synchronization: Using Synchronized methods, The synchronized Statement. **The Applet Class**: Applet Basics, Applet Architecture, Applet Skeleton, A Simple Banner Applets, Passing Parameters to Applets.
	UNIT IV: **Event Handling:** The delegation event model- Events, Event Sources, Event Listeners. Event Classes, Event Listener Interfaces, Using the delegation Event Model, Adapter Classes. **Swing Components:** JLable and ImageIcon, JTextField, The Swing Buttons: J Button, CheckBoxes, RadioButtons, JTabbedPane, JList, JComboBox, JTable, Menu Bars and Menu in Abtract Window ToolKit. **Collections Framework:** Collections overview, Collection interfaces: Collection, List, and Set. **Collection Classes:** ArrayList, LinkedList, HashSet. **Map Classes**: HashMap, TreeMap.
Text books and Reference books	**Text Book(s):** [1] E Balagurusamy, "Programming with Java: A Primer", 4th Edition, Tata McGraw Hill Education Pvt Ltd., 2011. [UNIT – I, Chapter – 1] [2] Herbert Schildt, "Java The Complete Reference", 8th Edition, McGraw-Hill Education, New Delhi, 2011. [UNIT – I (Chapter – 2,3, 4, 5) , UNIT – II , III , IV] **Reference Books:** [1] Herbert Schildt, Dale Skrien, "Java Fundamentals A Comprehension Introduction", Special Indian Edition, McGraw-Hill Education India Pvt. Ltd, 2013. [2] Paul J. Dietel and Dr.Harvey M. Deitel, "Java How to Program", 9th Edition, Prentice-Hall, Pearson Education, 2011. [3] Timothy Budd, "Understanding Object Oriented Programming with Java ", Updated edition, Pearson Education, 2013
E-resources and other digital material	[1] Prof. Indranil Sengupta: IIT Khargpur (12, May,2015). Internet Technology [NPTEL].Available: http://nptel.ac.in/syllabus/106105084/ [2] Learners TV, (12, may, 2015). Java Programming. Available: http://www.nptelvideos.com/java/java_video_lectures_tutorials.php

14IT3451-DATABASE MANAGEMENT SYSTEMS LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14IT3302 – Discrete Mathematical Structures 14CS1203- Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	**Upon successful completion of the course, the student will be able to:**	
	CO1	Analyze the concepts of different database technologies.
	CO2	Design and implement a database schema for a given problem domain.
	CO3	Implement a database using formal and informal query languages.
	CO4	Understand the different issues involved in the database design and construct a normalized database.
	CO5	Implement PL/SQL triggers, functions, Procedures and packages for ensuring data integrity and security.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1		3	3						3	
CO2		1									1	
CO3			3		1						3	
CO4			3								3	
CO5	3	3	1	1	3						3	

Course Content

Week 1:
Comparison on different types of DBMS.
Construct an ER-Diagram for given information model by using appropriate tool.

Week 2:
Transform ER model into a Relational model to implement the Data Definition language.
To implement Constraints on Relational Model.

Week 3:
To implement Data Manipulation Language on Relational Model.
Solving a query problems using different formal and informal query languages

Week 4:
To implement Queries using operators
(a) Logical operators (b)Relational operators (c)Comparison operators

Week 5:
To implementation Queries using functions
(a)Aggregate functions (b)String functions (c)date/time functions (d)conversion functions
(e) Mathematical functions

Week 6: To implement Nested Queries ,Queries using joins, Set operations and Security issues.

	Week 7 & 8: Case Study on a given application: apply above week 1 to week 6 lab list operations and Refine the schemas up to 4th normal form. (Mini Project). **Week 9:** Installing and Configuring MongoDBNoSQL. create a zip code data with different data types of NoSQL. To implementation different Queries on zip code data. **Week 10:** PL/SQL Programming I Programs using control structures. **Week 11:** PL/SQL Programming II Programs using functions, procedures and Cursors. **Week 12:** PL/SQL Programming III Programs using Triggers and Packages. **Week 13:** Case study on one real time application: apply week11 and week12 lab list operations.
Text books and Reference books	**TextBook(s):** [1]. Sanjay Mishra, Alan eaulieu, "Mastering Oracle SQL Paperback ", 2nd edition , O'Reilly Media, 2004. [2]. Steven Feuerstien,"Oracle Pl/SQL Best Practices, 2/E (Covers Oracle Database 11G)", O'Reilly Media ,2007. **Referene Books:** [1]. Karl seguin, "The Little MongoDBBooK", 2/E version 2.6, 2011.

14IT3452-JAVA PROGRAMMING LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14CS1103- Introduction to Computing 14CS1203- Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Implement Object Oriented Programming Principles.
	CO2	Understand and implement the use and creation of packages and interfaces.
	CO3	Implement exception handling, Multithreading, Streams and collection framework.
	CO4	Develop web based applications using applets and Swings.

Contribution of Course Outcomes towards achievement of Program Outcomes (1–Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1											
CO2	1	3	3									
CO3		1	1									
CO4		3	1						3		3	1

Course Content

Week 1:

Creating classes containing methods with and without arguments and creating objects

Week 2:

Java application to make use of default and parameterised constructors

Java application to implement method overloading

Java application to make use of static and final variables

Week 3:

Java application on String operations

Java application to implement inheritance – Multilevel and hierarchical inheritance

Java application to implement interfaces

Week 4:

Java application on implementing abstract classes and implementing dynamic method despatch

Java application on Exception Handling techniques

Week 5:

Java application on user defined exceptions, throw and throws keywords

Java application to create threads using Thread Class and Runnable interfaces

	Java application to implement synchronization **Week 6:** Java application on streams Java application to copy contents of one file to another **Week 7:** Java application on applets and parameter passing Java application to implement mouse and key listeners **Week 8 & Week 9:** Java application on Swing components **Week 10 & Week 11:** Java application on Collection Framework **Week 12:** Java application on GUI Design **Case Studies:** Developing stand alone and web applications
Text books and Reference books	**Text Book(s):** [1]. Herbert Schildt, "Java The Complete Reference", McGraw-Hill, 8th Edition, 2011 **Reference Books:** [1]. H. M. D. a. P. J. Dietel, "Java How to program", sixth edition ed.: Pearson education/PHI, 2011. [2]. C. S. H. a. G. Cornell, "Core java 2", Seventh Edition, Pearson Education, 2005 [3]. C. Horstmann, "Big Java", 2nd Edition.: john Wiley and Sons, Pearson Education, 2005
E-resources and other digital material	[1]. Prof. Indranil Sengupta: IIT Khargpur (12, May,2015). Internet Technology [NPTEL]. Available: http://nptel.ac.in/syllabus/106105084/ [2]. Learners TV, (12, may, 2015). Java Programming. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php

14IT3453-WEB PROGRAMMING LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14CS1103- Introduction to Computing 14CS1203- Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	**Upon successful completion of the course, the student will be able to:**	
	CO1	Design interactive web pages using operators and control structures
	CO2	Design and implement web pages using forms
	CO3	Design web pages that can handle session tracking

Contribution of Course Outcomes towards achievement of Program Outcomes(1–Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1					1							
CO2	1	1			3						1	
CO3		1			3						3	

Course Content

Week 1
Installation and configuration of scripting language

Week 2
Develop web pages on making use of Data types

Week 3
Develop web pages that makes use of operators

Week 4
Develop web pages that makes use of control structures

Week 5&6
Develop web pages using arrays and functions

Week 7
Design pages based on objects

Week 8
Develop web pages to demonstrate Formhandling

Week 9
Develop web pages to demonstrate validation of forms/active record validation

Case study: Application Development that uses form validation

	Week 10 Develop web pages Cookies and Sessions handling **Case study:** Application Development using the language
Text books and Reference books	[1]. C. Bates, "Web Programming building Internet Applications", Willey Dream Tech, 3rd edition, 2006 [2]. Kevin Tatroe, Peter MacIntyre, "Programming PHP", O'REILLY, 3rd Edition, 2013 [3]. Adam Trachtenberg, David Sklar, "PHP Cookbook: Solutions and Examples for PHP Programmers", O'REILLY, 2nd Edition, 2006 [4]. Lucas Carlson, Leonard Richardson, "Ruby Cookbook" ,O'REILLY, 2nd Edition,2015 [5]. Jay McGavren, "Head First Ruby", O'REILLY, 2nd Edition,2015
E-resources and other digital material	[1]. Prof. Indranil Sengupta, (16,05,2015) Internet Technology. Available: http://nptel.ac.in/syllabus/syllabus.php?subjectId=106105084

14IT3501-SOFTWARE ENGINEERING

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-2-0
Prerequisites:	14CS1103 - Introduction to computers	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand Software Engineering fundamentals and life cycle models- prescriptive models, Evolutionary process models and specialized models.
	CO2	Analyze the requirements engineering tasks and design concepts
	CO3	Analyze various software testing strategies like white box , black box, basis path and regression testing.
	CO4	Understand and design Class diagrams, use case diagrams, interaction diagrams, state diagrams and deployment diagrams for any real time applications.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2			1						2	
CO2		3	1							1	2	
CO3	1										2	
CO4		3	3	2							2	

Course Content

UNIT I:

Introduction: Software, Software Myths, Process Framework, Capability Maturity Model Integration.

Software Process Models: Prescriptive process model, Waterfall Model, Incremental process model, Evolutionary process model, Unified process.

Agile Process Models: Agility, Agile Process, Agile Process Models.

UNIT II:

Requirements Engineering: Requirements Engineering tasks, Initiating the Requirements engineering process, Eliciting Requirements- Developing use cases, Building the Analysis model, Negotiating, validating Requirements.

Building the Analysis Model: Requirements Analysis, Data Modelling Concepts

Design Engineering: Design with the context of Software Engineering, Design Process and Design Quality, Design Concepts.

UNIT III:

Architectural Design: Software Architecture, Data Design, Architectural Styles and Patterns, Architectural Design

Performing User Interface Design: The Golden Rules, Interface Design Steps

Testing Strategies: A Strategic Approach to Software Testing – Verification and Validation, Organizing for software testing, Test Strategies for Conventional software, Validation Testing, System Testing, Art of Debugging

	UNIT IV: **Testing Tactics**: Software Testing Fundamentals, Black Box Testing, White Box Testing, Basis Path Testing, Control Structure Testing. **Introduction to UML: An** Overview of the UML, A Conceptual Model of UML, Class Diagrams, Object Diagrams, Use case Diagrams, Interaction Diagrams, Activity Diagram, State Diagrams, Deployment Diagrams.
Text books and Reference books	**Text books** [1]. Roger S Pressman, "Software Engineering – A Practitioner's Approach", Sixth Edition, MCGRAW Hill Publications, 2010. [2]. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language user guide", Second Edition, Pearson, 2008. **References** [1]. I. Somerville, "Software Engineering", 6 ed.: Pearson Education. [2]. C. Ghezzi, et al., "Fundamentals of Software Engineering", Second Edition, PHI. [3]. RajibMall, "Fundamentals of Software Engineering", Second Edition, PHI.
E-resources and other digital material	[1]. https://www.youtube.com/watch?v=Z6f9ckEElsU, NPTEL, Lecture Series on Software Engineering by Prof.N.L. Sarda, Prof. Umesh Bellur,Prof.R.K.Joshi and Prof.Shashi Kelkar, Department of Computer Science & Engineering ,IIT Bombay, Oct 8, 2008. [2]. Software engineering NPTEL. Available: http://nptel.iitm.ac.in/video.php?courseId=1076 [3]. Software engineering MIT Videos. Available: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-912- introduction-to-copyright-law-january-iap-2006/video-lectures/lecture-4-softwarelicensing [4]. https://www.youtube.com/watch?v=4qKnEgsF.CA&list=PLrYIqcAgMeQgyMfiyWf7hn8BPUw8j_ors

14IT3502 -DATA WAREHOUSING & MINING

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites:	14IT3402 -DBMS	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Characterize a data mining system to examine the given database with data warehouse architecture
	CO2	Discover various interesting patterns or correlations among large set of data items which are useful in data analysis
	CO3	Design classifier model to predict future trends and Validate classifier accuracy with evaluation measures such as confusion matrix, sensitivity , specificity, precision recall , speed, robustness, scalability, interpretability etc.,
	CO4	Implement unsupervised learning techniques(clustering) for an application such as data instances segmentation which gives an insight into data distribution.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1		1	3	3	1							
CO2		2	3	3	1				2			
CO3		2	3	3	2				1			
CO4		2	3	3	2				1			
CO5												

Course Content

UNIT I:

Data Warehouse and Online Analytical Processing

Data Warehouse basic concepts , Data Warehouse Modeling: Data cube and OLAP, Data Warehouse Implementation , Data Generalization by Attribute Oriented Induction, Data Cube Computation Preliminary Concepts

Data Mining Introduction

Introduction, What and Why Data Mining, what kind of Data can be mined, What kind of Patterns Can be Mined, Which technologies are Used, Major Issues in data Mining, Getting to know your data: Data Objects and Attribute Types, Basic Statistical Description of , Data Visualization, Measuring Data Similarity and Dissimilarity

UNIT II:

Data Preprocessing

Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

Mining Frequent Patterns, Associations, and Correlations

Basic Concepts , Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods

UNIT III:

Classification & Prediction

Introduction, Classification by Decision tree induction, Bayesian Classification, Rule-Based Classification, Model Evaluation and Selection, Techniques to improve

	Classification Accuracy, Classification by Backpropagation, Support Vector Machines
	UNIT IV: **Cluster Analysis** Introduction, overview of basic Clustering methods, partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN, Grid- -based Clustering Method: STRING, Evaluation of Clustering.
Text books and Reference books	**Text Book(s):** [1]. Jiawei Han and MichelineKamber "Data Mining Concepts and Techniques" Third Edition, Elsevier, 2012. **Reference Books:** [1]. G. K. Gupta ,"Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006 [2]. A Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to DataMining", Pearson Education, 2007 [3]. K.P. Soman, ShyamDiwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006
E-resources and other digital material	[1]. Dr.S.Srinath. Introduction to Data Warehousing and OLAP [2]. Chakrabarti Bridging the Structured, Unstructured Gap http://videolectures.net/wsdm2010_chakrabarti_bsus/ [3]. QiLu Data mining Lecture.http://videolectures.net/kdd2010-lu-dmosi/

14IT3503-WEB PROGRAMMING AND DEVELOPMENT

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	14IT3405 - Object Oriented Programming using Java	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Develop secure and dynamic web pages using JavaScript
	CO2	Understand the basics of XML and JDBC Objects
	CO3	Develop and deploy Servlets and JSP technologies
	CO4	Understand and Analyze Enterprise Java Beans

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	3								1	
CO2	2	2	3								1	
CO3	2	2	3								1	
CO4	2	3	3									

Course Content

UNIT I:

Java Script:Introduction to scripting, Control Structures-I, Control Structures-II, Functions, Arrays, Objects.

XMl: Introduction,xmlBasics,structuringData,xmlNamespaces,Document Type Definitions(DTDs), w3c XML schema Documents

UNIT II:

JDBC OBJECTS: The concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview Of The JDBC Process, Database Connection, Associating The JDBC/ODBC bridge with the Database, Statement objects, Result set .

Java Servlets: Java Servlets and common gateway interface programming, benefits of using a java servlets, simple java servlet, anatomy of a java servlet, deployment descriptor, reading data from a client, reading http request headers, sending data to a client and working the http response header, working the cookies, tracking sessions

UNIT III:

Java Server Pages :JSP, JSP tags, Tomcat, Request String. User Sessions, Cookies, Sessions Objects

UNIT IV:

Enterprise java Beans : Enterprise, Deployment Descriptors, Session Java Bean, Entity Java Bean, Message-Driven Bean

Text books and Reference books

Text Book(s):

[1]. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, "Internet & World Wide Web How to Program", 5th Edition, Pearson Education, 2011

[2]. James Keogh, "J2Ee: The Complete Reference", 1st Edition, Mcgraw Hill

	Education, 2002 **Reference Books:** [1]. Chris Bates, "Web Programming, building internet applications", 2nd Eedition, WILEY Dreamtech,2006 [2]. Hans Bergsen, "Java Server Pages", SPD O'Reilly, 2nd edition, 2002
E-resources and other digital material	[1]. Patrick Royal, Java EE Essentials: Servlets and JavaServer Faces, 26-03-2016, Available: https://www.lynda.com/Java-tutorials/Java-EE-Essentials-Servlets-JavaServer-Faces/124399-2.html [2]. Advanced Java Programming by Infinite Skills, 26-03-2016 Available: https://www.udemy.com/advanced-java-programming/ [3]. Programming Tutorials by Rose India, 20-04-2016 – Available https://www.roseindia.net/

14IT3504-COMPUTER NETWORKS

Course Category:	Programme core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites :	14IT1103 - Introduction to Computing	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the reference models and physical connections of network systems
	CO2	Understand the address mapping elements and various transport layer protocols.
	CO3	Analyze various routing algorithms for finding the optimal path.
	CO4	Analyze issues in data link layer and apply error detection, correction techniques.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1					1						1	
CO2		1			1	2	2				1	
CO3	3	1			2		1				1	
CO4	1				1		2				1	

Course Content

UNIT I:

Introduction: Uses of Computer Networks, Network Hardware, LANs, MANs, WANs, Network Software.

Reference Models: The OSI Reference Model, TCP/IP Reference Model, the comparison of OSI, and TCP/IP reference models.

UNIT II:

Application Layer: Principles of network applications, The Web and HTTP, FTP, E-Mail in the internet, DNS-The internet's directory service.

Transport Layer: Connectionless Transport: UDP, Connection-Oriented Transport: TCP, Principles Congestion Control, TCP Congestion Control.

UNIT III:

The Network Layer: Introduction, Virtual circuits and Datagram Networks, The Internet Protocol(IP), Routing Algorithms, Routing in the Internet, Broadcast and Multicast routing

UNIT IV:

The Link Layer and Local Area Networks: Introduction and services, Error Detection and Correction Techniques, Multiple Access Protocols, Addressing, Ethernet**.**

Physical Layer: Guided transmission media: Magnetic Media, Twisted Pair, Coaxial Cable and Fiber Optics.

Text books and Reference books

Text Book(s):

[1]. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Third ed.: Pearson Education,2007

[2]. A.S. Tanenbaum, "Computer Networks", 5th Edition, Pearson Education /

	PHI, 2011 **Reference Books:** [1]. Behrouz A Fourzan, Data communications and networking 4th edition, TMH [2]. *Larry L. Peterson*, Bruce S. Davie, "Computer Networks: A Systems Approach", 5th edition, Morgan Publishers, 2011.
E-resources and other digital material	[1]. http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Computer%20networks/New_index1.html [2]. https://www.youtube.com/watch?v=O_rsqVtaloI [3]. https://www.tlm.unavarra.es/~daniel/docencia/arss/arss10_11/practicas/Tutorial_CSMA-CD.pdf [4]. .http://www.tutorialspoint.com/internet_technologies/internet_domain_name_system.htm

14IT2505A-DATA STRUCTURES

Course Category:	Institutional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites:	14CS1103: Introduction to Computing 14CS1203 : C Programming	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand Abstract Data Types, Arrays and Pointers
	CO2	Analyze and select appropriate abstract data type to solve a given problem.
	CO3	Understand non-linear data structures - Trees, Graphs and their representations.
	CO4	Understand and analyze various searching and sorting algorithms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**3**	**1**		**2**							**1**	
CO2	**1**	**2**									**1**	
CO3	**1**	**3**		**2**								
CO4	**2**	**3**		**2**								

Course Content

UNIT I:

Introduction to Data Structures: Introduction, Basic Terminology-Elementary Data Organization, Data Structures, Data Structure Operations

Arrays and Pointers: Introduction, Linear Arrays, Representation of Linear arrays in Memory, Traversing Linear arrays, Inserting and Deleting, Multidimensional Arrays

UNIT II:

Linked List: Introduction, Linked Lists, Representation of Linked list in memory, traversing linked list, Searching a linked list, Memory Allocation, Garbage Collection, Insertion into linked list, Deletion from linked list, Header linked list.

Stacks, Queues & Recursion: Introduction, Stacks, Array representation of Stacks, Linked representation of stacks, Arithmetic expression-Polish notation, Recursion, Towers of Hanoi, Implementation of recursive procedure by stacks, Queues, Linked Representation of Queues, Deques.

UNIT III:

Trees: Introduction, Binary trees, Representing Binary Trees in Memory, Traversing Binary Trees, Traversal Algorithms using Stacks, Binary Search Trees, Searching and Inserting in Binary Search Trees, Deleting in a Binary Search Tree.

Graphs: Introduction, Graph Theory Terminology, Sequential Representation of Graphs- Adjacency Matrix, Path Matrices, Linked Representation of Graph, Operations on Graph, Traversing a Graph, Spanning Tree.

UNIT IV:

Searching: Searching-Linear Search, Binary Search

Sorting: Introduction, Sorting, Bubble Sort, Quick sort- application of stacks,

	Insertion sort, Selection Sort, Merge Sort, Radix Sort.
Text books and Reference books	**Text Book(s):** [1]. Seymour Lipschutz- Data Structures, Revised First Edition, Schaum'sOutlines **Reference Books:** **[1].** Industrial Software Research & Development – ISRD Group – Data Structures using C, 2nd Edition, The McGraw Hill Companies [2]. R.F.Gilberg And B.A.Forouzan- Data structures: A Pseudocode Approach with C, 2nd edition, Cengage Learning. [3]. A.M.Tanenbaum,Y. Langsam, M.J.Augenstein- Data Structures using C, Pearson. [4]. R.Thareja – Data Structures using C, Oxford University Press [5]. Mark Allen Weiss, —Data structure and Algorithm Analysis in C, 2nd edition, Addison Wesley Publication, 2010.
E-resources and other digital material	[1]. Prof. Naveen Garg: IIT Delhi, (5th , may, 2015). Data Structures and Algorithms [Nptel]. Available: http://nptel.ac.in/ [2]. Erik Demaine, (5th , may, 2015). Advanced Data Structures [MIT- [3]. OpenCourseWare]. Available: http://ocw.mit.edu/

14IT2505B-WEB PROGRAMMING

Course Category:	Institute Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites:	14CS1103- Introduction to computing 14CS1203- Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Design interactive web pages using HTML, DHTML and Cascading Styles sheets.
	CO2	Understand the control statements and functions in Java Script
	CO3	Design web pages using JavaScript
	CO4	Implement XML concepts and Event handling in JavaScript

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1		3	1	1						2	
CO2	2	1	1								3	
CO3	2	2	3								3	
CO4	2		3									

Course Content

UNIT I:

Introduction to HTML: Introduction, editing HTML5, First HTML5 example, W3C HTML5 validation service, headings, linking, images, special characters and horizontal rules, lists, tables, forms, internal linking, meta elements, new HTML5 form input types, input and data list elements and auto complete attribute, page-structure elements.

UNIT II:

CSS: Introduction, inline styles, embedded style sheets, conflicting styles, link external style sheets, positioning elements, backgrounds, element dimensions, text shadows, rounded corners, color, transitions and transformations

XML: Introduction, structuring Data, XML Namespaces, Document Type Definitions(DTDs), W3C XML Schema Documents XML Basics

UNIT III:

JavaScript: Introduction to scripting, Displaying a line of Text, modification, obtaining user input with prompt dialogs, memory concepts, arithmetic, decision making.

Control Statements: if selection statements, if..else selection statements, while repetition statement, formulating algorithms, assignment operators, increment and decrement operators, for repetition statement, switch multiple selection statement, do…while repetition statement, break and continue statement, logical operators.

Functions: Function definitions, random number generation, scope rules, java script global functions, recursion, recursion vs iteration

UNIT IV:

Arrays: Introduction, declaring and allocating arrays, examples using arrays, references and reference parameters, passing arrays to functions, searching arrays.

JavaScript Objects: Introduction, Math Object, String Object, Date Object, Boolean and Number object, document object.

	Event Handling: introduction, Load Event, Event mouse move and the event object
Text books and Reference books	**Text Books:** [1]. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, Prentice Hall, Fifth Edition, 2011 **Reference Books:** [1]. David Flanagan, JavaScript: The Definitive Guide, O'Reilly Media, 6th Edition, 2011 [2]. S. M. Grath, XML by Example, Prentice Hall of India, 5 edition [3]. C. Bates, Web Programming building Internet Applications, Willey Dream Tech, 3rd edition, 2006
E-resources and other digital material	[1]. http://nptel.ac.in/syllabus/syllabus.php?subjectId=106105084 [2]. XML in 10 point. http://www.w3.org/XML/1999/XML-in-10-points [3]. Cascading Style Sheets from W3. http://www.w3.org/Style/CSS/

14IT2505C-JAVA PROGRAMMING

Course Category:	Institutional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites:	14CS1203 – Programming in C	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the features of Object Oriented Programming
	CO2	Understand the concepts of Polymorphism and Inheritance
	CO3	Implement interfaces to supports multiple inheritance and exception handling
	CO4	Understand the architecture of an Applet for designing applications

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1				1						2	
CO2	2	2	3								2	
CO3	1	1	2								3	
CO4	1	1	2						1		1	3

Course Content

UNIT I:

Fundamentals of Object Oriented Programming: Introduction, Object oriented paradigm, Basic concepts of Object Oriented Programming, Benefits of OOP, and Applications of OOP.

Introduction to Java: Java history, java features, how java differs from C and C++.

Data Types, variables and arrays: Java keywords, Primitive types, Integers, Floating-Point Types, Characters, Booleans, Variables, Type Conversion and casting, Arrays.

Classes and objects : Class fundamentals, declaring objects, assigning object reference variables, introducing methods, constructors, this keyword, Garbage collection.

UNIT II:

Classes and objects: Overloading methods, using objects as parameters, Returning objects, Recursion, static and final keywords.

Inheritance: Inheritance basics, using super, multilevel hierarchy, method overriding, dynamic method dispatch, using abstract classes, final with inheritance.

UNIT III:

Interfaces: Defining an interface, implementing interfaces, nested interfaces, applying interfaces.

Exception handling: Exception handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, throw, throws, finally, creating your own exception subclasses.

UNIT IV:

The Applet Class: Applet Basics, Applet Architecture, Applet Skeleton, A Simple Banner Applets, Passing Parameters to Applets.

Text books and Reference books	**Text Book(s):** [1]. E Balagurusamy, "Programming with Java: A Primer", 4th Edition, Tata McGraw Hill Education Pvt Ltd., 2011. [2]. Herbert Schildt, "Java The Complete Reference", 8th Edition, McGraw-Hill Education, New Delhi, 2011. **Reference Books:** [1]. Herbert Schildt, Dale Skrien, "Java Fundamentals A Comprehension Introduction", Special Indian Edition, McGraw-Hill Education India Pvt. Ltd, 2013. [2]. Paul J. Dietel and Dr.Harvey M. Deitel, "Java How to Program", 9th Edition, Prentice-Hall, Pearson Education, 2011. [3]. Timothy Budd, "Understanding Object Oriented Programming with Java ", Updated edition, Pearson Education, 2013.
E-resources and other digital material	[1]. Prof. I. Sengupta. (14th , May, 2015), Department of Computer Science &Engineering, I.I.T.,Kharagpur, "Internet Technologies", NPTEL. http://nptel.ac.in/video.php?subjectId=106105084 [2]. Prof. Shane P. (14th , May , 2015), Department of Computer Science & Engineering,, NPTEL Videos, http://www.nptelvideos.com/video.php?id=1461&c=15

14IT2505D-DATA BASE MANAGEMENT SYSTEMS

Course Category:	Institutional Elective	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites :	14IT3302 – Discrete Mathematical Structures	**Continuous Evaluation:**	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand information storage issues and derive an information model in the form of an entity relation diagram.
	CO2	Transform information model into a relational database schema.
	CO3	Formulate solutions to a broad range of query problems using formal and Informal query languages.
	CO4	Understand the normalization theory and construct normalized databases.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3										
CO2		1	3								2	
CO3		2		3							1	
CO4	1	3		3							3	3

Course Content

UNIT I:

Overview of Data base systems: File systems vs DBMS, advantages of a DBMS, Describing and storing data in a DBMS, structure of a DBMS, People who work with databases.

Introduction to Database Design: Database Design and ER Diagrams; Entities, attributes, and Entity sets; Relationships and relationship sets, additional features of the ER Model.

UNIT II:

Relational Model: Introduction to the Relational Model; Integrity Constraint Over relations ; Enforcing Integrity constraints ; Querying relational data ; Logical data base Design ; Introduction to Views; Destroying / altering Tables and Views.

SQL: Queries And Constraints – Part I: Form of Basic SQL Query - Examples of Basic SQL Queries ; UNION, INTERSECT, and EXCEPT.

UNIT III:

SQL: Queries And Constraints – Part II: Nested Queries - Introduction to Nested Queries , Correlated Nested Queries , Set - Comparison Operators ; Aggregative Operators ; NULL values - Comparison using Null values , Logical connectivity's - AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values ; Complex Integrity Constraints in SQL.

UNIT IV:

Schema Refinement and Normal forms: Schema refinement - Problems Caused by redundancy, Decompositions, Problem related to decomposition; Functional Dependencies; reasoning about FDS;NORMAL FORMS-FIRST, SECOND,

	THIRD Normal forms ,BCNF; properties of decomposition - Lossless join Decomposition, Dependency preserving Decomposition; Schema refinement in Data base Design ;Multi valued Dependencies - forth Normal Form.
Text books and Reference books	**Text Book(s):** [1]. Raghurama Krishnan, Johannes Gehrke, "Database Management Systems", 3rd Edition, TATA McGrawHill, 2003. **Reference Books:** [1]. C.J.Date , "Introduction to Database Systems", 8th edition, Pearson Education, 2004. [2]. Rob & Coronel ,"Data base Systems design, Implementation, and Management", 8th Edition,Thomson,2007. [3]. Elmasri Navrate, "Data base Management System", 3rd Edition,Pearson Education, 2005.
E-resources and other digital material	[1]. S. Sharma,(09,05,2015).Introduction to DBMS. http://www.youtube.com/watch?v=1f34MwqUhx8 [2]. P. B. Mahanty,(09,05,2015). DBMS and RDBMS. http://nptel.iitm.ac.in/video.php?courseId=1128&v=7952RsbAx2w8 [3]. ShyamalalKumawat,(09,05,2015). MYSQL.https://www.youtube.com/watch?v=XiDnK9Lq-Ng [4]. Prof.D.Janakiram,(09,05,2015). DBMS. https://www.youtube.com/watch?v=EUzsy3W4I0g&list=PL536244562840E982 [5]. Jennifer widom,(09,05,2015). Introduction to Databases https://www.youtube.com/watch?v=ShjrtAQmIVg.

14IT5506A- PYTHON PROGRAMMING

Course Category:	Programme Core- Independent Learning	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	0-0-0
Prerequisites:	14IT3405 Object Oriented Programming Using Java	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the fundamentals of Python Programming Language.
	CO2	Recognize and construct common programming idioms: variables, loop, branch statements, functions and develop Python programs for a given application.
	CO3	Analyze string functions and concept of files in python programming.
	CO4	Understand the concepts of searching and extracting data using regular expressions.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3		2	2								
CO2	3	2	2	1		1					2	
CO3	2	2	2	3		1					2	1
CO4	2	2	2	3		1					2	1

Course Content

UNIT I

Introduction- Why we program, creativity and motivation, computer hardware architecture, Understanding programming, Words and sentences, conversing with Python, terminology: interpreter and compiler, writing a program, what is a program, the building blocks of programs, what could possibly go wrong, the learning journey.

Variables, expressions and statements-Values and types, variables, variable names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names, debugging.

UNIT II

Conditional execution- Boolean expressions, logical operators, conditional execution, alternative execution, chained conditionals, nested conditionals, catching exceptions using try and except, short circuit evaluation of logical expressions, debugging.

Functions- Function calls, built-in functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions, why functions, debugging.

UNIT III:

	Iteration- Updating variables, the *while* statement, infinite loops, "infinite loops" and *break*, finishing iterations with *continue*, definite loops using *for*, loop patterns, debugging. **Strings-** A string is a sequence, getting the length of a string using *len*, traversal through a string with a loop, string slices, strings are immutable, looping and counting, the *in* operator, string comparison, *string* methods, parsing strings, format operator, debugging.
	UNIT IV: **Files-** Persistence, Opening Files, Text Files and Lines, Reading Files, Searching through a File, Letting the user choose the Filename, Using *try, except and open*, Writing Files **Regular Expressions:** Character matching in regular expressions, Extracting data using regular expressions, Combining searching and extracting, Escape character.
Text books and Reference books	**Text Book(s):** [1]. Charles Severance, Python for Informatics- Exploring Information. **Reference Books:** [1]. David M. Beazley. Python Essential Reference. 3rd Ed. Sams, Indianapolis. 2006. ISBN: 0-6723-2862-3.H. [2]. Wesley J. Chun. Core Python Programming.2nd Ed. Prentice Hall, Upper Saddle River, NJ. 2007. ISBN: 0-132-26993-7. [3]. Allen B. Downey, Think Python - An Introduction to Software Design, Green Tea Press Needham, Massachusetts, Version 2.0.17, 2012
E-resources and other digital material	[1]. https://www.coursera.org/course/pythonlearn [2]. https://www.edx.org/course/introduction-computer-science-mitx-6-00-1x-0 [3]. https://www.thenewboston.com/videos.php?cat=36 [4]. http://diveintopython.org/

14IT5506B- CYBER LAWS & INTELLECTUAL PROPERTY RIGHTS

Course Category:	Programme Core - Independent Learning	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	0-0-0
Prerequisites:	--	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the role of intellectual property rights.
	CO2	Understand students at all levels to develop patentable technologies and trademarks and copy rights.
	CO3	Understand the steps for protection of intellectual property rights at national, regional and international levels.
	CO4	Analyze and understand the legal aspects for intellectual property protection .

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1	1								1	
CO2	1	1	1								1	
CO3	1	1	1								1	
CO4	1	2	2								1	

Course Content	**UNIT I:** Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).
	UNIT II: IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.
	UNIT III: International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT), Indian Position Vs WTO and Strategies – Indian IPR legislations
	UNIT IV:– Cyber Law: Basic Concepts of Technology and Law : Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence Law of Digital Contracts : The Essence of Digital Contracts, The System of Digital Signatures, The Role and Function of Certifying Authorities, The Science of Cryptography Intellectual Property Issues in Cyber Space: Domain Names and Related issues, Copyright in the Digital Media, Patents in the Cyber World.
Text books and Reference books	**Text Book(s):** [1]. Subbaram N.R. " Handbook of Indian Patent Law and Practice ", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998. [2]. Rodney Ryder," Guide to Cyber Laws " 3rd Edition, Wadhwa publisher, 2001 **Reference Books:** **[1].** R Radha Krishnan & S Balasubramanian, "Intellectual Property Rights" , 1stEdition, Excel Books,2012. [2]. M Ashok Kumar & mohdIqbal Ali, "Intellectual PropertyRights" , 2 nd Edition, Serial publications, 2011.

E-resources and other digital material	[1]. prabuddhaganguli, Intellectual property right (1st edition) [English]. http://www.slideshare.net/harshhanu/intellectual-property-rights-13551183 [2]. http://www.e-booksdirectory.com/details.php?ebook=10758

14IT5506C- ENTREPRENEURSHIP DEVELOPMENT

Course Category:	Independent Learning	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	0-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understanding the concept of Entrepreneurship Development
	CO2	Analyzing the Project Identification And Selection
	CO3	Understanding the Institution Support and Financing of Enterprises
	CO4	Evaluate the Export Documentation and Procedure

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	1							1			
CO2				3							
CO3			3							3	
CO4											1

Course Content

UNIT I:

Introduction to Entrepreneur:

Evolution, Characteristics, Types, Functions of Entrepreneur - Distinction between an Entrepreneur and a Manager, Concept, Growth of Entrepreneurship in India, Role of Entrepreneurship in Economic Development.

Rural Entrepreneurship: Concept, Need, Problems, Rural Industrialization in Retrospect, Major Entrepreneurial Competencies Small Enterprises: Definition, Characteristics, Relationship between Small and Large Units, Rationale, Objectives, Scope, Opportunities for an Entrepreneurial Career

UNIT II:

Project Identification And Selection (PIS)

Meaning of Project, Project Identification, Project Selection, Project Formulation: Meaning, Significance, Contents, Formulation, Planning Commission's Guidelines for Formulating a Project Report, Specimen of a Project Report, Network Analysis, Common Errors in Project Formulation, Project Appraisal Concept, Methods of project appraisal, Growth of Business Ideas, Intellectual Property.

UNIT III:

Financing of Enterprises Need for Financial Planning, Sources of finance, Capital Structure, Term-loan, Sources of Short-Term Finance, Capitalization, Venture capital, Export Finance, Institutional Finance To Entrepreneurs, Preparation of Business Plans, Commercial Banks

Institution Support To Entrepreneurs: Need for Institutional support - Small Entrepreneurs: NSIC, SIDO, SSIB, Industrial Estates Specialized Institutions, Human

	resource issues, Total quality management issues for small enterprises, Growth strategies in small businesses, sickness in small businesses, small enterprises in international business
	UNIT IV: **Export Documentation and Procedure Small Enterprises:** Electronic commerce and small enterprises, Franchising **Leading The Growing Company And Planning For Management Succession**: Leadership in the new Economy, Hiring the Right Employees, Building the Right Organizational culture and structure, the challenge of Motivating Workers, Management Succession: Passing the Torch of Leadership
Text books and Reference books	**Text Book(s):** [1]. Roy Rajeev, "Entrepreneurship", Oxford Publication, Latest Edition [2]. E. Gordon & K. Natarajan, "Entrepreneurship Development", Himalaya Publication,2008 [3]. Coulter, "Entrepreneurship in Action", PHI Publication, 2nd Edition **Reference book(s):** [1]. P. C. Jain Handbook "For New Entrepreneur" Oxford Publication, Latest Edition [2]. S. S. Khanka," Entrepreneurial Development", S. Chand Publication Latest Edition [3]. Thomas W.Zimmerer & Norman M. Scarborough, " Essentials of Entrepreneurship and small business management", PHI Publication, 4th Edition [4]. Dr. Vidya Hattangadi, "Entrepreneurship" Himalaya Publication, 2007 [5]. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publication, 2008 [6]. Dr. v. B. Angadi, Dr.H. S. Cheema & Dr.M. R. Das, "Entrepreneurship, Growth,and Economic IntegrationA linkage", Himalaya Publication, 2009
E-resources and other digital material	[1]. Dr. S K Dhameja and Vealediction on 27th September 2013, [2]. Nitttrchd Availble: https://www.youtube.com/watch?v=7hcsTyZJZa8 [3]. Prof Pratap K.J. Mohapatra, IIT Kharagapur [4]. NPTEL Available : http://nptel.ac.in/courses/110105067/ [5]. Coursera Available: https://www.coursera.org/specializations/business-entrepreneurship

14IT5506D - AGILE PLANNING FOR SOFTWARE PRODUCTS

Course Category:	Independent Learning	**Credits:**	2
Course Type:	Theory	**Lecture-Tutorial-Practice:**	0-0-0
Prerequisites:	14IT3501-Software Engineering	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the importance of planning and create work break down structure for a software project
	CO2	Analyze different estimation techniques – story points, velocity estimates and planning, time boxing and Gantt charts.
	CO3	Understand iterations plans, various task dependencies and create CPM charts and PERT charts for a software product.
	CO4	Assess & plan for project risks and identify anti patterns

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3		1							1	1
CO2	2	3		2							1	1
CO3	2	3		1							1	1
CO4	1	2		1							2	1

Course Content

UNIT I:

Introduction: Introduction to planning - important terms, concepts,

Uncertainty Space - Navigating Uncertainty Space Diagrams, A Final Note on Uncertainty Spaces

Work Breakdown Structure- Example Work Breakdown Structure, Creating a Work Breakdown Structure, Uses of Work Breakdown Structures

Estimates, Targets, and Commitments – Estimates, Targets, Commitments, Estimate, Target, and Commitment Example.

UNIT II:

Estimation : Story Points- How To Use Story Points, Advantages of Story Points, Limitations of Story Points

Velocity Estimates- Velocity-Driven Development, Some Considerations in Using Velocity Estimates, Time Boxing, Gantt Charts, Release Plans .

UNIT III:

Planning : **Estimating Task Time** - Cone of Uncertainty Principle, Creating Time Estimates

Task Dependencies- Start-Start Dependency, Start-Finish Dependency, Finish-Start Dependency, Finish-Finish Dependency,

Critical Path Method (CPM) Charts- Creating a CPM Chart, Critical Paths

Program Evaluation and Review Technique (PERT) Chart- Example of a PERT Chart, Critical Paths

Iteration Plans- Creating an Iteration Plan, Sample Iteration Plan

	UNIT IV: **Risks** : **Anti-Patterns**- Group Anti-Patterns, Individual Anti-Patterns Causes of Failures, Risk Assessment, Likelihood, and Impact - Impact vs. Likelihood Matrix, Risk-Value Matrix, Risk Strategies, Contingency, Mitigation
Text books and Reference books	**Text books** **[1]. https://www.coursera.org/learn/agile-planning-for-software-products** **References** [1]. Rober C Martin, "Agile Software Development, Principles, Patterns and Practices", Pearson New International Edition. [2]. Mike Cohn, "Agile Estimating & Planning", Prentice Hall, Pearson Edition, 2006.
E-resources and other digital material	[1]. http://nptel.ac.in/courses/106101061/26#. [2]. https://www.youtube.com/watch?v=jRs-aFETAXY [3]. http://freevideolectures.com/Course/2318/Software-Engineering/26 [4]. http://nptel.kmeacollege.ac.in/courses/106101061/26

14IT3551-DATA WAREHOUSING & MINING LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14IT3402-Data Base Management Systems	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Implement various Schemas and OLAP operations in data warehouse
	CO2	Get acquaintance with data mining tools and implement different methods of preprocessing data.
	CO3	Implement association rule mining concepts of data mining
	CO4	Implement and analyze classification and clustering algorithms for different datasets

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1		2	3	3	3							
CO2		2	3	3	3							
CO3		2	3	3	3				2			
CO4		3	3	3	3				2			

Course Content

Week 1: Loading flat file into SQL Server Management Studio Database using SQL Server Integration Services and Performing various OLAP Operations.

Week 2: Performing various types of slowly changing dimensions.

Week3: Perform Star and snowflake schema on Adventure Works Database

Week 4: Creating Fact constellation Schema

Week 5: Create an dataset and apply preprocessing techniques like Data cleaning,Discretization, Min-Max Normalization and Integer Scaling Normalization on the dataset

Week 6: Application of Association rule mining using Apriori algorithm

Week 7: What attributes do you think might be crucial in making the credit assessement ? Come up with some simple rules in plain English using your selected attributes.

Week8: One type of model is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training

Week 9: One approach for solving the problem encountered in the previous question is using cross-validation? Describe what cross-validation is briefly. Train

	a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why? **Week 10**: Exhibiting clustering process using simple k-means and k-medians algorithms **Week 11**: Evaluation of clustering process using DBSCAN algorithm **Week 10**: Evaluate and compare the performance of clustering techniques
Text books and Reference books	**Text Book(s):** **[1].** MS SQL Server 2008 Database, SSMS **[2].** J. Han and M. Kamber, *Data Mining Concepts and Techniques*, 2 ed.: Elseiver publishers. **Reference Books:** [1]. A. K. PUJARI, *Data Mining Techniques*: University Press
E-resources and other digital material	[1] Dr.S.Srinath. Introduction to Data Warehousing and OLAP [2] Chakrabarti Bridging the Structured, Unstructured Gap http://videolectures.net/wsdm2010_chakrabarti_bsus/ [3] QiLu Data mining Lecture.http://videolectures.net/kdd2010-lu-dmosi/

14IT3552-WEB PROGRAMMING AND DEVELOPMENT LAB

Course Category:	Programming Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	Internet Programming, Java Programming	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Develop secure and dynamic web pages using JavaScript
	CO2	Implement the basics of XML and JDBC Objects
	CO3	Develop and deploy Servlets and JSP technologies

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1	1		1						2	
CO2		1	1		1						2	1
CO3	2	1	1		2						3	1

Course Content

Week 1

Create an html code for student monitoring system.

Week 2

Develop web pages that use of external style sheet

Develop web pages that use of internal style sheet

Week 3

Create JavaScript for arithmetic operations

Script to display a form that accepts student name, age and father name. When age field receives its focus display message that age should be blow 18-25.after losing its focus from age field verified users. Entered in between given values (or) not and display respective message

Script to display a form that accept first name, last name, mail id, qualification, year of pass and institute name. Display accepted in the table format.

Week 4

Script for accept terms and conditions and check box limit.

Implement following scripts

	a) Script for changing the background color randomly. b) Script for changing the background color using radio buttons. c) Script for changing the background color explicitly during run time. **Week 5&6** Script for validation and verification program. **Week 7** Create a servlets for student details application **Week 8** Create a servlets for client server application. Create a JSP page that handles objects. **Week 9** Create a jsp page for passing the parameters. Create a jsp page using use Bean. **Week 10** Create a jsp page using directives. Create a jsp page for an application using JDBC JavaExam.Com is a website that provides online examination of Java Language. Users must register to take exam. It stores results regarding the previous exams taken by users. It provides all the common operations related to users such as registration, login, change password and forgot password.
Text books and Reference books	**Text Book(s):** [1]. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, "Internet & World Wide Web How to Program", 5th Edition, Pearson Education, 2011 [2]. James Keogh, "J2Ee: The Complete Reference", 1st Edition, Mcgraw Hill Education, 2002 **Reference Books:** [1]. Chris Bates, "Web Programming, building internet applications", 2nd Eedition, WILEY Dreamtech,2006 [2]. Hans Bergsen, "Java Server Pages", SPD O'Reilly, 2nd edition, 2002
E-resources and other digital material	[1]. Patrick Royal, Java EE Essentials: Servlets and JavaServer Faces, 26-03-2016, Available: https://www.lynda.com/Java-tutorials/Java-EE-Essentials-Servlets-JavaServer-Faces/124399-2.html [2]. Advanced Java Programming by Infinite Skills, 26-03-2016 Available: https://www.udemy.com/advanced-java-programming/

14IT3553-COMPUTER NETWORKS LAB

Course Category:	Programming Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Analyze the Computer networking peripherals Devices and their configurations.
	CO2	Demonstrate techniques to correct and detect errors during transmission.
	CO3	Implementation of Socket Programming with TCP, UDP protocols.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1			1		2							
CO2	3		1									
CO3			3									

Course Content

Week 1: Demonstrate OSI, TCP/IP models using network devices like Repeater, Hub, Switch, Bridge, Router, Gate Way and their Difference among them.
Week 2: Implement the cross-wired cable and straight through cable using Crimping tools.
Week 3: Design Mesh, ring, star, bus topologies of computer networks using switch or router
Week 4: Describing the Computer peripherals, assembling and disassembling of a computer
Week 5: Configure the wireless network using wireless devices like WIFI USB connector.
Week 6: Connect the computers in Local Area Network and Study of basic network commands. Make the connection on the client computers in different operating systems (Windows, Linux) Basic networking Commands:- ping, tracert, netstat, ipconfig, route
Week 7: Write a program to implement Bit Stuffing, CRC-12 and CRC -16
Week 8: Write a Java program to implement TCP Server and TCP Client using Socket programming
Week 9: Write a Java program to implement UDP Server and UDP Client using Socket programming
Week 10: Write a Java Program to implement error detection methods
Week 11: Analyze network traffic flow using network simulators.
Week 12: Configure the network using IP Classification and sub, super netting
Week 13: Configuration of network by Static and Dynamic IP address in Windows, Ubuntu operating systems
Week 14: Configure the wired network and wireless network and speed test for the

	network
	Week 15: Installation and configuring DHCP server, and Design a network using any simulator
Text books and Reference books	**Text Book(s):** [1]. S. Tanenbaum, Computer Networks, 5th Edition ed.: Pearson Education / PHI, 2011 **Reference Books:** [1]. G.I.Papadimitriou, A.S.Pomportsis et al,. Wireless Networks, JOHN WILEY & SONS, LTD, 2003 [2]. Behrouz A Fourzan, Data communications and networking 4th edition, TMH [3]. Computer networks, Mayank Dave, CENGAGE.
E-resources and other digital material	[1]. http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Computer%20networks/New_index1.html [2]. [Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

14IT3601 -ARTIFICIAL INTELLIGENCE

Course Category:	Program Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	14MA1401 : Probability & Statistics, 14IT3403 : DAA	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Identify problems that are amenable to solution by AI methods
	CO2	Solve problems by applying a suitable state-space search method
	CO3	Represent knowledge of the world using logic and Infer new facts from that knowledge
	CO4	Use planning algorithms to find optimal solutions and and also design AI systems to improve their performance by Learning.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1		2							
CO2		2	1			1			1			
CO3	2	2		1		2						1
CO4	1		2		2							
CO5												

Course Content

UNIT I

Introduction:

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first search, Depth limited search, Iterative deepening depth first search bi-direction search - comparison. Search with partial information (Heuristic search) Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions.

UNIT II

Local search Algorithms, Hill climbing, simulated, annealing search, local beam search. Constrain satisfaction problems: Backtracking search for CSPs local search for constraint satisfaction problems.

Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning

	UNIT III Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propositional logic, Resolution, Forward & Backward Chaining. First order logic: Inference in first order logic, propositional Vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution.
	UNIT IV **Planning:** Classical planning problem, Language of planning problems, Expressiveness and extension, planning with state – space search, Forward states spare search, Backward states space search, Heuristics for stats space search. Planning search, planning with state space search, partial order planning Graphs. **Learning:** Forms of learning, Inductive learning, learning with Hidden variables – The EM Algorithm
	Content Beyond the Syllabus: Learning Decision Trees, Statistical Learning Methods
Text books and Reference books	**Text Books:** [1]. Russel and Norvig, Artificial Intelligence- A Modern Approach. Prentice Hall of India/Pearson Education, 2003. **Reference Books:** [1]. Elaine Rich and Kevin Knight: Artificial Intelligence – Tata McGraw Hill.Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.
E-resources and other digital material	**Web resources:** [1]. **http://nptel.ac.in/courses/106105078/** [2]. **http://aima.cs.berkeley.edu/ai.html** [3]. **http://airesources.blogspot.in/**

14IT3602- BIG DATA

Course Category:	Programme core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	14IT3502- Data Warehousing And Mining	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand Hadoop Architecture -- NameNode , big data analysis and lifecycle
	CO2	Master the concepts of Hadoop Distributed File System and MapReduce framework
	CO3	Gain Programming knowledge in in MapReduce and Learn to write Complex Map Reduce programs
	CO4	Able to Perform Data Analytics using ecosystems like Pig and Hive

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2			1	2							
CO2	1				2							
CO3	2				2							
CO4	2			1	3							

Course Content

UNIT I:

Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity), Data in the Warehouse and Data in Hadoop, Why is Big Data Important? Patterns for Big Data Development

Introduction to Hadoop:

Data, Data Storage and Analysis , Comparison with Other Systems : RDBMS , Grid Computing , Volunteer Computing , A Brief History of Hadoop , Apache Hadoop and the Hadoop Ecosystem , Hadoop Releases.

UNIT II:

Hadoop Distributed File System:: The Design of HDFS, HDFS Concepts , Blocks ,Namenodes and Datanodes, Basic Filesystem Operations, Hadoop Filesystems, Interfaces, The Java Interface, Reading Data from a Hadoop URL, Data Flow, Anatomy of a File Read , Anatomy of a File Write, Coherency Model

UNIT III:

MapReduce – A Weather Dataset, Data Format, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Map and Reduce, Java MapReduce , Scaling Out , Hadoop Streaming , Hadoop Pipes

Developing a MapReduce Application -The Configuration API, Combining Resources, Variable Expansion, Configuring the Development Environment, Writing a Unit Test, Mapper, Reducer, Running Locally on Test Data, Running a Job in a Local Job Runner, Testing the Driver

UNIT IV:

Hive- Installing Hive, An Example, Running Hive, Comparison with Traditional Databases, HiveQL, Tables, Querying Data

Text books and Reference books

Text Book(s):

[1]. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom

	Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012. [2]. Tom White, Hadoop, "The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012 **Reference Books:** [1]. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. [2]. David Loshin, "BigDataAnalytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph",Morgan Kaufmann Publishers, 2013 [3]. Hadoop in Practice by Alex Holmes, MANNING Publ. [4]. Hadoop in Action by Chuck Lam, MANNING Publ.
E-resources and other digital material	[1]. An overview of "Big Data": Available http://www.jbonneau.com/doc/2012-04-27-big_data_lecture_1.pdf [2]. Hadoop Tutorial: Developing Big-Data Applications with Apache Hadoop: Available http://www.coreservlets.com/hadoop-tutorial/ [3]. Random notes on big data – SlideShare: Available www.slideshare.net/yiranpang/random-**notes-on-big-data**-26439474 [4]. http://www.cloudera.com/content/cloudera-content/clouderadocs/HadoopTutorial/CDH4/Hadoop-Tutorial.html [5]. https: //www.ibm.com / developerworks / community / blogs / Susan Visser Editionntry/flash book understanding big data analytics for enterprise class hadoop and streaming data? lang en

14IT3603 INTERNET OF THINGS

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	14IT3305 – Computer Organization	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the design concepts and technologies of Internet of Things
	CO2	Understand the hardware platforms and develop the IOT applications using Arduino and Raspberry Pi programming
	CO3	Understand IOT design methodologies and develop python programs for IoT
	CO4	Implement the case studies for smart Home automation and smart parking IoT system

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						1	2					2
CO2	1	2	2	2								2
CO3	1	2	2	2		2						2
CO4		3	3	3		2	2					

Course Content

UNIT I:

Introduction to Internet of things: Introduction, Physical design of IoT, Logical Design of IoT,IoT Enabling technologies, IoT levels & Deployment templates.

Domain Specific IoTs: Home Automation, Cities

IoT and M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT

UNIT II:

The Basics of Sensors and Actuators: Introduction, A brief Introduction to sampling theory, Examples of Sensors and working Principles, Actuators.

Reading from Sensors: Sensing the world-Reading from Analog Sensors, Digital Sensors, Sensors with On/Off State.

The Arduino Microcontroller Platform: Microcontrollers, Programming Microcontrollers, The Arduino Platform, The Anatomy of an Arduino Board, The Development Environment, Setting up the IDE, Writing Arduino Software – some basic examples, Arduino simulator

UNIT III:

IoT Platforms Design Methodology: Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring.

IoT systems –Logical Design using python: Introduction, Python data types and Data structures, control flow, functions, Modules, Packages, File Handling, Date/Time operations, classes, python packages for IoT.

UNIT IV:

IoT physical devices & Endpoints: IoT Device, Raspberry pi Board, Raspberry pi interfaces, programming Raspberry pi with python.

Case Studies Illustrating IoT Design: Home Automation, Cities

	CONTENT BEYOND SYLLABUS IoT System Management with NETCONF-YANG, Data Analytics for IoT
Text books and Reference books	**Text Book(s):** [1]. Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1st Edition, VPT, 2014. [2]. CharalamposDoukas "**Building Internet of Things with the Arduino**" **Reference Books:** [1]. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013 [2]. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.
E-resources and other digital material	[1]. https://www.youtube.com/watch?v=G4-CtKkrOmc [2]. http://www.cse.wustl.edu/~jain/cse570-13/m_18iot.htm [3]. https://www.youtube.com/watch?v=9ZUFYyXhQm8 [4]. https://www.udemy.com/introduction-to-iot-using-raspberry-pi-2/

14IT3604- NETWORK SECURITY

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	14IT3504-Computer Networks	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Understand vulnerabilities and the role of security essentials in networked computers
CO2	Realize various security services like confidentiality, authentication and data integrity standards to protect data in communication
CO3	Understand different security approaches in email, IP and web based systems
CO4	Understand malicious activities and their counter measures to safeguard the system

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2	2					2				
CO2	1	3	3	2	3			2				
CO3	1	3	3	2	2			2				
CO4			3			3						

Course Content

UNIT I:

Overview : The OSI security architecture, Security Attacks, Security Services, Security Mechanisms, A model for Network security.

Classical Encryption Techniques : Symmetric cipher model – Cryptography, Cryptanalysis, **Block Ciphers and the DES** : Block cipher principles, Fiestel Cipher structure, The DES, The strength of DES, **AES :** The AES Cipher

UNIT II: Public key cryptography and RSA : Principles of public key cryptosystems, The RSA Algorithm.

Key Management: Diffie Hellman Key exchange. **Message Authentication andHash Functions :**Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash functions, SHA, HMAC,Digital Signatures,

UNIT III:

IP Security : IP Security Overview, IP Security Architecture, Authentication Header, ESP, Key Management, **Web Security** : Web Security Considerations,
Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction.

UNIT IV:

Intruders - Introduction, Intrusion Detection, Password Management.

Malicious Software : Viruses and related threats, Virus countermeasures

Firewalls : Firewall Design Principles

Text books and Reference books

Text Book(s):

[1]. W.Stallings, "Cryptography and network security: principles and practice", 4ed, Pearson education, 2010.

Reference Books:

	[1]. Charlie Kaufman, Radia Perlman, Mike Spenciner, "Network Security, private communication in public world", PHI, 2 ed, 2002. [2]. W.Stallings, "Network Security Essentials (Applications and Standards)", 4th ed, Pearson Education, 2012
E-resources and other digital material	[1]. https://www.pearsonhighered.com/assets/hip/us/hip_us_pearsonhighered/preface/0132775069.pdf [2]. http://faculty.mu.edu.sa/public/uploads/1360993259.0858Cryptography%20and%20Network%20Security%20Principles%20and%20Practice,%205th%20Edition.pdf

14IT4605A- DISTRIBUTED SYSTEMS

Course Category:	Programme Elective					**Credits:**						3
Course Type:	Theory					**Lecture-Tutorial-Practice:**						3-0-0
Prerequisites:	Operating Systems					**Continuous Evaluation:**						30
						Semester end Evaluation:						70
						Total Marks:						100
Course Outcomes	Upon successful completion of the course, the student will be able to:											
	CO1	Understand different types of distributed systems and architectures.										
	CO2	Analyze message-passing issues in distributed system										
	CO3	Explore the problems of synchronization in distributed processes.										
	CO4	Understand the fault tolerance for providing security in distributed systems										
Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO 10	PO 11
	CO1	1								3		
	CO2	3		1		1						
	CO3	3	1	1						1		
	CO4	1	1	1			1					
Course Content	UNIT I: **Introduction**: Definition, Goals, Types of Distributed Systems **Architectures:** Architectural Styles, System Architectures, Architectures versus Middleware, Self-Management in Distributed Systems **Processes**: Threads, Virtualization, Clients, Servers, Code Migration											
	UNIT II: **Communication:** Fundamentals, Remote Procedure call, Message-Oriented Communication, Stream-Oriented Communication, Multicast Communication **Naming** : Names, Identifiers, and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming											
	UNIT III: **Synchronization**: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of Nodes, Election Algorithms **Consistency and Replication** : Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols											
	UNIT IV: **Fault Tolerance**: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery **Security** : Introduction to Security, Secure Channels, Access Control, Security Management											
Text books and Reference books	**Text Book(s):** [1]. Andrew S. TenenBaum& Maarten van Steen, "Distributed Systems: Principles and Paradigms", Prentice-Hall, 2002. **Reference Books:** [1]. P. K. Sinha, "Distributed Operating Systems: Concepts and Design", IEEE Press, 1997.											

	[1]. A. S. TenenBaum, "Distributed Operating Systems", Prentice-Hall, 1995. [2]. Randy Chow, Theodore Johnson, "Distributed Operating Systems and Algorithm Analysis", Pearson, 2009.
E-resources and other digital material	[1]. http://www.nptel.ac.in/syllabus/syllabus_pdf/106106107.pdf [2]. Distributed Algorithms, https://canvas.instructure.com [3]. itvideo.me/page/Distributed algorithms

14IT4605B - DOT NET PROGRAMMING

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3405 : OOPs using Java	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Develop secure and dynamic web application using Event driven and Exception Handling Techniques.
	CO2	Develop web applications using Window Forms
	CO3	Understanding and building the applications that include database interactivity.
	CO4	Designing a Rich controls and error handling web page with ASP.net.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3		1					3		3	
CO2		3		3					3		3	
CO3		3		3					3		3	
CO4		3		3	3				3		3	

Course Content

UNIT I:

Introducing the Microsoft.Net Platform: Introducing the Microsoft.Net Platform, Features of the .NET Platform, Components of the .NET Architecture

Introducing C# Programming: Creating Your First C# Programming, Introducing Data types, Control Structures, Properties and Indexers, Delegates and Events, Exception Handling.

UNIT II:

Exception handling, Windows Forms : Introducing Windows Form , Writing a simple Windows Form Application, Writing a simple Text Editor, Using the List view and Tree view controls, Creating controls.

UNIT III:

ADO.NET:

Intorducing ADO.NET, Working with System.Data.OleDb, Working with SQL.NET, Working with Odbc.NET.

UNIT IV:

ASP.NET Introducing the ASP.NET Architecture, Working with web forms.

Text books and Reference books

Text Book(s):

[1]. Adrian Turtschi , Jason Werry, Greg Hack, Joseph Albahari, SaurabhNandu , Wei Meng Lee "C# .NET Web Developer's Guide" Syngress Publishing.

Reference Books:

[1]. Jesse Lberty "programming c#4.0", OReilly& Associates USA2010

E-resources and other

[1]. http://www.w3.org/XML/19

[2]. https://www.edx.org/course/programming-c-microsoft-dev204x-1

digital material	[3]. https://www.coursera.org/course/gameprogramming [4]. https://www.mooc-list.com/tags/c?static=true [5]. http://www.lynda.com/ASP-NET-training-tutorials/157-0.html

14IT4605C –ETHICAL HACKING

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3504-Computer Networks	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand legal and illegal issues involved in hacking computer networks
	CO2	Explore the usage of web tools for footprinting and port scanning methods
	CO3	Analyze vulnerabilities in operating systems, web applications and wireless networks
	CO4	Identify attacks related to network systems & provide counter measures

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1					3		3				
CO2					3							
CO3		3			2			3				
CO4		3				3		3				

Course Content

UNIT I:

Ethical Hacking Overview: Introduction to Ethical Hacking, What you can do Legally, What you cannot do Legally.

Network and computer attacks: Malicious software, Protecting against malware attacks, Intruder attacks on networks and computers, Addressing physical security, Key loggers and behind locked doors.

UNIT II:

Footprints and Social Engineering: Using Web tools for Footprinting, Conducting Competitive Intelligence, Using Domain Name System Transfers, Introduction to Social Engineering.

Port Scanning: Introduction to Port Scanning, Types of Port Scans, Using Port Scanning tools, Conducting Ping Sweeps.

UNIT III:

Desktop and OS Vulnerabilities: Windows OS Vulnerabilities, Tools for identifying vulnerabilities in Windows. Best practices for hardening Windows Systems, Linux OS Vulnerabilities

Hacking Web Servers: Understanding Web Applications, Understanding Web Application Vulnerabilities, Application Vulnerabilities and Countermeasures, Tools for Web attackers and Security testers, Web tools.

UNIT IV:

Hacking Wireless Networks: Understanding Wireless Technologies, Components of Wireless Networks, Understanding Wireless Network standards, Understanding Authentication, Understanding Wireless Hacking.

Network Protection Systems: Understanding Routers, Understanding Firewalls, Understanding Intrusion Detection and Prevention Systems, Understanding Honey pots.

	CONTENT BEYOND SYLLABUS **Embedded Operating Systems:** Windows and other Embedded Operating Systems. Vulnerabilities of Operating System. Best for protecting Embedded Operating Systems
Text books and Reference books	**Text Book(s):** [1]. Michael T. Simpson, Kent Backman, James E. Corley, "Hands -On Ethical Hacking and Network Defense", Second Edition, Cengage Learning, 2012. **Reference Books:** [1]. Steven DeFino, Barry Kaufman, Nick Valenteen, "Official Certified Ethical Hacker Review Guide", Cengage Learning, 2009. [2]. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series – Elsevier, 2011. [3]. Whitaker & Newman, "Penetration Testing and Network Defense", Cisco Press, Indianapolis, 2006.
E-resources and other digital material	[1]. https://www.youtube.com/watch?v=7nF2BAfWUEg Complete Free Hacking Course: Go from Beginner to Expert Hacker Today! [2]. https://www.youtube.com/watch?v=t2mRNxfHTjw&list=PL7134FC0815ADB8EB TRAINSIGNAL [3]. https://www.youtube.com/watch?v=O1eNQqgEevQ Ethical Hacking - Password Cracking Demo

14IT3605D-R PROGRAMMING FOR DATA SCIENCE

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	Basics of Programming	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basic concepts of R programming.
	CO2	Analyze the various control structures and I/O operations.
	CO3	Understand the various functions of R programming.
	CO4	Understand the concepts of simulation and debugging.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2		3							2	
CO2	2	2		3							2	
CO3	3	2		3							2	
CO4	3	2		3							2	

Course Content

UNIT I:

History and Overview of R

Introduction to R & S language,The S Philosophy,Back to R,Basic Features of R,Free Software, Design of the R System, Limitations of R.

Getting Started with R

Installation,Getting started with the R interface.

R Nuts and Bolts

Entering Input, Evaluation, R Objects, Numbers, Attributes, Creating Vectors, Mixing Objects, Matrices, Lists, Factors, Missing Values, Data Frames, Names.

UNIT II:

Getting Data In and Out of R

Reading and Writing Data,Reading Data Files with read.table(),Reading in Larger Datasets with read.table,Calculating Memory Requirements for R Objects.

Control Structures in R

if-else,forLoops,Nested for loops,whileLoops,repeatLoops,next,break.

	UNIT III: **Functions in R** Your First Function,ArgumentMatching,LazyEvaluation,TheArgument,Arguments Coming After the Argument. **Loop Functions** Looping on the Command Line,lapply(),sapply(),split(),Splitting a Data Frame, Tapply,apply(),Col/Row Sums and Means,Other Ways to Apply,mapply(),Vectorizing a Function.
	UNIT IV: **Debugging** Something's Wrong!,Figuring Out What's Wrong,Debugging Tools in R,Usingtraceback(),Using debug(),Using recover(). **Simulation** Generating Random Numbers, Setting the random number seed, Simulating a Linear Model, Random Sampling.
Text books and Reference books	**Text Book(s):** [1]. Roger D Peng, " R Programming for Data Science" Lean Publishing, 2014-15 [2]. Michael J Crawley " The R Book" John Wiley & Sons, 2007 **Reference Books:** [1]. Paul Teetor, "R Cookbook", Oreily publications, 2011 [2]. Mark Gardener, "Beginning R: The statistical programming language", 2012
E-resources and other digital material	[1]. https://www.coursera.org/learn/r-programming [2]. https://www.edx.org/course/introduction-r-data-science-microsoft-dat204x-2 [3]. https://www.udemy.com/r-basics/ [4]. https://www.udemy.com/r-programming/

14IT4605E -COMPUTER VISION

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand Computer vision and Mathematical model of image formation process.
	CO2	Analyze algorithms to segment, label, and compute the position and orientation of a set of objects in an image.
	CO3	Analyze the main gradient based edge detection operations and apply techniques to extract useful features from an image
	CO4	Analyze the suitable Expectation-Maximization algorithm for missing data problems of image and camera models.
	CO5	Understand object recognition and its applications.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											
CO2		3	3									
CO3		3	3									
CO4				2								
CO5	2											1

Course Content

UNIT I:

Introduction: Image Formation & Image Models: Pinhole cameras. **Geometric camera models**: - Elements of analytical Euclidean geometry, camera parameters & perspective projections.

Sources, Shadows and Shading: Radiometric Properties of Light Sources, Qualitative Radiometry. Sources and their Effects

Color: The Physics of Color, Human Color Perception, Representing Color.

UNIT II:

Linear filters: Linear Filters and Convolution, Shift invariant linear systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing.

Edge Detection: Estimating Derivatives with Finite Differences, Noise, Edges and Gradient-based Edge Detectors.

Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids.

UNIT III:

Segmentation by Clustering: Human vision, Applications: Shot Boundary Detection, Background Subtraction. Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering.

Fitting: The Hough Transform, Fitting Lines, Fitting Curves.

Segmentation and Fitting using Probabilistic Methods: Missing Data Problems, Fitting and Segmentation.

UNIT IV:

Model based vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by Pose Clustering, Obtaining

	Hypotheses Using Invariants. **Finding Templates Using Classifiers**: Classifiers, Building Classifiers from Class Histograms, Feature Selection. **Recognition:** Object detection, Face recognition.
Text books and Reference books	**Text Book(s):** [1]. Forsyth and Ponce, "Computer Vision A Modern Approach" PHI-Eastern Economy Edition. [2]. Computer vision-algorithms and applications Richard Szeliski September 3, 2010 draft c 2010 Springer. **Reference Books:** [1]. Dyer, C.R., Volumetric scene reconstruction from multiple views, in Foundations of Image Understanding. 2001, Boston. [2]. Shapiro, L.G. and G.C. Stockman, Computer Vision. First ed. 2001: Prentice Hall. [3]. Hartley, R. and A. Zisserman, Multiple View Geometry in Computer Vision.Second ed. 2004: Cambridge University Press. [4]. Ballard, D.H. and C.M. Brown, Computer vision First ed. 1982: Prentice Hall [5]. Sonka, M., V. Hlavac, and R. Boyle, Image processing, analysis and machine vision. Third ed. 2007: CL-Engineering.
E-resources and other digital material	**Web Resources:** [1]. Williams, A.V. Fundamentals of Computer Vision. CMSC 828D 2000 [cited 2011 20.01]; Available from:http://www.umiacs.umd.edu/~ramani/cmsc828.html. [2]. Siddiqi, K. Centre for Intelligent Machines.[cited 2011 20.01]; Available from: http://www.cim.mcgill.ca/~siddiqi/558b.html. [3]. Duraiswami, R. Computer Vision. Spring 2005 [cited 2011 20.01]; Available from: http://www.umiacs.umd.edu/~ramani/cmsc426/index.html. [4]. Digital Image Processing. 2008 [cited 2011 20.01]; Available from:http://www.icaen.uiowa.edu/~dip/syllabus.html

14IT4605F APTITUDE RELATED ANALYTICAL SKILLS

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Elective	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3302: Discrete Mathematical Structures	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	**Upon successful completion of the course, the student will be able to:**	
	CO1	Understand the concepts of numbers, ages, averages, simple and compound interest
	CO2	Understand the basics of data sufficiency, data interpretation and solve problems on trains
	CO3	Analyze the problems related to logical reasoning
	CO4	Understand the concepts of Synonyms, antonyms and Analyze the recent issues via email and essay writing

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1										3	
CO2	1										3	
CO3	1										3	
CO4										3		

Course Content

UNIT I:
Numbers, LCM,GCD, Fractions and decimals, Percentages, Profit and Loss, Simple and Compound Interest, Clocks and Calendars, Problems on Ages, Averages, Ratio and Proportion

UNIT II:
Permutations, Combinations, Probability, Mixtures and Solutions, Time, Speed & Distance, Time & Work, Data Interpretation, Data Sufficiency, Odd man Out, Problems on Trains

UNIT III:
Series Completion, Direction Sense Test, Coding-Decoding, Blood Relations, Logical Ven Diagrams, Alpha numeric Series, Analytical Reasoning,

UNIT IV:
Synonyms & Antonyms, Essay Writing, E-mail Writing

Text books and Reference books

Text Book(s):

[1]. Agarwal.R.S – Quantitative Aptitude for Competitive Examinations, S.Chand Limited 2011

[2]. Agarwal.R.S, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand Limited,2010

[3]. Barrons GRE High-Frequency 333 Words Vocabulary List

Reference Books:

[1]. Edgar Thrope, Test Of Reasoning for Competitive Examinations, Tata

	McGraw Hill, 4th Edition, 2012 [2]. Green Sharon Weiner M.A & Wolf Ira K. Barron's New GRE, 19th Edition. Barron's Educational Series, Inc, 2011. [3]. Lewis Norman, "Word Power Made Easy", Published by W.R.Goyal Pub, 2011.
E-resources and other digital material	**Web Resources:** [1]. http://www.careerbless.com/aptitude/qa/home.php [2]. http://www.indiabix.com/ [3]. http://www.careerarm.com/437-quantitative-aptitude-formulas-shortcuts/ [4]. http://www.govtjob.guru/quantitative-aptitude-questions/ [5]. http://www.placementexpress.com/

14IT3651 - BIG DATA LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	DBMS, Data Warehousing & Mining	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the concepts and challenges in analyzing big data.
	CO2	Learning to work with ecosystems available in Hadoop.
	CO3	Understand the impact of big data for business strategies &decisions.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
	CO1	3	3		1	3				1			
	CO2	3	3		1	3				1			
	CO3	3				1				1			1

Course Content	Week1 • Applications of Big Data • Advantages & Disadvantages of Big Data • Challenges of Big Data • Characteristics Of Big Data • Tools
	Week2 Hadoop installation (cloudera)
	Week3 Exploring HDFS (Hadoop Distributed File System). Listing of files, exploring directories.
	Week4 HDFS operations using commands. HDFS commands.
	Week5 Hive architecture, creating hive tables using hiveql language.
	Week6 Loading data into Hive warehouse. Applying aggregate operations on data.
	Week7 Implementing partitioning of data in Hive-warehouse using HiveQL.
	Week8 Implementation of bucketing of data in Hive Warehouse HiveQL, CTAS query.
	Week9 & 10 Implementing the map-reduce case studies.
Text books and reference	Text Book(s): 1. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch

books	,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012. 2. Tom White, Hadoop, "The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012 Reference Books: 1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 2. David Loshin, "BigDataAnalytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph",Morgan Kaufmann Publishers, 2013 3. Hadoop in Practice by Alex Holmes, MANNING Publ. 4. Hadoop in Action by Chuck Lam, MANNING Publ.
E-resources and other digital material	1. An overview of "Big Data": Available http://www.jbonneau.com/doc/2012-04-27-big_data_lecture_1.pdf 2. Hadoop Tutorial: Developing Big-Data Applications with Apache Hadoop: Available http://www.coreservlets.com/hadoop-tutorial/ 3. Random notes on big data – SlideShare: Available www.slideshare.net/yiranpang/random-notes-on-big-data-26439474 4. http://www.cloudera.com/content/cloudera-content/clouderadocs/HadoopTutorial/CDH4/Hadoop-Tutorial.html 5. https: //www.ibm.com / developerworks / community / blogs / Susan Visser Editionntry/flash book understanding big data analytics for enterprise class hadoop and streaming data? lang en

14IT3652-INTERNET OF THINGS LAB

Course Category:	Program Core						**Credits:**					2	
Course Type:	Lab						**Lecture-Tutorial-Practice:**					0-0-3	
Prerequisites:	Computer Networks Lab						**Continuous Evaluation:**					30	
							Semester end Evaluation:					70	
							Total Marks:					100	
Course Outcomes	Upon successful completion of the course, the student will be able to:												
	CO 1	Understand the design concepts and technologies of Internet of Things.											
	CO 2	Develop IoT applications using various sensors.											
	CO 3	Implement the IOT applications using Raspberry pi 3 and Arduino Uno.											
Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
	CO 1		1	3	2	2							
	CO 2			1		3							
	CO 3		1	1	3								
Course Content	**Week 1 & 2:** • Identify the parts of the Arduino Board. • How to install Arduino IDE in different Operating systems. • Blink the LED on and off with 500 milli-sec time delay using Arduino UNO board.												
	Week 2 & 3: • Blink the LED on and off with 200 milli-sec time delay using Arduino UNO board. • Controlling AC light using Arduino UNO with relay module • Detecting obstacle with IR Sensor and Arduino												
	Week 4&5: • Set Up the Dht11 Humidity Sensor on an Arduino • Find the distance using Ultrasonic Sensor HC-SR04 and Arduino • Display the wave on Processing IDE console using HC-SR04 Sensor												
	Week 6 & 7: • Automatic street light control is used to control the street light (Turn on and off based on the light). • Smoke Detection using MQ-2 Gas Sensor												
	Week 8 & 9: • Motion detection using PIR Sensors • Display the text using 16x2 LCD Display Module												
	Week 10 & 11: • Controlling LED with Raspberry with Pi3 • Interfacing an LED and Switch with Raspberry Pi 3												
Text books and	**Text Book(s):** [1]. Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-**												

Reference books	**Approach)",** 1st Edition, VPT, 2014. [2]. Charalampos Doukas "**Building Internet of Things with the Arduino**" **Reference Books:** [1] Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013 [2] Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.
E-resources and other digital material	[1]. https://www.arduino.cc/en/Tutorial/HomePage [2]. https://www.raspberrypi.org/blog/tag/tutorials/

14IT3653 MOBILE APPLICATION DEVELOPMENT LAB

Course Category:	Program Core					**Credits:**						2	
Course Type:	Lab					**Lecture-Tutorial-Practice:**						0-0-3	
Prerequisites:	Java Programming Lab					**Continuous Evaluation:**						30	
						Semester end Evaluation:						70	
						Total Marks:						100	
Course Outcomes	Upon successful completion of the course, the student will be able to:												
	CO1	Implement mobile application development frameworks for Android.											
	CO2	Understand the basic and important design concepts and issues of development of mobile applications											
	CO3												
Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO12
	CO1	1		3						3			
	CO2	1	1	3						3			
Course Content	**Week 1** • Installation of Android Studio												
	Week 2: • Java Android Program to Build a Simple Android Application . • Java Andorid Program to Demonstrate TextView and EditText UI controls												
	Week 3: • Java Andorid Program to develop native Calculator												
	Week 4: • Java Andorid Program to install web site in your own Android App • Java Android Program to develop web application in Android.												
	Week 5: • Java android Program to create multiple activities. • Java Android Program to send data from one activity to another activity.												
	Week 6: • Java android Program to create multiple activities. • Java Android Program to send data from one activity to another activity.												
	Week 7: • Java Android Program to Create Checkboxes and Radio Buttons.												
	Week 8: • Java Android Program to Demonstrate ListView UI Control • Java Android Program to Demonstrate Alert Dialog Box.												
	Week 9: • Java Android Program to Demonstrate an Adapter • Java Android Program to demonstrate Advanced Adapter												

	Week 10: • Java Android Program to Demonstrate Explicit Intent • Java Android Program to Demonstrate Implicit Intent
	Week 11: • Java Android Program to Insert Time and Date Picker Dialog
	Week 12: • Develop an Android App which display the details of your complete biodata with images and UI components.
Text books and Reference books	**Text Book(s):** [1]. Android Programming Unleashed by B.M.Harwani,SAMS [2]. Android A Programmer's Guide by J.F.DiMarzio, Mc Graw Hill Publication [3]. Android Programming for Beginners by John Horton, Packt Publishing. **Reference Books:** [1]. Android Apps for Absolute Beginners,Second Edition,Wallace Jackson,Apress Publication [2]. Android Programming for Beginners,By Joseph Joyner [3]. Programming Android by Laird Dornin,O'REILLY [4]. Android Programming:The Big Nerde Ranch Guide by Bill Phillips [5]. Android Programming:Pushing the Limits,by Erik Hellman ,WILEY Publication
E-resources and other digital material	[1]. https://developer.android.com/studio/install.html [2]. https://www.lynda.com/Android-tutorials/Android-App-Development-Essential-Training/442863-2.html

14IT5654 – TERM PAPER

Course Category:	**Program Core**					**Credits:**			2				
Course Type:	**Term Paper**					**Lecture-Tutorial-Practice:**			0-0-2				
Prerequisites:						**Continuous Evaluation:**			30				
						Semester end Evaluation:			70				
						Total Marks:			100				
Course Outcomes	Upon successful completion of the course, the student will be able to:												
	CO1	Choose the topic in the domain of interest in order to study literature.											
	CO2	Analyze the selected topic and organize the content											
	CO3	Summarize and communicate the content to audience in an effective manner											
	CO4	Practice the learning by self study											
Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO12
	CO1		3	2		2	2	1					
	CO2	2	3	3	2	2	2	2					
	CO3								2	3	3	2	2
	CO4		2			1	2					2	2

.14IT3701-CLOUD COMPUTING

Course Category:	Programme Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-1-0
Prerequisites:	Computer Networks	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the components and services of cloud computing relevant to various applications.
	CO2	Analyze the cloud technology and its storage providers for accessing the cloud.
	CO3	Analyze the cloud services in different cloud vendors
	CO4	Compare and contrast the economic benefits delivered by various cloud models based on application requirements, economic constraints and business requirements

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
	CO1	1	1								3		
	CO2		1	3		1							
	CO3				3				1				
	CO4			1			3						

Course Content	**UNIT I:** **Cloud Computing Basics:** Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud. **Organizing the Cloud computing:** When to use cloud computing, Benefits, Limitations, Security concerns, Regulatory Issues. **Business case for going to the cloud:** Cloud computing services, Helping the business with applications, Deleting data centers, Salesforce, Thomson Returns.
	UNIT II: **Hardware and Infrastructure:** Clients, Security, Network, Services. **Accessing the Cloud:** Platforms, Web Applications, Web APIs, and Web Browsers. **Cloud Storage:** Overview, Cloud Storage Providers. **Standards**: Application, Client, Infrastructure, Service.
	UNIT III: **Software as a service:** Overview, Driving Forces, Company offerings, Industries. **Software plus Services:** Overview, Mobile Device Integration, Providers, Microsoft Online. **Developing Applications:** Google, Microsoft, Intuit Quick Base, Cast Iron Cloud, and Bungee Connect, Development.
	UNIT IV: **Local clouds and Thin Clients:** Virtualization, Server Solutions, Thin Clients. **Migrating to the Cloud:** Cloud Services for Individuals, Cloud services aimed at the mid-market, Enterprise- Class Cloud Offerings, Cloud Migration

	.
Content beyond syllabus	Exposure to real time storage management system using simulators, free resources for cloud.
Text books and Reference books	**Text Book:** [1]. Velte T. Antony, Velte J. Toby., Elsenpeter Robert, "Cloud Computing: A Practical Approach", Tata McGraw- Hill , 2010, **Reference Books:** [1]. Miller Michael, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, 2008. [2]. Beard Haley, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pvt. Limited , 2008.
Web resources:	[1]. http://www.mycloudbuddy.com/ [2]. http://www.google.com/apps/intl/en/business/index.html

14IT3702- MACHINE LEARNING

Course Category:	Program core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	14IT3502- Data Warehousing and Mining	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basic concepts and techniques of machine learning.
	CO2	Understand Genetic and Neural network algorithms.
	CO3	Analyze various learning algorithms to retrieve knowledge
	CO4	Understand the learning algorithms for finding regularities in data

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2			2								
CO2	2			2	1							
CO3	2	2		2								
CO4	3	2		2								

Course Content

Unit I

Introduction: Learning problems, perspectives and issues, concept learning, version spaces and candidate eliminations, inductive bias, decision tree learning, representation, algorithm, heuristic space search.

Unit II

Neural Networks And Genetic Algorithms: Neural network representation, problems, perceptrons, multilayer networks and back propagation algorithms, advanced topics, Genetic algorithms, hypothesis space search, genetic programming

Unit III

Bayesian and Computational Learning: Bayes theorem , concept learning, maximum likelihood, minimum description length principle, Bayes optimal classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian belief network, EM algorithm.

Unit IV

Instance Based Learning: K-Nearest neighbour learning, locally weighted regression, radial basis functions, case based learning.

Text books and Reference books

Text Book(s):

[1]. Tom M. Mitchell, Machine Learning, McGraw Hill , 2013.

Reference Books:

[1]. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press, 2004

[2]. T. Hastie, R. Tibshirani, J. H. Friedman, The Elements of Statistical Learning, 1/e, Springer, 2001.

[3]. M Narasimha Murty, Introduction to Pattern Recognition and Machine Learning, World Scientific Publishing Company, 2015

E-resources and other digital material	[1"https://www.youtube.com/embed/fC7V8QsPBec" [2]."https://www.youtube.com/embed/mfePdDh9t6Q?list=PLszwY6Kw2_n99YKb-sNv9uFoMTHGNyXph" [3]. http://www.cs.cmu.edu/~tom/10701_sp11/lectures.shtml

14IT3703- CYBER SECURITY

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-1-0
Prerequisites:	14IT3504-Computer Networks 14IT3604- Network Security	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the assets of information and significance of security
	CO2	Understand data leakage, protection and security policies
	CO3	Analyse log files and backup strategies for securing the data in real time environment
	CO4	Analyse the issues in handling web vulnerabilities

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3	3									
CO2			1	2								
CO3	1	1	3	1	1							
CO4	1		2	3	1	1						

Course Content

UNIT I: Information Security and Threats

Introduction – Information Security, Information Assets & Threats - Threats to Information Assets, Types of Attacks, Types of Virus, Types of Worms, Types of Trojans, Network Attacks, Common Vulnerabilities and Exposures (CVE).

Fundamentals of Information Security: Elements of information security – Network Security, Application Security, Communications Security. Principles and concepts – data security – Critical Information Characteristics, Information States, Prevention Vs Detection, Types of controls – Access Control Models.

UNIT II: Data Leakage and Prevention

Introduction to Data Leakage, Organisational Data Classification, Location and Pathways, Content Awareness, Content Analysis Techniques, Data Protection

Information Security Policies, Procedures, Standards and Guidelines : Information Security Policies, Key Elements of a Security Policy.

Network Sniffers and Injectors – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet

UNIT III: Log Correlation and Management

Event Logs - Concepts, Log Management and its need, Log Management Process, Configuring Windows Event Log, IIS Log Files, Log Analysis and Response.

Data Backup : Data Backup -Overview, Types of Backup, Backup Procedures., Types of Storage,

UNIT IV:

Web Application Hacking : Scanning for web vulnerabilities : Nikto, , HTTP utilities - Curl,

Open SSL, Stunnel, Application Inspection – Zed Attack Proxy, Sqlmap, Password Cracking and Brute-Force Tools

Content Beyond Syllabus	**Handling Network Security Incidents** Network Reconnaissance Incidents ,Denial of Service Incidents, Unauthorized Access Incidents, Inappropriate usage incident, Multiple component incident
Text books and Reference books	Text Book(s): [1]. Student Handbook – Security Analyst, NASSCOM [2]. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill Reference Books: [1]. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley [2]. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009. [3]. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005 [4]. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2006. [5]. McClure, Stuart, Saumil Shah, and Shreeraj Shah. Web Hacking:attacks and defense. Addison Wesley. 2003.
E-resources and other digital material	[1]. http://www.hackerhighschool.org/lessons.html [2]. http://www.techworm.net/2015/08/the-top-ten-hacker-tools-of-2015.html [3]. https://www.cybrary.it/course/ethical-hacking/ [4]. http://hackingteacher.com/Ethical-Hacking-Tools-Download.html **[5].**http://hackeracademy.com/

14HS1704 ENGINEERING ECONOMICS AND FINANCE

Course Category:	Institutional Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand various forms of organizations and principles of management **(a,** l).
	CO2	**U**nderstand the various aspects of business economics (a, e, l)
	CO3	Acquire knowledge on Human resources and Marketing functions (a, l)
	CO4	understand best alternatives for various investment decisions and different depreciation methods (a, e, l)

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1										2
CO2	2				3							2
CO3	2											2
CO4	2				3							2

Course Content

UNIT I:

Forms of Business Organization: Salient Features of Sole Proprietorship, Partnership, Joint Stock Company: Private Limited and Public Limited Companies, Co-operative Society and Public Sector.

Management: Introduction to Management, Management an Art or Science, Functions of Management, Principles of Scientific Management, Henri Fayol's Principles of Management.

UNIT II:

Introduction to Economics: Introduction to Basic Economic Concepts, Utility Analysis: Marginal Utility and Total Utility, Law of Diminishing Marginal Utility, Law of Equi Marginal Utility, Demand Analysis: Theory of Demand: Demand Function, Factors Influencing Demand, Demand Schedule and Demand Curve, Shift in Demand, Elasticity of Demand: Elastic and Inelastic Demand, Types of Elasticity, Factors of Production, Production Function, Production with one variable input, Isoquants, Returns to Scale, Cost Function: Cost - Output Relationship in short run and long run, Relationship between AC and MC. Supply Analysis: Supply Schedule and Supply Curve, Factors Influencing Supply, Supply Function, Theory of firm: Price determination under equilibrium of firm, Perfect competition.

UNIT III:

Human Resource Management: Meaning and difference between Personnel Management and Human Resource Management, Functions of Human Resource Management, Recruitment and Selection Process.

Marketing Management: Concept of Selling And Marketing – Differences, Functions of Marketing, Product Life Cycle, Concept of Advertising, Sales Promotion, Types of Distribution Channels, Marketing Research, Break-Even Analysis - Problems

	UNIT IV: **Financial Management:** Functions of Financial Management, Time value of money with cash flow diagrams, Calculation of Simple and Compound Interest - Present worth, Future worth, Annual Equivalent, Methods of Evaluating Alternatives under Present worth method, Future worth method, Annual Equivalent method for choice of decision making among alternative projects. **Production Management:** An Overview and significance of Production Management, Objectives, Scope of production management, Production cycle. Depreciation, Causes of depreciation, Factors influencing depreciation, common methods of Depreciation: Straight Line Method, Declining Balance Method, Sum of Year's Digits Method –Problems.
Text books and Reference books	**Text Books:** [1]. P.Premchand Babu and M.Madan Mohan *Managerial Economics and Financial Analysis* Himalaya publishing house 2011 edition [2]. M. Mahajan *Industrial Engineering and Production Management* 2nd Edition Dhanpat Rai Publications. **Reference Books:** [1]. [Theusen & Theusen, "***Engineering economy***". [2]. Philip Kotler & Gary Armstrong "***Principles of Marketing***" ,pearson prentice Hall,New Delhi,2012 Edition. [3]. B.B Mahapatro, ***"Human Resource Management".***,New Age International ,2011 [4]. IM Pandey, "***Financial Management***" Vikas Publications 11th Edition [5].R.Panneer selvam, ***"Production and operations management",*** PHI Learning pvt Ltd, New Delhi, 2012
Web resources:	[1]. www.tectime.com [2]. www.exinfm.com [3]. www.slideshare.net [4]. www.economywatch.com

14IT4705A-BUSINESS INTELLIGENCE

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3502 Data Warehousing & Mining	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the concepts and components of Business Intelligence(BI).
	CO2	Understand the business strategies applied over different areas of business.
	CO3	Discover the requirements need to design a business intelligence model.
	CO4	Develop a behavioral model to assess the behavior of the customer.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3		2	2								
CO2	3	2	2	1		1					2	
CO3	2	2	2	2		1					2	1
CO4	2	2	2	3		1					2	1

Course Content

UNIT I:

Business Intelligence and Information Exploitation: Improving the Decision-Making Process, Why a Business Intelligence Program, Business Intelligence and Program Success, The Analytics Spectrum, Taming the Information Explosion.

The Value of Business Intelligence: Value Drivers and Information Use, Performance Metrics and Key Performance Indicators, Using Actionable Knowledge, Horizontal Use Cases for Business Intelligence, Vertical Use Cases for Business Intelligence.

UNIT II:

Planning for Success: Introduction, Organizational Preparedness for Business Intelligence and Analytics, Initial Steps in Starting a Business Intelligence Program, Bridging the Gaps between Information Technology and the Business Users, Knowing the Different Types of Business Intelligence Users, Business Intelligence Success Factors: A Deeper Dive, More on Building Your Team, Strategic Versus Tactical Planning.

Developing Your Business Intelligence Roadmap: A Business Intelligence Strategy: Vision to Blueprint, The Business Intelligence Roadmap: Example Phasing, Planning the Business Intelligence Plan.

UNIT III:

The Business Intelligence Environment: Aspects of Business Intelligence and Analytics Platform and Strategy, The Organizational Business Intelligence Framework, Services and System Evolution.

Business Processes and Information Flow: Analytical Information Needs and Information Flows, Information Processing and Information Flow, The Information Flow Model.

Data Requirements Analysis: Introduction, Business Uses of Information, Metrics: Facts, Qualifiers, and Models, What is Data Requirements Analysis?.

UNIT IV:

Data Profiling: Establishing Usability of Candidate Data Sources, Data Profiling Activities, Attribute Analysis and Relationship Analysis.

Deriving Insight from Collections of Data: Introduction, Customer Profiles and

	Customer Behavior, Customer Lifetime Value Demographics, Psychographics, Geographic's, Geographic Data, Behavior Analysis.
Content Beyond Syllabus	BI Application areas, BI in the company management, BI Tools
Text books and Reference books	**Text Book(s):** [1]. D. Loshin, Business Intelligence: The savvy manager's guide,Morgan Kaufmann Publishers, 2003. **Reference Books:** [1]. M. Biere, Business intelligence for the enterprise, 2 ed.: IBM Press, 2003. [2]. C. Howson, Successful Business Intelligence: Secrets to making Killer BI Applications, 1 ed.: McGraw-Hill 2007.
E-resources and other digital material	[1]. Angela Shen-Hsieh. 20 January). Available: http://www.techrepublic.com/videos/whiteboard/next-generation-of-business-intelligence/218297 [2]. John O'Brien. 20 January). Web Course CTO of Dataupia. Available: http://www.techrepublic.com/videos/whiteboard/greening-the-data-center/177737?tag=mantle_skin;content

14IT4705B- DESIGN PATTERNS

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3501 : Software Engineering	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the necessity of design patterns in the recurring design problems
	CO2	Understand object creation mechanisms through Creational Patterns
	CO3	Analyze software problems and relations between entities using Structural Patterns
	CO4	Identify common communication patterns between the objects

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1											
CO2		3	3									
CO3		3	3									
CO4				2								
CO5	2											1

Course Content

UNIT I:
Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern. **Creational Patterns:** Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT II:
Structural Patterns : Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy Patterns

UNIT III:
Behavioral Patterns -I : Chain of Responsibility , Command, Interpreter, Iterator, Mediator Patterns

UNIT IV:
Behavioral Patterns-II: Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

Text books and Reference books

Text Book(s):

[3]. E. Gamma, et al., Design Patterns: Elements of Reusable Object-Oriented Software, 2 ed., 1994.

Reference Books:

[1]. A. Shalloway, Design Patterns Expalined: Pearson Education, 2002.
[2]. B. Hughes and M. CotterelI, Software Project Management, 5 ed.: Tata McGraw-Hill, 1968.
[3]. M. Grand and Wiley, Paterns in JAVA vol. 1: Dream Tech.

E-resources and other digital material

Web Resources:

[1]. P. S. N. Srihari and Web course Department of Computer Science & Engineering, University of buffalo. Available: http://www.cedar.buffalo.edu/~srihari/CSE555/

[2]. P. U. Park. 20 January). Web course Computer Science and Engineering Michigan State University Available: http://www.cse.msu.edu/~cse802/#Schedule

14IT4705C- MOBILE COMPUTING

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3504 :Computer Networks	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand Cellular telephony with respect to satellite communication systems.
	CO2	Recognize The cellular and First generation cellular system
	CO3	Identify the GSM cellular telephony Architecture and physical layer.
	CO4	Analyze the GPRS and CDMA in mobile communication systems

Contribution of Course Outcomes towards achievement of Program Outcomes(1 – Low, 2-Medium, 3-High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					3		1				
CO2		3		1			2				1
CO3				3					1		
CO4	3				2						3

Course Content

UNIT I:

Overview and classification of mobile communication systems: Introduction, Paging systems, Wireless telephony, Trunking systems, Cellular telephony, Personal satellite communication systems, Wireless access to the local area networks. **Introduction to MC:** Applications, Vehicles, Emergencies, Business, Replacement of Wired networks, Infotainment and more, Location dependent services, Mobile and wireless devices, Cellular Systems, Satellite Systems, GEO, LEO, MEO, GPRS, Architecture, Support nodes

UNIT II:

The cellular system concept: Simplified design of a classic cellular system, Elements of the traffic theory applied to cellular systems, Ways of increasing the system capacity, Channel assignment to the cells

First generation cellular telephony: NMT and AMPS examples, First generation cellular systems, Services offered by NMT, Typical mobile station and base station design, The overview of AMPS, AMPS radio interface, Call processing in AMPS

UNIT III:

GSM cellular telephony: Architecture and system aspects, Introduction, Basic GSM architecture, Basic radio transmission parameters of the GSM system, Logical channel description, GSM time hierarchy, GSM burst structures, Description of the call set-up procedure, Handover, Ensuring privacy and authentication of a user, Modifications and derivatives of GSM

GSM cellular telephony physical layer: Introduction, Construction of a typical mobile station, Coding and decoding of a speech signal, Full rate speech coding, Half rate speech coding.

	UNIT IV: **Data transmission in GSM:** Introduction, Organization of data transmission in the GSM system, Data services in GSM, Rate adaptation, Channel coding, Radio Link Protocol (RLP), Data transmission in the aspect of access to different networks, Transmission of short messages - SMS, High-Speed Circuit-Switched Data service - HSCSD, General Packet Radio Service - GPRS, GPRS system architecture, GPRS services, EDGE - Enhanced Data rate for Global Evolution, Main improvements in the physical layer **CDMA in mobile communication systems:** Introduction, Motivation for considering CDMA as a potential multiple access method, Spreading sequences.
Content Beyond Syllabus	**Generations of network** 1 g, 2g, 3g, 4g, 5g, **Future of smartphone, Mobile OS:** Android, webOS, Maemo, Moblin, MeeGo, Tizen, Sailfish OS, Firefox OS.
Text books and Reference books	**Text Book(s):** [1]. Krzysztof Wesolowski, "Mobile Communication Systems", Wiley publication, 2002 [2]. Jochen Schilller ,"Mobile Communication ", Addision wisely,Pearson Education, 2003 **Reference Books:** [1]. W. Frank Ableson, Robi sen, Chris King, " Android IN ACTION ", Third Edition, Dreamtech Press, 2011 [2]. Mobile Computing By Rajkamal (Oxford), 2007 [3]. Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober, "Principles of Mobile Computing", Springer, 2006
E-resources and other digital material	[1]. https://www.youtube.com/watch?v=LZuzO0FKd0A, Jack A.Hayman, George Washington University [2]. https://www.youtube.com/watch?v=eXZXvuCPNSw, Brendan Hannigan, General Manager, IBM Security

14IT4705D- SOFTWARE PROJECT PLANNING & MANAGEMENT

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3501 – Software Engineering	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand risk management analysis techniques to quantify the likely effect of risk on project timescales.
	CO2	Analyze the dimensions of requirements gathering in delivering successful IT project.
	CO3	Analyze a project to identify the scope of work, provide accurate cost estimates and to plan the various activities.
	CO4	Understand and analyze the resources required for a project and to produce a work plan and resource schedule.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2			1						2	
CO2		3	1							1	2	
CO3	1										2	
CO4		3	3	2							2	

Course Content

UNIT I:

Risk Management: Introduction What is risk management and why is it important?, Risk management cycle, Risk identification: common tools and techniques, Risk Quantifications, Risk Monitoring, Risk Mitigation, Risks and Mitigation in the context of global project teams

Project Planning and Tracking:

Components of Project Planning and Tracking, The "What " Part of a Project Plan, The "What Cost " Part of a Project Plan, The "When " Part of Project Planning, The "How " Part of a Project Planning: Tailoring of Organizational Processes For the Project, The " By Whom " Part of the Project Management Plan : Assigning Resources, Putting it all together .

UNIT II:

Project Closure: When Does Project Closure Happen?. Why Should We Explicitly do a Closure?, An Effective Closure Process, Issues that Get Discussed During Closure, Metrics for Project Closure, Interfaces to the Process Database.

Software Requirements gathering: Inputs and start criteria for requirements gathering, Dimensions of requirements gathering, Steps to be followed during requirements gathering, outputs and quality records from the requirements phase, skill sets required during requirements phase.

	UNIT III: **Estimation:** What is Estimation? when and why is Estimation done?, the three phases of Estimation, Estimation methodology, formal models for size Estimation, Translating size Estimate into effort Estimate, Translating effort Estimates into schedule Estimate, common challenges during Estimation , Metrics for the Estimation processes. **Design and Development Phases**: Some differences in our chosen approach, salient features of design, evolving an architecture/ blueprint, design for reusability, technology choices/ constraints, design to standards, design for portability, user interface issues, design for testability.
	UNIT IV: **Project management in the testing phase:** Introduction, What is testing?, what are the activities that makeup testing?, test scheduling and types of tests, people issues in testing, management structures for testing in global teams, metrics for testing phase. **Project management in the Maintenance Phase:** Introduction, Activities during Maintenance Phase, management issues during Maintenance Phase, Configuration management during Maintenance Phase, skill sets for people in the maintenance phase, estimating size, effort, and people resources for the maintenance phase.
Content Beyond Syllabus	Practical techniques risk management, Metrics in risk management.
Text books and Reference books	**Text books** [1]. Ramesh Gopalaswamy: "Managing Global Projects ", Tata McGraw Hill, 2013. **References** [1]. 1.Watts Humphrey, "Managing the Software Process ",Pearson Education, New Delhi, 2000 [2]. 2. PankajJalote, "Software Project Management in practice", Pearson Education, New Delhi, 2002.
E-resources and other digital material	[1]. http://www.nptelvideos.in/2012/12/project-and-production-management.html [2]. http://nptel.ac.in/courses/106101061/2

14IT4705E-THEORY OF AUTOMATA AND FORMAL LANGUAGES

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14CS1103 : Introduction to Computing	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basic concepts of formal language theory and construct Finite state machines
	CO2	Analyze the properties of Regular Expressions and Regular Languages
	CO3	Analyze normal formal techniques and context free languages
	CO4	Design Pushdown Automata and Turing machines for the grammar or language

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1			1						2	
CO2	2	3									3	
CO3	3	1									1	
CO4	3	3		2							1	

Course Content

UNIT I:

Introduction: Introduction to Finite Automata, The central concepts of Automata theory

Finite Automata: Informal picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata, Finite automata with Epsilon –Transitions, An Applications-Text Search.

UNIT II:

Regular Expressions and Languages : Regular expressions – Operators of Regular Expressions, Building Regular Expressions, Precedence of Regular Expressions, Finite Automata and Regular Expressions - From DFA's to Regular Expressions, Converting DFA's to Regular expressions by eliminating states, Converting regular expressions to automata; Application of Regular Expressions- Regular Expressions in UNIX, Lexical Analysis, Algebraic Laws for Regular Expressions.

Properties of Regular languages : Proving languages not to be regular; Closure properties of Regular Languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT III:

Context-Free Grammars and Languages: Context –free grammars, Parse trees-Constructing Parse Trees, The yield of a parse tree; Applications of Context Free Grammars, Ambiguity in grammars and languages- Ambiguous grammars, Removing ambiguity from Grammars, Leftmost derivation as a way to express ambiguity, Inherent ambiguity.

Properties of Context-Free Languages: Normal Forms for Context-Free Grammars, The pumping lemma for Context Free Language's, Closure properties of Context Free Language's

UNIT IV:

Pushdown Automata: Definition of the Pushdown automata, The languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Push Down Automata.

Turing Machines: Introduction, The Turing machine, Programming Techniques for Turing

	Machine, Extensions to the Basic Turing Machine.
Content Beyond the syllabus	Applications of Finite Automata, Programming Techniques for Turing Machines, Post Correspondence problem
Text books and Reference books	**Text Book(s):** [1]. John E.. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson education, 2011 **Reference Books:** [1]. John E.Hopcroft . and Jeffery D.Ullman, "Introduction to Automata Theory Languages and Computation". D. Pearson Education, 2002(reprint) [2]. Lewis H.P. & Papadimitriou C.H , "Elements of Theory of Computation", Second edition, Pearson /PHI. [3]. K.L.P.Mishra and N. Chandrashekaran, "Theory of computation" , 2nd edition, PHI
E-resources and other digital material	[1]. http://nptel.ac.in/courses/106106049/ [2]. http://dev.tutorialspoint.com/automata_theory/index.htm [3]. http://nptel.ac.in/courses/106103070/ [4]. http://www.nptelvideos.in/2012/11/theory-of-computation.html [5]. https://www.youtube.com/watch?v=-aIRqNnUvEg

14IT4705F- SIMULATION AND MODELING

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14MA1401: Probability and Statistics 14CS1203 : C Programming	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basics of system and its models
	CO2	Understand the approaches to generate Random Numbers t
	CO3	Analyze the techniques to test the Random Numbers
	CO4	Understand the simulation language General Purpose System Simulation to solve real world applications such as super market and manufacturing shop

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1			1									
CO2	3	1										
CO3	3		2									
CO4		2									1	

Course Content

UNIT I:

System Models: The Concepts of a System, System Environment, Stochastic Activities, Continuous and Discrete Systems, Sytem /Modeling, Types of Models, Static Physical Models, Dynamic Physical Models, Static Mathematicsal Models, Dynamic Mathematical Models, Principles used in Modeling, Steps in Simulation Study.

System Studies: Subsystems, A coroporate Model, Environment Segment, Production Segment, Management Segment, The Full Corporate Model.

System Simulation: The Monte Carlo Simulation, Cobweb Models.

UNIT II:

Random – Number Generation:

Properties of Random Numbers, Generation of Pseudo-Random Numbers, Techniques for Generating Random Numbers.

Techniques for Generating Random Numbers: Linear Cogruential Method, Combined Linear Congruential Generators

Tests for Random Numbers: Frequency Tests. Run Tests, Tests for Auto Correlation, Gap Test, Poker Test

	UNIT III: **Inverse Transform Technique:** Exponential Distribution, Uniform Distribution, Weibull Distribution, Triangular Distribution, Empirical Continuous Distribution, Continuous Distribution without a closed form inverse, Discrete Distributions. Direct Transformation for the Normal and Lognormal Distribution, Convolution Method, Erlang Distribution **Acceptance-Rejection Technique**: Poisson Distribution, Gamma Distribution
	UNIT IV: **Introduction to GPSS:** GPSS Programs, General Description, Action Times, Succession of Events, Choice of Paths, Facilities and Storages, Gathering Statistics, Conditional Transfers, Program Control Structures. **Case Studies:** Simulation of Manufacturing Shop, Simulation of a Super Market
Content Beyond Syllabus	Other Simulation Languages CSSP, SIMULA
Text books and Reference books	**Text Book(s):** [1]. Geoffrey Gordon, "System Simulation", 2nd Edition, Prentice Hall, India, 2007. [2]. Jerry Banks and John S.Carson, Barry L. Nelson, David M. Nicol, "Discrete Event System Simulation", 3rd Edition, Pearson Education Asia, 2000. **Reference Books:** [1]. Narsingh Deo, "System Simulation with Digital Computer, "Prentice Hall, India, 2001 [2]. Simulation Modeling and Analysis by Law and Kelton, 3rd Edition , TATA McGRAW HILL [3]. Shannon, R.E. Systems simulation, The art and science, Prentice Hall, 1975.
E-resources and other digital material	[1]. Prof. Robert B. Cooper, Stochastic Models for Computer Science, 11-01-2017 – Available https://www.youtube.com/watch?v=MAgBAw-4Z1s

14IT3751 - CLOUD COMPUTING LAB

Course Category:	Program Core						**Credits:**					2	
Course Type:	Lab						**Lecture-Tutorial-Practice:**					0-0-3	
Prerequisites:	Computer Networks Lab						**Continuous Evaluation:**					30	
							Semester end Evaluation:					70	
							Total Marks:					100	
Course Outcomes	Upon successful completion of the course, the student will be able to:												
	CO1	Understand the Cloud Sim											
	CO2	Implement Data Centers with host and cloudlet.											
	CO3	Analyse the issues in handling cloud designs.											
Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	
	CO1		2	2	3								
	CO2		1	2	3	2							
	CO3					2	3						
Course Content	**Week 1:** • A simple example showing how to create a datacenter with one host and run one cloudlet on it.												
	Week 2 & 3: • A simple example showing how to create two datacenters with one host and a network topology each and run two cloudlets on them. • A simple example showing how to create two datacenters with one host each and run cloudlets of two users with network topology on them.												
	Week 4 & 5: • A simple example showing how to create two datacenters with one host each and run two cloudlets on them. • A simple example showing how to create two datacenters with one host each and run cloudlets of two users on them												
	Week 6 & 7: • An example showing how to create scalable simulations. • A simple example showing how to create a datacenter with one host and network topology and and run one cloudlet on it. Here, instead of using a BRIE file describing the links, links are inserted in the code.												
	Week 8 , 9 & 10: • A simulation of a heterogeneous power aware data center that applies the Median Absolute Deviation (MAD) VM allocation policy and Minimum Migration Time (MMT) VM selection policy. • A simulation of a heterogeneous power aware data center that applies the Local Regression (LR) VM allocation policy and Minimum Utilization (MU) VM selection policy. • An initial example on the use of container simulation												

Text books and Reference books	**Text Book:** [1] Velte T. Antony, Velte J. Toby., Elsenpeter Robert, "Cloud Computing: A Practical Approach", Tata McGraw- Hill , 2010, **Reference Books:** [1] Miller Michael, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, 2008. [2] Beard Haley, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pvt. Limited , 2008.
E-resources and other digital material	[1]. **http://www.cloudbus.org/cloudsim/examples.html** [2]. http://installwithme.blogspot.in/2014/10/how-to-install-cloudsim-in-windows.html

14IT3752- CYBER SECURITY LAB

Course Category:	Program Core						**Credits:**					2	
Course Type:	Lab						**Lecture-Tutorial-Practice:**					0-0-3	
Prerequisites:	Computer Networks Lab						**Continuous Evaluation:**					30	
							Semester end Evaluation:					70	
							Total Marks:					100	
Course Outcomes	Upon successful completion of the course, the student will be able to:												
	CO1	Understand the packet analysis											
	CO2	Implement to capture network packets and tries to display that packet data as detailed as possible.											
	CO3	Analyse the issues in handling web vulnerabilities											

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	
CO1	1		3						3			
CO2		1	3						1			
CO3	1		2	3	1	1						

Course Content

Week 1&2:
- Program using Tcpdump and Windump

Week 3:
- Programs using Wireshark.
- Programs using Ettercap.

Week 4&5:
- Programs using Hping.
- Programs using Kismet

Week 6&7:
Scanning for web vulnerabilities : Nikto

Week 8:Graph algorithms
- Scanning for web vulnerabilities : HTTP utilities - Curl,
- Password cracking and Brute Force Tools

Text books and Reference books

Text Book(s):

[1]. Student Handbook – Security Analyst, NASSCOM

[2]. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill

Reference Books:

[1]. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

[2]. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

[3]. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005

[4]. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2006.

[5]. McClure, Stuart, Saumil Shah, and Shreeraj Shah. Web Hacking:attacks and defense. Addison Wesley. 2003.

E-resources and other digital material	[1]. http://www.hackerhighschool.org/lessons.html [2]. http://www.techworm.net/2015/08/the-top-ten-hacker-tools-of-2015 [3]. https://www.cybrary.it/course/ethical-hacking/ [4]. http://hackingteacher.com/Ethical-Hacking-Tools-Download.html **[5].**http://hackeracademy.com/

14IT6753/14IT6754 - INTERNSHIP \ INDUSTRY OFFERED COURSE

Credits : 2

Semester End Evaluation : 100

As per the Academic Rules & Regulations of VR14 (7.2.6 & 8.36 Industry Interaction)

The students may register for one of the following and it is mandatory to acquire two credits for the award of the degree:

Internship:

The students are expected to do internship of minimum 3 weeks duration in the industry approved by respective Head of the Department. It carries two credits.

Evaluation Process

The candidate shall submit the comprehensive report to the department. The report will be evaluated for 100 marks by the project review committee.

Industry offered courses:

The courses under this category shall be offered by the Industry experts whose minimum academic qualification is Bachelor of Engineering of equivalent. The courses under this category carry two credits.

Evaluation Process

The semester end examination for courses under this category is evaluated for 100 marks and it shall be conducted and evaluated by the industry expert who has delivered the lecture or by faculty nominated by the head of the department in consultation with the industry expert. The question paper pattern shall be decided by the industry expert at the beginning of the course and same is to be approved by the head of the department.

There will not be continuous evaluation for the courses under this category.

14IT5754 – MINI PROJECT

Course Category:	**Program Core**						**Credits:**					2	
Course Type:	Mini Project						**Lecture-Tutorial-Practice:**					0-0-3	
Prerequisites:							**Continuous Evaluation:**					30	
							Semester end Evaluation:					70	
							Total Marks:					100	
Course Outcomes	Upon successful completion of the course, the student will be able to:												
	CO1	Identify specific problem from the domain related literature study with well defined objectives.											
	CO2	Design and implement solution to the chosen problem using modern tools/algorithms/fundamental principles of Technology											
	CO3	Demonstrate and communicate the project objectives & outcomes in an effective manner											
	CO4	Organize the Technical report effectively using modern tools.											
Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO12
	CO1		3	2		2	2	1					
	CO2	2	3	3	2	2	2	2					
	CO3								2	3	3	2	2
	CO4		2			3	2					2	2

14IT3801 - SOFTWARE TESTING METHODOLOGIES

Course Category:	Programme Core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practice:**	4-0-0
Prerequisites:	14IT3501- Software Engineering	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basics of software testing and analyze software testing life cycle
	CO2	Analyze the testing techniques for performing Black Box and White Box Testing for a given application.
	CO3	Implement transaction flow testing, domain testing and state testing for a given application and apply in commercial environments.
	CO4	Interpret the control flow graph and identify the path products, path sums and path expressions.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2	1		1							
CO2	2	2	2	2								
CO3	3	1	2	1								
CO4	3	1	2	1								

Course Content

UNIT I:

Introduction to Software Testing : Introduction, Evolution of Software Testing, Software Testing – Myths and Facts, Goals of software Testing, Software Testing Definitions, Model for Software Testing, Effective software testing vs Exhaustive Software Testing..

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle (STLC), Software Testing Methodology.

Verification & Validation : Verification and Validation(V & V) Activities, Verification, Verification of Requirements, Verification of High-level Design, Verification of Low-level Design, How to verify code, Validation.

UNIT II:

Dynamic Testing: Black Box Testing Techniques: Boundary Value Analysis (BVA), Equivalence Class Testing, State Table based Testing, Decision Table based Testing, Cause -Effect Graphing based Testing, Error Guessing.

Dynamic Testing : White Box Testing Techniques: Need of White Box Testing, Logic Coverage Criteria, Basis Path Testing, Graph Matrices, Loop Testing, Data Flow Testing, Mutation Testing.

UNIT III:

Transaction Flow Testing: Transaction flows, transaction flow testing techniques.

Domain Testing : Domains and Paths, Nice Domains & Ugly Domains, Domain Testing

	UNIT IV: **Paths, Path products and Regular expressions**: Path Products & Path Expression, Reduction procedure, Applications **State, State Graphs and Transition Testing**: State graphs, good & bad state graphs, state testing.
Content beyond the syllabus	Software Metrics, Test Suit Management
Text books and Reference books	**Text Book(s):** [1]. Boris Beizer, "Software Testing techniques", second edition, Dreamtech, 2009. [2]. Naresh Chauhan, "Software Testing Principles and Practices, Oxford University Press, 2010. **Reference Books:** [1]. Brian Marick , "The craft of software testing", Pearson Education [2]. Edward Kit , "Software Testing in the Real World", Pearson. [3]. Perry, "Effective methods of Software Testing" , John Wiley [4]. Meyers, "Art of Software Testing, John Wiley. [5]. Dr.K.V.K.K.Prasad , "Software Testing Tools" , Dreamtech.
E-resources and other digital material	[1]. Testing video *NPTEL*. Available: http://nptel.iitm.ac.in/video.php?courseId=1076 **[2].** Software testing *MIT*. Available: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-912-introduction-to-copyright-law-january-iap-2006/video-lectures/lecture-4-software-licensing/

14IT4802A - INFORMATION RETRIEVAL SYSTEMS

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Outline basic terminology and components in information storage and retrieval systems
	CO2	Fundamental functions used in information retrieval such as automatic indexing, abstracting and clustering
	CO3	Compare and contrast information retrieval models and internal mechanisms such as Boolean, Probability, and Vector Space Models
	CO4	Understand the unique features of Internet-based information retrieval and describe current trends in information retrieval such as information visualization.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1					2						
CO2		2	2	3	3							
CO3		2	2	3	3						2	
CO4		2	2	3	3						2	

Course Content

UNIT I:

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

Information Retrieval System Capabilities: Search, Browse.

UNIT II:

Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.

Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.

Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT IV:

User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.

Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.

Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

Content beyond syllabus:	Text categorization algorithms, Information extraction and integration
Text books and Reference books	**Text Book(s):** [1]. M. T. M. Gerald J Kowalski, Information Storage and Retrieval Systems: Springer International Edition, 2005. **Reference Books:** [1]. W. B. Frakes, Ricardo Baeza-Yates, *Information Retrieval Data Structures and Algorithms*: Prentice Hall PTR, 2000. [2]. R. Baeza-Yates, *Modern Information Retrival*: Pearson Education, 2000. [3]. R. Korfhage, *Information Storage & Retrieval*: John Wiley & Sons, 2006.
E-resources and other digital material	[1]. https://web.stanford.edu/class/cs276/handouts/lecture1-intro.ppt,Stanford University. [2]. https://www.youtube.com/watch?v=m0oiAOgSQFw, by by Prof. Pushpak [3]. Bhattacharyya, Department of Computer science & Engineering,IIT Bombay [4]. https://www.youtube.com/watch?v=5L1qemKyUKA, by Professor Dan Jurafsky & Chris Manning,Stanford.

14IT4802B-HIGH PERFORMANCE COMPUTING

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3305 : Computer Organization 14IT3306 : Operating Systems	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Understand about Modern Processors and concepts
CO2	Exemplify various optimization techniques.
CO3	Analyze the technologies enabling parallel computing
CO4	Understanding about Memory Parallel Programming using OpenMP

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3	3		1							
CO2	1	1	1									
CO3	3	1	1		3	3						
CO4					1	1						

Course Content

UNIT I: MODERN PROCESSORS

Stored Program Computer Architecture- General purpose cache-based microprocessor architecture –Performance metrics and benchmarks- Moore's Law- Pipelining- Super scalarity-SIMD- Memory Hierarchies -prefetch-Multicore processors- Mutithreaded processors- Vector Processors- Design Principles- Maximum performance estimates

UNIT II: BASIC OPTIMIZATION TECHNIQUES FOR SERIAL CODE

Scalar profiling- Function and line based runtime profiling- Hardware performance counters- Common sense optimizations- Simple measures, large impact- Elimination of common subexpressions- Avoiding branches- Using SIMD instruction sets- The role of compilers - General optimization options- Inlining - Aliasing- Computational Accuracy- Register optimizations- Using compiler logs- C++ optimizations - Temporaries- Dynamic memory management- Loop kernels and iterators Data Access Optimization: Balance analysis and lightspeed estimates- Storage order.

UNIT III: PARALLEL COMPUTERS

Taxonomy of parallel computing paradigms- Shared memory computers- Cache coherance- UMA - ccNUMA- Distributed-memory computers- Hierarchical (hybrid) systems- Networks- Basic performance characteristics- Buses- Switched and fat-tree networks- Mesh networks- Hybrids

Basics of parallelization - Why parallelize - Data Parallelism - Function Parallelism.

-

UNIT IV: SHARED MEMORY PARALLEL PROGRAMMING WITH OPENMP

Introduction to OpenMP - Parallel execution - Data scoping- OpenMP work sharing for loops- Synchronization - Reductions - Loop Scheduling - Tasking - Efficient OpenMP programming: Profiling OpenMP programs - Performance pitfalls

Content Beyond Syllabus

Hybrid parallelization with MPI and OpenMP

Text books and Reference books	**Text Books:** **[1].** Georg Hager, Gerhard Wellein, "Introduction to High Performance Computing for Scientists and Engineers", Chapman & Hall / CRC Computational Science series, 2011. **References:** [1]. Charles Severance, Kevin Dowd, "High Performance Computing", O'Reilly Media, 2nd Edition, 1998. [2]. Kai H wang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw-Hill, New Delhi, 2003. [3]. David E. Culler & Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/Software Approach", Morgan Kaufman Publishers, 1999.. [4]. Michael J. Quinn, "Parallel Programming in C with MPI & OpenMP", Tata McGraw-Hill, New Delhi, 2003
E-resources and other digital material	[1]. http://nptel.ac.in/courses/106105033/1 [2]. http://nptel.ac.in/courses/106108055/

14IT4802C -WIRELESS NETWORKS

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3504-Computer Networks 14IT3604-Network Security	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the perceptions of wireless technologies and its challenges
	CO2	Analyze the performance of multiple access systems in wireless environment
	CO3	Analyze the concept of wireless LAN & Bluetooth technology with its architecture
	CO4	Understand the technical aspects of radio-based vehicle communication

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2				3					1	
CO2	1	1	1		2						2	
CO3	1		1					3			1	
CO4		1	1		3							

Course Content

UNIT I:

Introduction – Evolution of Wireless Networks, Early Mobile Telephony, Analog Cellular, Telephony, Digital Cellular Telephony, Cordless Phones, Wireless Data Systems, Fixed Wireless Links, Satellite Communication Systems, Third Generation Cellular Systems and Beyond. **Challenges -** Wireless Medium, Unreliability, Spectrum Use, Power Management, Security, location/Routing, Interfacing with Wired Networks, Health Concerns.

UNIT II:

Multiple Access for Wireless Systems, Frequency Division Multiple Access, FDMA, Time Division Multiple Access, Code Division Multiple Access (CDMA), ALOHA-Carrier Sense Multiple Access (CSMA), Polling Protocols.

Performance Increasing Techniques for Wireless Networks - Diversity Techniques, Coding, Equalization, Power Control, Multi sub carrier Modulation.

UNIT III:

Wireless Local Area Networks: Introduction, Benefits of Wireless LANs, Wireless LAN Applications, Wireless LAN Concerns, Wireless LAN Topologies, Wireless LAN Requirements. **Introduction to PAN Technology and Applications** : PAN Concerns, PAN Applications, Commercial Alternatives: Bluetooth, The Bluetooth Specification, The Bluetooth Radio Channel, Piconets and Scatternets, Inquiry, Paging and Link Establishment, Packet Format, Link Types, Power Management, Security.

UNIT IV:

Mobile Network layer - Mobile IP - Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Dynamic host configuration protocol.

Vehicular Ad hoc Networks : Introduction : Basic Principles and Challenges.

Information Dissemination in VANETs : Information Transport - Protocols for

	information transport.
Content Beyond Syllabus	**Security in VANETs, Wireless Local Loop Techniques**
Text books and Reference books	**Text Book(s):** [1]. Georgios I. Papadimitriou, Andreas S. Pomportsis, P. Nicopolitidis, Mohammed S. Obaidat, "Wireless Networks", John Wiley & Sons Ltd, 2003. [2]. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2008. [3]. Hannes Hartenstein, Kenneth P Laberteaux "VANET: Vehicular Applications and Inter-Networking Technologies", John Wiley & Sons Ltd, 2010. **Reference Books:** [1]. William Stallings, "Wireless Communications and Networks", Second Edition, Pearson Education, 2005.
E-resources and other digital material	[1]. George Corser, (19, February, 2013). VANET Authentication, Security and Privacy Available: https://www.youtube.com/watch?v=cyfloHsvqTE [2]. Prof. Raj Jain (04, June, 2014). Introduction to Bluetooth and Bluetooth Smart. Available: https://www.youtube.com/watch?v=KE64vIzceqE

14IT4802D-SOFTWARE RELIABILITY

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3501-Software Engineering	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the concepts of Software and Hardware Reliability
	CO2	Analyze various parameter estimation techniques for software reliability.
	CO3	Understand software development process and its applications
	CO4	Emphasize the Applications of Software Reliability Growth Models in software development

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1			1								
CO2	3			2								
CO3	2											
CO4	2		1	3								

Course Content

UNIT I:

Problem, Process and Process - Process and Solution, The software reliability engineering process, Defining the product.

Engineering "Just Right" Reliability – Failure, faults and errors, Availability, a complement to reliability, system and component reliabilities and failure intensities, predicting basic failure intensity.

UNIT II:

System Reliability Concepts - Reliability Measures, Common Distribution Functions, A Generalized System ability Function, System Reliability with Multiple Failure Modes, Markov Processes, Counting Processes.

Theory of Estimation - Point Estimation, Maximum Likelihood Estimation Method, Maximum Likelihood Estimation with Censored Data, Statistical Change-point Estimation Methods,

Goodness of Fit Techniques, Least Squared Estimation, Interval Estimation, on-parametric Tolerance Limits, Sequential Sampling, Bayesian Methods

UNIT III:

Software Development Lifecycle and Data Analysis – Introduction, Software *vs* Hardware Reliability, Software Reliability and Testing Concepts, Software Lifecycle, Software Development Process and its Applications, Software Verification and Validation Data Analysis, Failure Data Sets.

UNIT IV:

Software Reliability Modeling-Introduction, Halstead's Software Metric, McCabe's Cyclomatic Complexity Metric, Error Seeding Models, Failure Rate Models, Curve Fitting Models, Reliability Growth Models , Markov Structure Models, Time Series Models, Non-homogeneous Poisson Process Models

Imperfect-debugging Models – Introduction, Parameter Estimation, Model Selection,

	NHPP Exponential Models, NHPP S-shaped Models, NHPP Imperfect Debugging Models, NHPP Imperfect Debugging S-shaped Models, Applications, Imperfect Debugging *vs* Perfect Debugging, Mean Time Between Failures for NHPP
Content Beyond Syllabus	Software Reliability Growth Testing, Duane Growth Model
Text books and Reference books	**Text Book(s):** [1]. John D. Musa, "*Software Reliability Engineering",* Tata McGraw Hill, 1999. [2]. Hoang Pham, "System Software Reliability", Springer **Reference Books:** [1]. Patric D. T.O connor, "*Practical Reliability Engineering*", 4th Edition, JohnWesley & sons, 2003. [2]. Michael Lyu, "*Handbook of Software Reliability Engineering"*, IEEE Computer Society Press, ISBN: 0-07-039400-8, 1996.
E-resources and other digital material	[1]. http://www.slideshare.net/AnandKumar87/software-reliability-11841804 [2]. http://www2.warwick.ac.uk/fac/sci/wmg/ftmsc/modules/modulelist/peuss/slides/section_7a_reliability_notes.pdf [3]. http://textofvideo.nptel.iitm.ac.in/108102045/lec36.pdf

14IT4802E- SOFT COMPUTING

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3302: Discrete Mathematical Structures 14IT3601: Artificial Intelligence	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basics of Fuzzy Sets
	CO2	Understand the concepts of Fuzzy logic System Components in terms of Fuzzification and Defuzzification
	CO3	Understand the basics of Genetic algorithms
	CO4	Analyse the various operators in Genetic Algorithms

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1			1									
CO2	3	1										
CO3	3		1									
CO4		2									1	

Course Content

UNIT I:
Classical & Fuzzy Sets: Introduction to classical sets – properties, operations and relations; Fuzzy sets – memberships, uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions

UNIT II:
Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods

UNIT III:
Fundamentals of Genetic Algorihtms: History of Genetic Algorithms, Basic Concpts, Creation of OffSprings, Working Principle, Encoding, Fitness Function, Reproduction

UNIT IV:
Genetic Modelling: Inheritance Operator, Cross Over, Inversion and deletion, Mutation Operator, Convergence of Genetic Algorithm, Applications, Advantages of Genetic Algorithms.

Content Beyond Syllabus

Neuro Fuzzy Systems, Fuzzy Genetic Algorihtms

Text books and Reference books

Text Book(s):

[1]. Rajasekharan and Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms: Sysnthesis and Applications", Kindle Edition, PHI Publications, 2013

Reference Books:

[1]. Tom M Mitchell, Machine Learning, Indian Edition, McGraw Hill

	Education,2013 [2]. S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley Publication [3]. Timothy J.Ross "Fuzzy Logic With Engineering Applications" Wiley.
E-resources and other digital material	[1]. Prof. Sukhendu Das and Prof C A Murthy, FCM and Soft Computing Techniques, NPTEL, , 25-01-2017 – Available http://nptel.ac.in/courses/106106046/41#

14IT4802F - RESEARCH PROCESS AND METHODOLOGY

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	-	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basic framework of research process
	CO2	Analyze various methods of data collection
	CO3	Analyze the data by applying statistical techniques to interprete results
	CO4	Write an effective technical report

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1		3	1	1		2						1
CO2	2	1										
CO3	3	2	1	3	2							
CO4		3				1	1	2		3	1	

Course Content

Unit I

Introduction: Introduction to Research and Problem Definition Meaning, Objective and importance of research, Types of research, steps involved in research, defining research problem

Research Design: Research design, Methods of research design, research process and steps involved, Literature Survey

Unit II

Data Collection: Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research

Unit III

Data Analysis: Data Analysis and interpretation Data analysis, Statistical techniques and choosing an appropriate statistical technique, Hypothesis, Hypothesis testing-Parametric, Chi-Square,Anova, Data processing software (e.g. SPSS etc.), statistical inference, Interpretation of results

Unit IV

Technical Writing and reporting of research Types of research report: Dissertation and Thesis, research paper, review article, short communication, conference presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism

Content beyond the Syllabus	Non parametric Testing , Multi variate Analysis
Text books and Reference books	**Text Book(s):** [1]. C. R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques , New Age International publishers, Third Edition.

	[2]. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition, SAGE, 2005 **Reference Books:** [1]. Ronald E. Walpole , Raymond H.Myers, Shoron L.Myers & Keying Ye, Probability and Statistics for Engineers & Scientists, 8th edition, Pearson Education, 2009. [2]. Creswell, John W. Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications, 2013.

14IT4803A - NATURAL LANGUAGE PROCESSING

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the basic Notation in natural language processing.
	CO2	Solve NLP sub problems using tokenizing and tagging
	CO3	Apply various Parsing Techniques in NLP
	CO4	Analyze the semantic of sentences

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2		3							2	
CO2	2	2		3							2	
CO3	3	2		3							2	
CO4	3	2		3							2	

Course Content

UNIT I:

Introduction – Models and Algorithms, Regular Expressions and Automata - Regular Expression - Basic Regular Expression Patterns, Disjunction, grouping, and precedence, Finite State Automata – using an FSA to recognize sheeptalk, formal languages, Non Deterministic FSAs, Using an NFAs to accept strings, Recognition as search, Relating Deterministic and Non Deterministic Automata. Regular Languages and FSAs, Morphology and Finite-State Transducers survey of English Morphology -Inflectional Morphology, Derivational Morphology, Finite-State Morphological Parsing – The lexicon and Morphotactics, Morphological parsing with finite state transducers, orthographic rules and finite state transducers, Combining an FST Lexicon and Rules, the Porter Stemmer, Human Morphological Processing.

UNIT II:

N-grams- Counting Words in Corpora, Unsmoothed N-grams, Smoothing – Add-One smoothing, witten-Bell Discounting, GoodTuring Discounting, Backoff, Deleted Interpolation, N-Grams for spelling and Pronunciation, context-sensitive spelling error correction, N-grams for pronunciation Modelling, Entropy- Cross entropy for comparing models, the entropy of English.

Classes and Part-of-Speech Tagging- English Word Classes, Tagsets for English, Part of Speech Tagging, Rule-Based Part of Speech Tagging, Stochastic Part of Speech Tagging, Transformation-Based Tagging – How TBL rules are applied, How TBL rules are Learned.

UNIT III:

Context Free Grammars - Constituency, Context-Free Rules and Trees, Sentence-Level Constructions, the Noun Phrase, Coordination, Agreement, The Verb phrase and Sub Categorization, Auxiliaries, spoken language syntax, grammar equivalence and normal form, finite state and context free grammars, grammars and human processing.

Parsing with Context Free Grammars – Parsing as Search – top-down parsing,

	bottom-up parsing, comparing top-down and bottom-up parsing, A Basic Top-Down Parser, problems with the basic top down parser, left recursion, ambiguity, repeated parsing of subtrees, The Earley Algorithm, Finite State Parsing Methods.
	UNIT IV: **Representing Meaning -** Meaning Structure of Language, First Order Predicate Calculus, Representing Linguistically Relevant Concepts **Semantic Analysis –**Syntax, Driven Semantic Analysis - Semantic Attachments for a fragment of English.
Text books and Reference books	**Text Book(s):** [1]. D. Jurafsky and J. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition" Pearson Education, 2005. **Reference Books:** [1]. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing", MIT Press,1999. [2]. James Allen. "Natural Language Understanding", Addison Wesley, 1995.
E-resources and other digital material	[1]. http://nptel.iitm.ac.in/courses/106101007/ [2]. http://nptel.iitm.ac.in, by Prof. Pushpak Bhattacharyya, Department of Computer science & Engineering,IIT Bombay [3]. http://opencourseonline.com/,Stanford NLP - Professor Dan Jurafsky & Chris Manning [4]. https://www.youtube.com/watch?v=bDPULOFFlaI, by Prof.Sudeshna Sarkar and Prof.Anupam Basu, Department of Computer Science and Engineering,I.I.T, Kharagpur.

14IT4803B-PRIVACY PRESERVING

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3502-Data Analytics 14MA1401- Probability & Statistics	**Continuous Evaluation:**	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the concepts of privacy and its applications to day to day life.
	CO2	Analyze different statistical disclosure methods for protecting individual data.
	CO3	Analyze Statistical measures of anonymity
	CO4	Analyze various methods for Privacy preserving.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1		1										
CO2	2			1	2							
CO3	1			2	3							
CO4	1			2	2							

Course Content

UNIT I:

An Introduction to Privacy-Preserving Data Mining : . Introduction, Privacy-Preserving Data Mining Algorithms. **A General Survey of Privacy-Preserving Data Mining Models and Algorithms**:

Introduction, The Randomization Method, Privacy Quantification, Multiplicative Perturbations, Data Swapping. Group Based Anonymization: The *k*-Anonymity Framework, Personalized Privacy-Preservation, Utility Based Privacy Preservation, Sequential Releases, The *l*-diversity Method, The *t*-closeness Model.

UNIT II:

A Survey of Inference Control Methods for Privacy-Preserving Data Mining: Introduction, A classification of Micro data Protection Methods. Perturbative Masking Methods: Additive Noise, Micro aggregation, Data Swapping and Rank Swapping, Rounding, Resampling. Non-perturbative Masking Methods: Sampling, Global Recoding, Top and Bottom Coding

UNIT III:

Measures of Anonymity: Introduction, What is Privacy? Data Anonymization Methods , A Classification of Methods. Statistical Measures of Anonymity: Query Restriction, Anonymity via Variance, Anonymity via Multiplicity. Probabilistic Measures of Anonymity: Measures Based on Random Perturbation, Measures Based on Generalization. Computational Measures of Anonymity: Anonymity via Isolation.

UNIT IV:

k-Anonymous Data Mining: Introduction, k-Anonymity, Algorithms for Enforcing k-Anonymity,k-Anonymity Threats from Data Mining: Association Rules, Classification Mining, k-Anonymity in Data Mining

Randomization Methods for Privacy-Preserving Data Mining : Introduction, Reconstruction Methods for Randomization : The Bayes Reconstruction Method The EM Reconstruction Method , Utility and Optimality of Randomization Models.

Content Beyond syllabus:	Multiplicative Perturbation Privacy-Preserving Data Mining Mining Association Rules under Privacy Constraints
Text books and Reference books	**Text Book(s):** [1]. Charu C. Aggarwal and Philip S. Yu, Privacy-Preserving Data Mining Models and Algorithms, 2008 Springer Science+Business Media, LLC **Reference Books:** [1]. Benjamin C.M. Fung, Ke Wang, Ada Wai-Chee Fu, Philip S. YuAuthor, "I*ntroduction to Privacy-Preserving Data Publishing: Concepts and Techniques,* **Chapman & Hall/CRC Data Mining and Knowledge Discovery Series** [2]. jaideepVaidya,Christopher W. Clifton,Yu Michael Zhu,"PRIVACY PRESERVING DATA MINING" SPRINGER PUBLISHER
E-resources and other digital material	[1]. www.rsrikant.com/talks/pakdd02. privacy preserving challanges and opportunities [2]. www.academia.edu/.../Privacy_Preserving_Data_Mining_Applications

14IT4803C- E-MARKET PLACE

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the E-Marketing context: e-business models, performance metrics, and role of strategic planning.
	CO2	Know how to use marketing functions of product, pricing, distribution, and marketing communication for a firm's E-Marketing strategy.
	CO3	Describe several technological, legal and ethical issues regarding internet use
	CO4	Describe marketing strategies of segmenting, targeting, positioning, and differentiation.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2										1
CO2	2	2			3							
CO3									3			
CO4	2		2									1

Course Content

UNIT I:

CONVERGENCE –The Music Industry, What is E-Marketing?, How Does E-Marketing Relate to E-Business?, what is the Internet?, E-Marketing's Past, Present, and Future.

STRATEGIC E-MARKETING – The Amazon Story, Strategic Planning, From Strategy to Electronic Strategy, From Business Models to E-Business Models, E-Business Models, Performance Metrics.

UNIT II:

THE E-MARKETING PLAN – The Playboy Story, Overview of The E-Marketing Planning Process, Creating an E-Marketing Plan, A Seven-Step E-Marketing Plan.

GLOBAL MARKETS – The FIFA Story, Overview of Global E-Marketing Issues, Country and Market Opportunity Analysis, Technological Readiness Influences Marketing, Wireless Internet Access, The Digital Divide.

UNIT III:

ETHICAL AND LEGAL ISSUES- Software Privacy, Overview of Ethics and Legal Issues, Privacy , Digital Property, Online Expression, Emerging Issues.

E-MARKETING KNOWLEDGE –The Purina Story, Data Drives Strategy, Marketing Knowledge Management, Other Technology-Enabled Approaches, Real-Space Approaches, Marketing Databases and Data Warehouses, Data Analysis and Distribution, Knowledge Management Metrics,

CONSUMERS BEHAVIOR – The Hanover Story, Consumers in the Twenty-First Century, Inside the Internet Exchange Process.

UNIT IV:

	SEGMENTATION, TARGETING -Segmentation and Targeting Overview, Three Markets, Market Segmentation Bases and Variables, Targeting Online Customers **DIFFERENTIATION, AND POSITIONING STRATEGIES-** The J.Peterman Story, Differentiation Dimensions, Differentiation Strategies, Bases and Strategies for Positioning, Repositioning Strategies
Content Beyond the syllabus	E-Marketing Communication, Customer Relationship Management
Text books and Reference books	**Text Book(s):** [1]. Strauss.J, Adel Ei-ansary & Frost, R. (2014). *E-Marketing* (4th ed.). Pearson Prentice Hall. **Reference Books:** [1]. Digital Marketing: Global Strategies from the World's Leading Experts. Wind J. & Mahajan V. 1st Ed. Wiley. [2]. DigiMarketing: The Essential Guide to New Media & Digital Marketing. Wertime K. & Fenwick I. Wiley.
E-resources and other digital material	[1]. http://www.athabascau.ca/syllabi/mktg/mktg410.php [2]. http://smude.edu.in/smude/programs/management/mba/marketing-managament/e- marketing.html [3]. http://spsu.ac.in/wp-content/uploads/coursestructure/mba/EMarketing.pdf

14IT4803D-SOFTWARE METRICS AND QUALITY MANAGEMENT

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3501 Software Engineering	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand different metrics associated with Software Development and evaluation
	CO2	Exemplify Quality measurement and metrics, Quality plan and implementation
	CO3	Understand SQA standards and software process assessments
	CO4	Understand the importance of standards in the quality management process and their impact on the final product

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2										1	
CO2	2			2							2	
CO3	1										2	
CO4	1			1							3	

Course Content

UNIT I

Software Metrics: Need of Software Measurement, Definition of Software Metrics, Classification of Software Metrics, Entities to be Measured, Size of Metrics.

Testing metrics for Monitoring and Controlling the Testing Process: Measurement Objectives for Testing, Attributes and Corresponding Metrics in Software Testing, Attributes, Estimation models for Estimation Testing Efforts, Architectural Design Metric Used for Testing, Information Flow Metrics Used for Testing, Cyclomatic9 Complexity Measures for Testing, Function Point Metrics for Testing, Test Point Analysis (TPA).

UNIT II

Product Metrics: Software Quality, A framework for product metrics, Metrics for analysis model, Metrics for Design model, Metrics for source code, Metrics for Testing, Metrics for Maintenance.

Metrics for Process and Projects: Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating metrics within the software process, Metrics for Small Organization, Establishing a Software metric Program.

UNIT III

Quality Management: Quality concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical software Quality Assurance, Software reliability, The ISO 9000 Quality Standards, The SQA plan.

UNIT IV

	Software Quality Management: Software Quality, Broadening the concept of Quality, Benefits of Investment on Quality, Quality Management, Quality Factors, Methods of Quality Management, Software Quality Metrics, SQA Models **A Case Study: Income Tax Calculator**
Text books and Reference books	**Text Books:** [1]. Naresh Chauhan, Software Testing- Principles and Practices, Oxford Higher Education, 2010. [2]. Roger S. Pressman, Software Engineering- A Practitioner's Approach, McGraw-Hill international sixth edition, 2005. **Reference Books:** [1]. Norman Fenton, James Bieman, Software Metrics – A Rigorous and Practical Approach, CRC Press, 2014. [2]. Stephen H.Khan, Metrics & Models in Software Quality Engineering, second edition, Addison Wisley, 2004
E-resources and other digital material	**Web resources:** **[1].** http://nptel.ac.in/courses/106105078/ **[2].** http://aima.cs.berkeley.edu/ai.html **[3].** http://airesources.blogspot.in/

14IT4803E – SEMANTIC WEB AND SOCIAL NETWORKS

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3402:DBMS 14IT2505B:Web programming	**Continuous Evaluation:**	
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand basics of Semantic Web and Social Networks
	CO2	Analyze the role of ontology and inference engines in semantic web
	CO3	Comprehend key aspects of Web architecture and importance of functioning of the World Wide Web
	CO4	Demonstrate 187nalyse187g and aggregating social network data

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1		3	3		3		3	3				
CO2	1	3		1	3			3				
CO3	1	1		1		3	3		3	3	3	
CO4	1		3		3		3	3				

Course Content

UNIT I:

The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web**.**

Social Network Analysis: What is network analysis?, Development of Social Network Analysis, Key concepts and measures in network analysis**.**

Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT II:

Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data

UNIT III:

Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

UNIT IV:

Evaluation of Web-Based Social Network Extraction: Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, Optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

Text books and Reference books

Text Book(s):

[1]. Peter Mika ," Social Networks and the Semantic Web ",First Edition,Springer,2007.

	Reference Books: [1]. Berners Lee, Godel and Turing ," Thinking on the Web ",Wiley inter science, 2008. [2]. John Davies , Rudi Studer , Paul Warren ," Semantic Web Technologies: Trends and Research in Ontology-based Systems",Wiley,2006.
E-resources and other digital material	[1]. Prof.Anupam Basu, Dept.of Computer Science,IITKharagpur,video lecture. http://onlinevideolecture.com/index.php?course_id=142&lecture_no=18 [2]. Dr. Bhavani Thuraisingham ,june 2010, Knowledge Management, Semantic Web and Social Networking ,ppt slides, ic.ucsc.edu/~wsack/fdm20c/fall2008/Lectures/social-networks.ppt

14IT4803F – PATTERN RECOGNITION

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:		**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the process of transforming "patterns" into a computer algorithm.
	CO2	Understand the mathematical basis of statistical approaches for pattern recognition.
	CO3	Apply the pattern recognition methodologies to real world problems in activity 189nalyse189g and decision making.
	CO4	Analyze the basic concepts and methods for the recognition of patterns in data.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1											
CO2		3	3									
CO3		3	3									
CO4				2								
CO5	2											1

Course Content

UNIT I:

Introduction: Machine perception, pattern recognition systems, the design cycle, learning and adaptation**.**

Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces**.**

UNIT II:

Normal density: Univariate and multivariate density, discriminant functions for the normal density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context.

Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

UNIT III:

Problems of dimensionality: Accuracy, Dimension and Training Sample size, Computational Complexity, Over fitting.

Component analyses and discriminants: Principal component analysis, Fisher Linear Discriminant, Multiple Discriminant Analysis, Nonlinear component analysis; Low dimensional representations and multi dimensional scaling**.**

UNIT IV:

Hidden Markov Models: First- Order Markov Models, First- Order Hidden Markov Models, Hidden Markov Model computation, Evaluation, Decoding, Learning

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering.

Text books and Reference books	**Text Book(s):** **[1].** Richard*, et al.*, *Pattern classifications,*, 2 ed.: Stroke. Wiley student edition **Reference Books:** [1]. Earl Gose and Richard John baugh, *Pattern Recognition and Image Analysis*: PHI, 2004. [2]. B. H. Lawerence Rabiner, *Fundamentals of speech Recognition,*: Prentice Hall,United States ed edition, 1993.
E-resources and other digital material	**Web Resources:** [1]. P. S. N. Srihari and *Web course Department of Computer Science & Engineering, University of buffalo*. Available: http://www.cedar.buffalo.edu/~srihari/CSE555/ **[2].** P. U. Park. 20 January). *Web course Computer Science and Engineering Michigan State University* Available: http://www.cse.msu.edu/~cse802/#Schedule

1 4IT4803G- NETWORK MANAGEMENT SYSTEMS

Course Category:	Programme Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practice:**	3-0-0
Prerequisites:	14IT3504-Computer Networks 14IT3604- Network security	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand general concepts and architecture behind standard based network management
	CO2	Analyze a specific SNMP version and learn different SNMP architectures.
	CO3	Analyze remote monitoring of SMI and MIB in SNMPV3.
	CO4	Able to configure and use SNMP-based tools for network management applications

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2										
CO2			1	3	1							
CO3	1			2				2				
CO4			1	1								

Course Content

UNIT I:

Basic Foundations, Standards and Models: Network management standards, Network management model, information model, communication model, Functional model.

SNMPv1 Network Management: Organization & Information model, The SNMP model, The Organization model, system overview, the Information model. Communications and Functional models; The SNMP communication model, Functional model.

UNIT II:

SNMP management SNMPv2: Major changes in SNMPv2, SNMPv2 structure of management information, The SNMPv2 management information Base, SNMPv2 protocol, compatibility with SNMPv1.

UNIT III:

SNMPv3:SNMPv3 documentation and Architecture.

SNMP Management RMON: RMON SMI and MIB, RMON1, RMON2, ATM Remote monitoring.

UNIT IV:

Management Tools, systems and Applications: Network management Tools and systems, Network Statistics measurement systems. Network management Applications, Configurations management, fault management, performance management, Event correlation techniques, security management, Accounting management, Report management, Policy-Based management, Service level management.

Content Beyond Syllabus	HFC Network Management, ATM Network Management
Text books and Reference books	**Text Book(s):** [1]. M. Subramanian, Network management: Principles and Practices ,Second Edition

	,Pearson. **Reference Books:** [1]. A. Clem, Network management fundamentals, 1 ed.: CICSOP PRESS, 2006. [2]. H T Kung, Traffic management for high speed networks, Fourth Lecture Series.: National Academy press, Washington D.C 1997.
E-resources and other digital material	[1]. P. T. Anderson. (2008, 20 January). *Network management University of Washington Online Course*. Available: http://freevideolectures.com/Course/2829/CSEP-561-Network-Systems# [2].http://nptel.ac.in/courses/IITMADRAS/Computer_Networks/pdf/Lecture41_SNMP.pdf [3]. http://textofvideo.nptel.iitm.ac.in/106105081/lec37.pdf

14IT3851-SOFTWARE TESTING TOOLS LAB

Course Category:	Programme Core	**Credits:**	2
Course Type:	Lab	**Lecture-Tutorial-Practice:**	0-0-3
Prerequisites:	14IT3501 : Software Engineering	**Continuous Evaluation:**	30
		Semester end Evaluation:	70
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Knowledge on the Test Environment and perform manual and automation testing using various automation tools.
	CO2	Generate test plans for a given application
	CO3	Design and Execute tests cases.
	CO4	Analyze various testing tools for testing different applications preparing the test plans and test cases

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1											
CO2								3			2	
CO3				1	2						2	
CO4					3						3	

Course Content	**Week 1:**Introduction to various software testing methodologies
	Week 2: Implementation of Path Testing a. Statement Testing b.Branch Testing c.Cyclomatic Complexity
	Week 3: Test plan document for any application
	Week 4: Write the test cases for ATM Application. Write the test cases for Banking Application.
	Week 5: Introduction to Junit tool and Various testing static methods using Junit. Parameterized test using multiple parameters in Junit
	Week 6: To check given number is even or odd To check whether given number is prime or not
	Week 7: To check given number is factorial or not. To check whether given number is Armstrong or not.
	Week 8: Introduction to Selenium Testing of online Mortgage Calculator application.
	Week 9: Testing of online pressure conversion application.
	Week 10:IBM Rational Functional Tester-Record and Play, Time Delayed Method
	Week 11:IBM Rational Functional Tester- Object Recognition Properties, BreakPoints
	Week 12: Overview of QTP, Introduction to QTP and Installation steps
	Week 13: Record and Play, Parameterization Recovery Scenario manager
	Week 14: Checking the list of orders table. Checking the list of orders based on customer name. Deletion of order in flight application. Updating the order in flight application.
	Week 15: How to add Windows based application to QTP. Calculator application adding into QTP

Text books and Reference books	**Text books References:** [1]. Vinnakota Ravi Sankar "Quick Test Professional" Covers QTP 9.2, 9.5, 10.00 and 11.00 Paperback,Mar 2013 [2]. Frank Appel , "Testing with Junit",August 2015
E-resources and other digital material	[1]. http://www.vogella.com/tutorials/Junit/article.html

14IT5852 – MAJOR PROJECT

Course Category:	**Program Core**						**Credits:**						10
Course Type:	Major Project						**Lecture-Tutorial-Practice:**						0-3-9
Prerequisites:							**Continuous Evaluation:**						30
							Semester end Evaluation:						70
							Total Marks:						100
Course Outcomes	Upon successful completion of the course, the student will be able to:												
	CO1	Analyze real world problems and Apply prior knowledge to choose open-ended computational problem by considering multiple realistic constraints											
	CO2	Design and implement solution to the chosen problem using modern tools/algorithms/fundamental principles of Technology											
	CO3	Evaluate the various validation and verification methods on the developed solution prototype.											
	CO4	Generate possible alternative solutions to the chosen problem, compare, 195nalyse them and derive performance metrics of the results.											
	CO5	Demonstrate and communicate the project objectives & outcomes in an effective manner.											
	CO6	Organize the Technical report effectively using modern tools.											
Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12
	CO1		3	2		2	2	1					
	CO2	2	3	3	2	2	2	2					
	CO3	3	2	2	2								1
	CO4	3	2	2	2								1
	CO5								3	3	2	1	1
	CO6		2			1	2					2	2