Shobhit
Institute of Engineering & Technology
Deemed to-be-University
EDUCATION EMPOWERS

School of Engineering & Technology

Scheme of Teaching and Syllabi
For
B.Tech. (Computer Science & Engineering)

Department of Computer Science & Engineering

Approved and adopted in year 2018 (Board of Studies, August 3, 2018)
by 23rd Academic council (Agenda no-03)

Index

Scheme of Teaching – B.Tech. I Year
(Computer Science branch)
Structure in accordance with AICTE Model Curriculum
Effective w.e.f. Academic Session 2018-19
SEMESTER –I/II

Subject Code	Subject Name	L	T	P	Cr
BSC 101	Physics	3	1	0	4
BSC 103	Mathematics-I	3	1	0	4
ESC 101	Basic Electrical Engineering	3	1	0	4
BSC 151	Physics Lab.	0	0	3	1.5
ESC 151	Electrical Engineering Lab.	0	0	2	1
ESC 152	Engineering Graphics & Design	0	1	4	3
	MOOCs (For B.Tech. Hons. Degree**)***				
	Total	**9**	**4**	**9**	**17.5**

SEMESTER –I/II

Subject Code	Subject Name	L	T	P	Cr
BSC 102	Chemistry	3	1	0	4
BSC 104	Mathematics-II	3	1	0	4
ESC 103	Programming for Problem Solving	3	0	0	3
HSMC101	Professional Communication and Soft Skills	2	0	0	2
BSC 152	Chemistry Lab.	0	0	3	1.5
ESC 153	Programming for Problem Solving Lab.	0	0	4	2
ESC 154	Workshop Practice	0	1	4	3
HSMC151	Communication Lab.	0	0	2	1
	MOOCs (For B.Tech. Hons. Degree**)***	0	0	0	0
	Total	**11**	**3**	**13**	**20.5**

SEMESTER-III					
Subject Code	**Subject Name**	**L**	**T**	**P**	**Cr**
ECC-305	Analog Electronics Circuits	4	1	0	4
CSC302	Data Structures using 'C'	5	1	0	5
BAS-310	Discrete Mathematics	3	1	0	3
BSA-301	Economics	3	1	0	3
ECC-307	Digital Electronics	4	1	0	4
CSC-351	Data Structure using C Lab(DS Lab)	**0**	**0**	**2**	**1**
CSC-352	IT Workshop(MAT Lab)	**0**	**0**	**4`**	**2**
	Total	**19**	**5**	**6**	**22**

SEMESTER-IV					
Subject Code	Subject Name	L	T	P	Cr
BSB-401	Organizational Behavior	3	0	0	3
CSC 403	Operating Systems	3	0	4	4
CSC 402	Computer Organization &Architecture	3	0	4	4
CSC-404	Design and Analysis of Algorithms	3	0	4	4
CSC-401	Internet and Web Technology	4	0	2	5
ECE-409	Fundamentals of Digital Signal Processing	3	0	0	3
MCC 401	Environmental Sciences	2	0	0	0
CSC 451	Design and Analysis of Algorithms Lab.	0	0	2	1
CSC 452	Internet and Web Technology Lab.	0	0	2	1
	Total	19	0	7	25

SEMESTER-V					
Subject Code	Subject Name	L	T	P	Cr
CSC-501	Formal Language & Automata Theory	3	1	0	3
CSC-502	Software Engineering	3	0	0	3

CSC-501	Data Base Management System	3	1	0	5
CSC-504	Object Oriented programming using C++	3	1	0	4
DCS-504	Discipline Specific Elective-I	3	1	0	3
DCS-501	Open Elective	3	1	0	3
CSC-551	Data Base Management System Lab	0	0	2	1
CSC-552	Object Oriented Programming Lab	0	0	2	1
	Total	12	3	6	18
MCC-505	Cyber Security	2	0	0	Non Credits

SEMESTER VI

Subject Code	Subject Name	L	T	P	Cr
CSC-601	JAVA Programming	3	1	0	4
CSC-602	Artificial Intelligence	3	0	0	3
CSC-603	Computer Graphics	3	1	0	4
CSC-604	Compiler Construction and Design	3	1	0	4
CSC 651	JAVA Programming Lab	0	0	2	1
CSC 652	Computer Graphics Lab	0	0	2	1
CSC 653	Artificial Intelligence Lab.	0	0	2`	1
DCS-603	Discipline Specific Elective-II	3	1	0	4
O	Open Elective	3	1	0	4
	Total	12	3	6	18
MCC-606	Technical Seminar	2	0	0	0

SEMESTER-VII

Subject Code	Subject Name	L	T	P	Cr
CSC-701	Advanced Computer Architecture	3	1	0	4
CSC-702	Mobile Computing	3	1	0	4
CSC-703	.Net Framework	3	1	0	4
CSC-704	Distributed Systems	3	0	0	3

CSC 751	.Net Framework Lab	0	0	2	1
	Total	12	3	2	16
SEMESTER –VIII					
Subject Code	Subject Name	L	T	P	Cr
CSC-861	Industrial Training & Presentation				15
Discipline Specific Subjects(DCS)					
Subject Code	Subject Name	L	T	P	Cr
DCS-401	Software Project Management	3	1	0	4
DCS-402	Principles of Programming Language	3	1	0	4
DCS-403	Reconfigurable Computing	3	1	0	4
DCS-404	Modeling and Simulation	3	1	0	4
DCS-501	Data Warehousing & Data Mining	3	1	0	4
DCS-502	Advances in Database Technology	3	1	0	4
DCS-503	Embedded Systems	3	1	0	4
DCS-504	Foundation Languages for Machine Learning: Python and R Programming	3	1	0	4
DCS-601	Knowledge Management	3	1	0	4
DCS-602	Pattern Recognition	3	1	0	4
DCS-603	Cloud Computing	3	1	0	4
DCS-604	Machine Learning	3	1	0	4
DCS-701	Real Time Systems	3	1	0	4
DCS-702	Virtual Reality	3	1	0	4
DCS-703	Digital Image Processing	3	1	0	4
DCS-704	Asp .Net	3	1	0	4

List of MOOCs (NPTL) Based Recommended Courses for first year B.Tech Students
Developing Soft Skills and personality-Odd Semester-8 Weeks-3 Credits
Enhancing Soft Skills and personality-Even Semester-8 Weeks-3 Credits
AICTE Guidelines in Model Curriculum: After successful completion of 160 credits, a student shall be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours only, if he/she completes additional university recommended courses only (Equivalent to 20 credits; NPTEL Courses of 4 Weeks, 8 Weeks and 12 Weeks shall be of 2, 3 and 4 Credits respectively) through MOOCs.
For registration to MOOCs Courses, the students shall follow NPTEL Site http://nptel.ac.in/ as per the NPTEL policy and norms. The students can register for these courses through NPTEL directly as per the course offering in Odd/Even Semesters at NPTEL. These NPTEL courses (recommended by the University) may be cleared during the B. Tech degree program (not necessary one course in each semester). After successful completion of these MooCs courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through their college of study only. The student shall be awarded Hons. Degree (on successful completion of MOOCS

based 20 credit) only if he/she secures 7.50 or above CGPA and passed each subject of that Degree Programme in single attempt without any grace marks.

Programme Objectives:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problem.

PO2. Problem analysis: Identify, formulate, 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 public health and safety, and 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 modeling 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 the 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. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Educational Objectives:

PE-01 To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.

PE-02 To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society

PE-03 To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of a multidisciplinary teams.

PE-04 To produce successful Computer Science and Engineering graduates with personal and professional responsibilities and commitment to lifelong learning

Syllabus

Physics

BSC 101	**Cr.**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Unit-I

Waves & Optics: Coherent sources; Superposition of waves and interference of light; interference due to thin film; Newton's ringsr; Fraunhofer diffraction from a single slit; the Rayleigh criterion for limit of resolution; Diffraction gratings and their resolving power; phenomenon of Double Refraction; ordinary and extra-ordinary rays; Nicol prism; Circularly and Eliiptically polarized light; Optical Rotation, Specific Rotation; Einstein's theory of matter radiation interaction and A and B Coefficients; population inversion; Ruby and He-Ne lasers

Unit-II

Electromagnetic: Bio-Savart law; Divergence and curl of static magnetic field; Continuity equation for current densities; Displace current and magnetic field arising from time-dependent electric field; Maxwell's equations in differential and integral form; Maxwell's equations in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples; Momentum carried by electromagnetic wave; skin depth

Unit-III

Relativistic Mechanics: Frame of reference; Inertial & non-inertial frames; Galilean transformations; Michelson-Morley experiment; Galilean transformations; Postulates of special theory of relativity; Lorentz transformations; Length contraction; Time dilation; Velocity addition theorem; Variation of mass with velocity; Einstein's mass energy relation; Relativistic relation between energy and momentum; Massless particle.

Unit-IV

Quantum Mechanics: Introduction to quantum mechanics; wave nature of particles (de-Broglie waves); phase velocity and group velocity; Heisenberg's uncertainty principle and applications; Time-dependent and time-independent Schrodinger equations for wave function; Born interpretation, probability current; expectation values; free-particle wave-function and wave-packets; Solution of stationary-state Schrodinger equation for one dimensional problems-particle in a box.

Unit-V

Semiconductor Physics: Intrinsic and extrinsic semiconductors; Free electron theory; Kronig-Penny Model (to introduce origin of band gap); Energy bands in solids, E-k diagram, Direct and indirect band gaps; Types of electronic materials: metals, semiconductors, and insulators; Density of states, occupation probability; Fermi level; Effective mass, phonons.

Course Outcomes:

1. To solve the waves and optics problems.
2. To develop the understanding of laws of thermodynamics and their application in various processes.
3. To analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications
4. To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.
5. To develop the understanding of Physics laws in all inertial systems and speed of light in free space for all observers.
6. To understand the difference between classical and quantum mechanics, the idea of wave function, uncertainty relations, solution of Schrodinger equation for simple potential, eigen vallue and eigen function.
7. To aware of knowledge about the physics of semiconductor materials, crystalline structure structure of semiconductor, properties of n-type and p-type semiconductors and band sturctures of semiconductors.

Reference Books:

1. Griffiths David J., Introduction to Electrodynamics, PHI Learning, New Delhi
2. Gaur R.K. and Gupta S.L., Engineering Physics, Dhanpat Rai Publication
3. Beiser Arthur, Concepts of Modern Physics, TMH, New Delhi
4. Avadhanulu M.N. and Kshirsagar P.G., A Text of Engineering Physics, 8th edition, S. Chand, New Delhi
5. Singh J., Semiconductor optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
6. Sze S.M., Semiconductor Devices: Physics and Technology, Wiley (2008)
7. De Anuradha, Optical Fibre & Laser, New Age, New Delhi
8. Ghatak Ajoy, optics, Tata McGraw Hill Education Private Ltd., New Delhi
9. Brijlal & Subramanian, Optics, S. Chand Publication, New Delhi
10. Svelto O., Principles of Lasers, 5th edition, Springer
11. Pillai, S.O., Solid State Physics, New Age International Ltd, New Delhi

Physics Lab.

BSC 151

Cr.	L	T	P
1.5	0	0	3

LIST OF EXPERIMENTS (Choose any 10 experiments)

1. To determine the wavelength of monochromatic light (sodium light) by Newton's Rings.
2. To determine the Specific Rotation of Plane of Polarization of cane sugar solution using Bi-quartz Polarimeter.
3. To determine the wavelength of spectral lines using plane transmission (diffraction) grating.
4. To determine the specific resistance of the material of given wire using Carey-Foster's bridge.
5. To study the variation of magnetic field with distance along the axis of a current carrying coil and to estimate the radius of the coil.
6. To calibrate the given voltmeter with the help of a potentiometer.
7. To calibrate given ammeter with the help of a potentiometer.
8. (a) To measure the resistivity of the given semiconductor material and (b) To determine the band gap of the semiconducting material.
9. To study the Hall Effect and to determine the Hall coefficient & carrier density in a given semiconductor (N-type) material used in Hall effect set-up.
10. To determine the value of the acceleration due to gravity (g), using a bar pendulum.
11. To determine the Planck's constant 'h' by using radiation in a fixed spectral range.

Chemistry

BSC 102

Cr.	L	T	P
4	3	1	0

Unit-I

Atomic and Molecular Structure: Molecular orbital's of diatomic molecules. Band theory of solids. Liquid crystal and its applications. Point defects in solids. Structure and applications of Graphite and Fullerenes. Concepts of Nanomaterials and its application.

Unit-II

Spectroscopic techniques and Applications: Elementary idea and simple applications of Rotational, Vibrational, Ultraviolet& Visible and Raman spectroscopy.

Unit-III

Electrochemistry: Nernst Equation and application, relation of EMF with thermodynamic functions (ΔH, ΔF and Δ S). Lead storage battery.

Corrosion; causes, effects and its prevention.

Phase Rule and its application to water system.

Unit-IV

Water Analysis: Hardness of water, Techniques for water softening (Lime-soda, Zeolite, Ion exchange resin and Reverse osmosis method).

Fuels: Classification of fuels, Analysis of coal, Determination of calorific value (Bomb calorimeterand Dulong‟smethos).

Unit-V

Polymer: Basic concepts of polymer-Blend and composites, Conducting and biodegradable polymers. Preparation and application of some industrially important polymers (Buna-S, Buna-N, Neoprene, Nylon-6, nylon-6,6 and Terylene). General methods of synthesis of organometallic compounds (Grignard reagent) and their applications.

Course Outcomes:

1. Use of different analytical instruments.
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water.
3. Measure hardness of water.

4. Estimate the rate constant of reaction.

Reference Books:

1. University Chemistry By B.H. Mahan
2. University Chemistry By C.N.R. Rao
3. Organic Chemistry By I.L. Finar
4. Physical Chemistry By S. Glasstone
5. Engineering Chemistry By S.S. Dara
6. Polymer Chemistry ByFre W., Billmeyer
7. Engineering ChemistryBy Satya Prakash

Chemistry Lab.

BSC 152

Cr.	L	T	P
1.5	0	0	3

LIST OF EXPERIMENTS(Choose any 10 experiments)

1. Determination of alkalinity in the given water sample.
2. Determination of temporary and permanent hardness in water sample using EDTA.
3. Determination of iron content in the given solution by Mohr's method.
4. Determination of viscosity of given liquid.
5. Determination of surface tension of given liquid.
6. Determination of chloride content in water sample.
7. Determination of available chlorine in bleaching powder.
8. Determination of pH by pH-metric titration.
9. Preparation of Phenol-formaldehyde and Urea-formaldehyde resin.
10. Determination of Cell constant and conductance of a solution.
11. Determination of rate constant of hydrolysis of esters.
12. Verification of Beer's law.

Course Outcomes:

1. Use of different analytical instruments.
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water.
3. Measure hardness of water.
4. Estimate the rate constant of reaction.

Mathematics-I

BSC 103

Cr.	L	T	P
4	3	1	0

Unit-I

Matrices: Types of Matrices: Symmetric, Skew-symmetric and Orthogonal Matrices; Complex Matrices, Inverse and Rank of matrix using elementary transformations, Rank-Nullity theorem; System of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Eigen values and eigenvectors; Diagonalisation of a Matrix.

Unit-II

Differential Calculus- I: Introduction to limits, continuity and differentiability, Rolle's Theorem, Lagrange's Mean value theorem and Cauchy mean value theorem, Successive Differentiation (n^{th} order derivatives), Leibnitz theorem and its application, Envelope, Involutes and Evolutes, Curve tracing: Cartesian and Polar co-ordinates

Unit-III

Differential Calculus-II: Partial derivatives, Total derivative, Euler's Theorem for homogeneous functions, Taylor and Maclaurin's theorems for a function of one and two variables, Maxima and Minima of functions of several variables, Lagrange Method of Multipliers, Jacobians, Approximation of errors.

Unit-IV

Multivariable Calculus-I:

Multiple integration: Double integral, Triple integral, Change of order of integration, Change of variables

Application: Areas and volumes, Centre of mass and centre of gravity.

Unit-V

Vector Calculus:

Vector differentiation: Gradient, Curl and Divergence and their Physical interpretation, Directional derivatives, Tangent and Normal planes.

Vector Integration: Line integral, Surface integral, Volume integral, Gauss's Divergence theorem, Green's theorem, Stokes theorem (without proof) and their applications.

COURSE OUTCOMES

1. Remember the concept of matrices and apply for solving linear simultaneous equations.
2. Understand the concept of limit, continuity and differentiability and apply in the study of Rolle,s , Lagrange,s and Cauchy mean value theorem and Leibnitz theorems .
3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians.
4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity.
5. Remember the concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals.

Text Books:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd., 2008.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
3. R K. Jain & S R K. Iyenger , Advance Engineering Mathematics, Narosa Publishing House 2002.

Reference Books:

1. E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.
2. Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
3. Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas, Calculus, Eleventh Edition, Pearson.
4. D. Poole, Linear Algebra : A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
6. Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.
7. P. Sivaramakrishna Das and C. Vijayakumari, Engineering Mathematics, 1st Edition, Pearson India Education Services Pvt. Ltd
8. Advanced Engineering Mathematics. Chandrika Prasad, Reena Garg, 2018.
9. Engineering Mathemathics – I. Reena Garg, 2018.

Mathematics-II

BSC 104	Cr.	L	T	P
	4	3	1	0

Unit-I

Ordinary Differential Equation: Linear differential equation of n^{th} order with constant coefficients, Simultaneous linear differential equations, Second order linear differential equations with variable coefficients, Solution by changing independent variable, Reduction of order, Normal form, Method of variation of parameters, Cauchy-Euler equation, Series solutions (Frobenius Method).

Unit-II

Multivariable Calculus-II: Improper integrals, Beta & Gama function and their properties, Dirichlet's integral and its applications, Application of definite integrals to evaluate surface areas and volume of revolutions.

Unit-III

Sequences and Series: Definition of Sequence and series with examples, Convergence of sequence and series, Tests for convergence of series, (Comparison Test, Ratio test, Cauchy Root Test, Raabe's test).

Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-IV

Transform Calculus-1: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method.

Unit-V

Transform Calculus-2: Fourier transforms and Z-transform: properties, methods, inverses and their applications.

COURSE OUTCOMES

1. Understand the concept of differentiation and apply for solving differential equations.
2. Remember the concept of definite integral and apply for evaluating surface areas and volumes.
3. Understand the concept of convergence of sequence and series. Also evaluate Fourier series
4. Understand the concept of Laplace transform and apply to solve ODE and PDE.
5. Understand the concept of Fourier and Z-transform.

Text Books:

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
3. R. K. Jain & S. R. K. Iyenger , Advance Engineering Mathematics , Narosa Publishing -House, 2002

Reference Books:

1. E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.
2. Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
3. Maurice D. Weir, Joel Hass, Frank R.Giordano, Thomas, Calculus, Eleventh Edition, Pearson.
4. G.B Thomas, R L Finney, Calculus and Analytical Geometry, Ninth Edition Pearson, 2002.
5. James Ward Brown and Ruel V Churchill, Fourier Series and Boundary Value Problems, 8th Edition-Tata McGraw-Hill
6. D. Poole , Linear Algebra : A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
8. Charles E Roberts Jr, Ordinary Diffrential Equations, Application, Model and Computing, CRC Press T&F Group.
9. Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, 6th Edition, Tata McGraw-Hill.
10. James Ward Brown and Ruel V Churchill, Complex Variable and Applications, 8th Edition, Tata McGraw-Hill.
11. P. Sivaramakrishna Das and C. Vijayakumari, Engineering Mathematics, 1st Edition, Pearson India Education Services Pvt. Ltd.
12. Advanced Engineering Mathematics By Chandrika Prasad, Reena Garg Khanna Publishing House, Delhi

Basic Electrical Engineering

ESC 101

Cr.	L	T	P
4	3	1	0

Unit-I

DC Circuits: Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, Kirchhoff‟s laws, Loop and nodal methods of analysis, Star-delta transformation, Superposition theorem, Thevenin theorem, Norton theorem.

Unit-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit-III

Transformers: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, transformation ratio, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Unit-IV

Electrical Machines: Rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, Applications, starting and speed control of induction motor. Single-phase induction motor, Construction, working, Applications, Construction and working of dc motor, Construction and working of synchronous generators.

Unit-V

Electrical Installations: Tools and Accessories, causes and prevention of accidents, Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.

COURSE OUTCOMES

1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits.
2. Analyze the steady state behavior of single phase and three phase AC electrical circuits.
3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer.
4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
5. Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.

Text / Reference Books:

1. D. P. Kothari and I. J. Nagrath, "*Basic Electrical Engineering*", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "*Basic Electrical Engineering*", McGraw Hill, 2009.
3. L. S. Bobrow, "*Fundamentals of Electrical Engineering*", Oxford University Press, 2011.
4. V. D. Toro, "*Electrical Engineering Fundamentals*", Prentice Hall India, 1989.
5. E. Hughes, "*Electrical and Electronics Technology*", Pearson, 2010.

Electrical Engineering Lab.

ESC 151

Cr.	L	T	P
1	0	0	2

LIST OF EXPERIMENTS

1. Verification of Kirchhoff‟s laws
2. Verification of Superposition Theorem
3. Verification of Thevenin Theorem.
4. Verification of Norton Theorem.

5. To perform open circuit test on a single phase transformer.
6. To perform short circuit test on a single phase transformer.
7. To plot the B-H curve of a single phase transformer.
8. Determination of (i) Percentage Regulation and (ii) efficiency by load test of a single phase transformer
9. Determination of efficiency of a dc shunt motor by load test
10. To study running and speed reversal of a three phase induction motor and record speed in both directions.
11. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single phase induction machine and synchronous machine.

Laboratory Outcomes

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical machines.

Engineering Graphics and Design

ESC 152	Cr.	L	T	P
	3	0	1	4

Unit I

Introduction to Engineering Drawing, Orthographic Projections Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Scales – Plain and Diagonal Scales

Principles of Orthographic Projections – Conventions – Projections of Points and Lines inclined to both planes; Projections of planes inclined Planes – Auxiliary Planes.

Unit II

Projections and Sections of Regular Solids Sections in lined to both the Planes – Auxiliary Views; Simple annotation, dimensioning and scale. Floor plans that include: windows, doors and fixtures such as WC, sink, shower, etc.

Prism, Cylinder, Pyramid, Cone – Auxiliary Vies: Development of surfaces of Right Regular Solids–Prism, Pyramid, Cylinder and Cone.

Unit III

Isometric Projections Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conversions.

Unit IV

Computer Graphics Listing the computer technologies the impact on graphical communication, Demonstration knowledge of the theory of CAD software, Set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Applying various ways of drawing, Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, Printing documents to pater using the print command: orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface, Computer-aided design (CAD) software modeling of parts and assemblies.

Unit V

Demonstration of a simple team design project Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture;

geometric dimensioning and tolerance; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying color coding according to building drawing practice, Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modeling (BIM).

Text / Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R. (2014), Engineering Drawing, Charotar Publishing House.
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C.M. (2012), Engineering Graphics, TMH Publication
4. Engineering Graphics & Design, A.P. Gautam & Pradeep Jain, Khanna Publishing House
5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
6. (Corresponding set of) CAD Software Theory and User Manuals.

Programming for Problem Solving

ESC 103

Cr.	L	T	P
4	3	1	0

Unit-I

Computer System: Components of computer systems, history; Operating system, Input and output devices, memory units, Processor, Compiler, Assembler, Interpreter, Loader, Linker, System software and Application software.

Algorithm: Steps to solve logical and numerical problems, Representation of Algorithm: Flow Chart and Pseudo code with examples, from algorithm to Program, Source Code.

Unit-II

Programming Languages: Low level programming languages, High level languages.

Introduction to 'C': History, Structure of a C program,Use of Editor, Compilation and execution of program, Syntax and Logical errors in compilation, object and executable code, Data types, C tokens, Basic input output through printf( ) and scanf( ), Comments.

Unit-III

Operations and Expressions: Operators- arithmetic, relational and logical, Order of evaluation of expression, Special Operators: assignment, bitwise shift Operators, type conversion.

Conditional Branching: Applying if and switch statements, nested if and else, use of break and default with switch, Compound statements.

Iterations and loops: Use of for, while and do-while loops, Use of break and continue statements.

Unit-IV

Functions: Introduction, Functions prototypes, Parameters passing in functions: call by value and call by reference, Returning values from functions, Scope rules of variables, Storage class specifiers, Recursion.

Arrays : Array notaion and representation, One dimensional array, Strings, Multidimensional arrays, Passing arrays to function.

Structures:Structure, Defining structure, Nested structures, Array of structure, Passing structures to functions,User defined data types, Enumerated data types, Unions.

Unit-V

Basic Algorithms: Searching: Linear and Binary Search; Sorting: Bubble sort.

Pointers and Functions: Idea of Pointers, Defining Pointer, Pointer notation, Declaration, applications, Introduction to Dynamic memory allocation and library functions, introduction to linked lists.

File Handling in C: Data and information, File concepts, File organization, Files in C, Files and streams, Stream I/O.

COURSE OUTCOMES

1. To develop simple algorithms for arithmetic and logical problems.

2. To translate the algorithms to programs & execution (in C language).
3. To implement conditional branching, iteration and recursion.
4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
5. To use arrays, pointers and structures to develop algorithms and programs.

Reference Books:

1. Sharma, A.K. *Fundamentals of Computers and Programming with C*. Dhanpat Rai Publications, New Delhi, 2005.
2. Ritchie, Dennis M. and Brian W. Kernigham. *The C Programming Language*. PHI, New Delhi, 1988.
3. Williams, Brian K. and Stacy C. Sawyer. *Using Information Technology*. TMH, New Delhi, 2003.
4. Curtin, Dennis P., Kim Foley, Kunal Sen, and Cathleen Morin. *Information Technology.* TMH, 1998.
5. King, K.N. *C Programming – A Modern Approach*. WW Norton & Co., 1996.

Programming for Problem Solving Lab.

ESC 153

Cr.	L	T	P
2	0	0	4

LIST OF EXPERIMENTS

Lab 1: Familiarization with programming environment (Choose any two programs)

1. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
2. WAP to calculate the area and circumference of a circle.
3. WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula C/5=(F-32)/9.

Lab 2: Simple computational problems using arithmetic expressions

4. WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
5. WAP that swaps values of two variables using/without using a third variable.

Lab 3: Problems involving if-then-else structures (Choose any three programs)

6. WAP that checks whether the two numbers entered by the user are equal or not.
7. WAP to find the greatest of three numbers.
8. WAP that finds whether a given number is even or odd.
9. WAP that tells whether a given year is a leap year or not.

Lab 4: Problems involving Switch-case (Choose any two programs)

10. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:
    Between 90-100%----------Print ‘A’
    80-90%----------Print ‘B’
    60-80%----------Print ‘C’
    Below 60%----------Print ‘D’
11. WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.
12. A program to input any number from 0 to 9, and display it in the form of words (using switch .. case).

Lab 5: Loops, while and for loops (Choose any three programs)

13. A program to input any ten numbers and find highest & lowest from them.
14. A program to input a number and display its Table.
15. WAP to print the sum of all numbers up to a given number.
16. WAP to find the factorial of a given number.
17. WAP to print sum of even and odd numbers from 1 to N numbers.
18. WAP to print the Fibonacci series.
19. WAP to check whether the entered number is prime or not.
20. WAP to find the sum of digits of the entered number.
21. WAP to find the reverse of a number.
22. WAP to print Armstrong numbers from 1 to 100.
23. WAP to convert binary number into decimal number and vice versa.

Lab 6: 1D Array manipulation (Choose any two programs)

24. WAP that simply takes elements of the array from the user and finds the sum of these elements.
25. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.
26. WAP to find the minimum and maximum element of the array.
27. WAP to search an element in an array using Linear Search.
28. WAP to sort the elements of the array in ascending order using Bubble Sort technique.

Lab 7: Strings (Choose any two programs)

29. A program to check whether given string is palindrome or not.
30. A program to input a string and find its length.
31. WAP to implement strlen(), strcat(),strcpy() using the concept of Functions.

Lab 8: 2D arrays (Choose any one program)

32. WAP to add and multiply two matrices of order nxn.
33. WAP that finds the sum of diagonal elements of a mxn matrix.

Lab 9: Functions, Recursive functions (Choose any three programs)

34. A Function to find factorial value of a given number.
35. A Function that returns sum of values from one to a given number.
36. A program to interchange values of two variables using Call by value.
37. A program to interchange values of two variables using Call by reference.
38. A program to find factorial of a number using recursive functions.

Lab 10: Pointers and dynamic memory allocation

39. WAP to swap two elements using the concept of pointers.

Lab 11: Structures

40. Define a structure data type TRAIN_INFO. The type contain Train No.: integer type Train name: string Departure Time: aggregate type TIME Arrival Time: aggregate type TIME Start station: string End station: string The structure type Time contains two integer members: hour and minute. Maintain a train timetable and implement the following operations:

(i) List all the trains (sorted according to train number) that depart from a particular section.

(ii) List all the trains that depart from a particular station at a particular time.

(iii) List all he trains that depart from a particular station within the next one hour of a given time.

List all the trains between a pair of start station and end station.

Lab 12: File handling (Choose any one program)

41. WAP to compare the contents of two files and determine whether they are same or not.
42. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

Workshop Practice

ESC 154

Cr.	L	T	P
3	0	1	4

LIST OF EXPERIMENTS

Machine shop:

- Study of machine tools in particular Lathe machine
- Demonstration of different operations on Lathe machine
- Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting.
- Study of Quick return mechanism of Shaper.

Fitting shop:

- Preparation of T-Shape Work piece as per the given specifications.
- Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
- Practice marking operations.

Carpentry:

- Study of Carpentry Tools, Equipment and different joints.
- Practice of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint

Electrical & Electronics

- Introduction to House wiring, different types of cables. Types of power supply, types of motors, Starters, distribution of power supply, types of bulbs, parts of tube light, Electrical wiring symbols.
- Soldering and desoldering of Resistor in PCB.
- Soldering and desoldering of IC in PCB.
- Soldering and desoldering of Capacitor in PCB

Welding:

- Instruction of BI standards and reading of welding drawings.
- Butt Joint
- Lap Joint
- TIG Welding
- MIG Welding

Casting:

- Introduction to casting processes

Smithy

- Sharpening any arc and edge.
- Preparing small arc and edge,
- Repair of agricultural implements and power plough, use of power hammer etc.

Plastic Moulding& Glass Cutting

- Introduction to Patterns, pattern allowances, ingredients of moulding sand and melting furnaces.

Foundry tools and their purposes

- Demo of mould preparation

- Practice – Preparation of mould
- Glass cutting

Text Books:

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. JeyapoovanT.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

Professional Communication and Soft Skills

HSMC 101

Cr.	L	T	P
3	2	0	0

Unit-I

Essential Vocabulary: The concept of word Formation, Root words from foreign languages and their use in English, Basic words, Synonyms, Antonyms, Homophones, One word substitutes, Idioms and Phrases, and Technical Vocabulary.

Unit-II

Reading Techniques: Approaches of reading, top down, bottom up, skimming, scanning, analyzing, summarizing, unseen passage.

Unit-III

Essential Grammar: Phrase, Basic Clause, Sentence Patterns, Correct Usage of Different Word-Classes, Articles, Tense, Concord, Prepositions, and Transformation, Punctuation Marks.

Unit-IV

Basic Technical Writing Skills: Letter Writing Skills, Form & Structure, Writing Personal & Official Letters, Letters of Inquiry, Instruction Letters, Quotations, Supply Orders, Complaint and Adjustment Letters, Designing Resume, CV, Bio-Data and Job Application, Notices, Agenda, Minutes of Meeting.

Unit-V

Nature and Style of sensible Writing: Describing, Defining, Providing examples or evidence, Writing introduction and conclusion, Précis Writing, Essay Writing.

COURSE OUTCOMES

The student will acquire basic proficiency in English language including listening, speaking, reading and writing skills.

Reference Books:

1. Rizvi, M. Ashraf. *Effective Technical Communication*. Tata McGraw-Hill, New Delhi, 2005.
2. Singh, R.P. and Kavita Tyagi .*Assets of General English*. Pragati Prakashan, Meerut, 2001.
3. Anderson, Paul V., *Technical Communication: A Reader-Centered Approach*. Cengage Learning, New Delhi, 2007.

Communication Lab.

HSMC 151

Cr.	L	T	P
1	0	0	2

Basics of Phonetics	:	**International Phonetic Alphabet, Phonemes, Allophones, Phonetic Transcription, Organs of Speech, Places and Manners of Articulation, Syllable**
Stress in Speech	:	**Practising the Accentual Patterns in English**
Rhythm in Speech	:	**Practising Strong and Weak-forms of Words**
Intonation in Speech	:	**Practising Patterns of Tones in English**

Conversational Skills	:	**Situational Dialogues, Telephonic Conversations**
Listening Comprehension	:	**Comprehending Online/Offline Audio or Video**

Group Discussion, Non-verbal Communication, Presentation Skills, Job Interview, Debate, Extempore

Reference Books:

1. Sethi, J. and P.V. Dhamija. *A Course in Phonetics & Spoken English*. 2nd Ed. New Delhi: Prentice Hall of India, 2008. Print
2. Roach, Peter. *English Phonetics & Phonology: A Practical Course*. 4th Ed. New Delhi: Cambridge University Press, 2009. CD-ROM, Print
3. Hornby, A.S. *Oxford Advanced Learner's Dictionary*. 8th Ed. New Delhi: Oxford University Press, 2010. CD-ROM, Print.
4. Dutt, P.K., G. Rajeevan and C.L.N. Prakash. *A Course in Communication Skills*. New Delhi: Cambridge University Press, 2008. CD-ROM, Print.
5. Kumar, E. Suresh and P. Sreehari. *A Handbook for English Language Laboratories*. New Delhi: Cambridge University Press, 2007. Print.
6. Sethi, J., K. Sadanand and D.V. Jindal. *A Practical Course in English Pronunciation*. New Delhi: Prentice Hall of India, 2004. CD-ROM, Print.
7. Kumar,E. Suresh. *A Handbook for English Language Laboratories*. Foundation Books; New Delhi, 2007.

Semester-III

ECC-305 ANALOG ELECTRONIC CIRCUITS

Cr	**L**	**T**	**P**
4	**3**	**1**	**0**

Course Objective:

This is a basic analog electronics course. The most important objective for electronic circuits is to build an amplifier. This course will develop the principles behind the design of an amplifier. You should be able to design an operational-amplifier independently well before the end of the course.

Course Outcomes:

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

CO1: Understand the characteristics and Applications of diode.
CO2: Discuss the characteristics and Applications of transistor.
CO3: Describe the characteristics and Applications of MOSFET.
CO4: Design and analyse various rectifier and amplifier circuits.
CO5: Understand the functioning of OP-AMP and design OP-AMP based circuits.

Course Content

UNIT- 1

Diode circuits:

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave Rectifiers, Zener diodes, clamping and clipping circuits.

UNIT-2

BJT circuits:

Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal Model, biasing circuits, current mirror; common-emitter, common-base and common-collector Amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

UNIT-3

MOSFET circuits:

MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: Small-signal model and biasing circuits, common-source, common-gate and common-drain Amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.

UNIT-4

Differential, multi-stage and operational amplifiers:

Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal Structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset Voltage, input bias current, input offset current, slew rate, gain bandwidth product).

UNIT-5

Applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, oscillators (Wein bridge and phase shift).Analog to Digital Conversion. Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector.

Text/References:

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
5. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

CSC-302 DATA STRUCTURES & ALGORITHMS

L T P C 5 1 2 6

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

Course Outcomes:

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to

implement it.
3. For a given problem of Stacks, Queues, linked list and Tree, student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

Course Content

Unit 1:

INTRODUCTION

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

Unit 2:

STACKS AND QUEUES

ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit 3:

LINKED LISTS

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees, B Tree, B+ Tree: definitions, algorithms and analysis.

Unit 4

SORTING AND HASHING

Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods. Hashing and collision resolution.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

REFERENCES

1. A. M. Tenenbaum, Langsam, Moshe J. Augentem , "*Data Structures using C*," PHI Pub.

2. A.V. Aho, J.E. Hopcroft and T.D. Ullman, "*Data Structures and Algorithms*" Original edition, Addison-Wesley, 1999, Low Priced Edition.
3. Ellis Horowitz & Sartaj Sahni, "*Fundamentals of Data structures*" Pub, 1983,AW

ECC-307 DIGITAL ELECTRONICS

L T P C 3 1 0 4

Course Objectives:
Toacquirethebasicknowledgeofdigitallogiclevelsandapplicationofknowledgetounderstanddigital electronics circuits

Course Outcomes:
At the end of this course, students will demonstrate the ability to
CO1: Unders

tand working of logic families and logic gates.
CO2. Design and implement Combinational and Sequential logic circuits.
CO3. Understand the process of Analog to Digital conversion and Digital to Analog conversion
CO4. use PLDs to implement the given logical problem.

Course Content

Unit 1: FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES
Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

Unit 2: COMBINATIONAL DIGITALCIRCUITS
Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

Unit 3: SEQUENTIAL CIRCUITS AND SYSTEMS
A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

Unit 4: A/D AND D/A CONVERTERS

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

Unit 5: SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

REFERENCES:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

CSC-352 IT WORKSHOP (MATLAB)

L T P C 0 0 4 2

Pre-requisites: There are no formal prerequisites for this course.

Course Objectives:

The course is intended to assist undergraduates in learning the basics of programming in general and programming MATLAB in particular. Basics of programming in MATLAB will be covered, with the goal of having students become comfortable enough to continue learning MATLAB and other programming languages on their own.

Course Outcomes:

At the end of the course, students will be able to
1. Use MATLAB for programming purposes
2. Learn and explore MATLAB further on their own
3. Use this learning experience to learn other programming languages.

Unit 1: INTRODUCTION

Data types and variables: Introduction to MATLAB, Data Types, Inter-conversion of Data types, MATLAB Variables, Keywords and Constant, Session Command. *MATLAB Operators and Operations:* Operators (Arithmetic, Relational, Logical, Bitwise), Set Operations, Operator Precedence, Mathematical Functions.

Unit 2: PROGRAMMING IN MATLAB

Script and Function: Decision Making, Loops, branches, Functions, Working on Script File (Creating, Saving and Executing), MATLAB I/O, Formatted I/O Method,.

Unit 3: ARRAYS AND GRAPHICS

Matrices and Arrays: Introduction to Matrices, Operations on Arrays/Matrices, Manipulations of Arrays/Matrices, Expansion of Matrix Size, Reduction of Matrices/Arrays order, *Graphics:* Introduction to plot, Basic 2-D Plots(Style options, Labels, Axis control, etc.), specialized 2-D Plots, drawing multiple plots. Using MATLAB for fractals and chaos and Conway game of life

Unit 4: FILE HANDLING AND DEBUGGING

File Handling: Introduction to file handling, working on files, accessing of Text File, Saving/ Loading MATLAB Variables, reading data without opening file, reading and writing Excel. *Debugging:* Introduction to debugging, Break points, debugger, stepping, watching variable values, debugging commands.

REFERENCES:

1. Delores M. Etter, David C. Kuncicky, Holly Moore, "*Introduction to MATLAB 7.0*", Pearson, 2013.
2. Rudra Pratap, "*Getting Started with MATLAB*", OXFORD University Press, 2010.
3. Agam Kumar Tyagi, "*MATLAB and Simulink for Engineers*", University Press, 2012.

WEB REFERENCES

https://ocw.mit.edu/courses/mathematics/18-s997-introduction-to-matlab- programmingfall-2011/syllabus/

BAS-310	**Discrete Mathematics**	**3L:1T:0P**	**3 Credits**

Objectives of the course

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counterexamples.
5. Apply logical reasoning to solve a variety of problems.

Course Outcomes

1. For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives
2. For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference
3. For a given a mathematical problem, classify its algebraic structure
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
5. Develop the given problem as graph networks and solve with techniques of graph theory.

Detailed contents:

Unit 1:

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

Unit 2:

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

Unit 3:

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

Unit 4:

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

Unit 5:

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

Suggested books :

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Suggested reference books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.
Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

Economics

BSA 301	**Cr**	**L**	**T**	**P**
	3	**3**	**1**	**0**

Course Objective

To integrate the basic concepts of economics with the tools of mathematics and statistics in order to analyze and make optimal business decisions

Course Outcomes

CO1: Understand the roles of managers in firms
CO2: Understand the internal and external decisions to be made by managers
CO3: Analyze the demand and supply conditions and assess the position of a company
CO4: Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.
CO5: Analyze real-world business problems with a systematic theoretical framework.

Course Contents

Unit 1: Introduction

What Economics Is All About; Essence Of Economics; Definitions Of Economics; Nature Of Economics; Scope Of Economics; Positive & Normative Economics; Microeconomics – Meaning & Scope; Macroeconomics – Meaning & Scope; Difference Between Micro And Macro Economics; Limitations Of Economics; Subject Matter Of Economics; Methods Of Economics; Central Problems Of An Economy; Production Possibility Curve.

Unit 2: Producer Behaviour & Supply

Production Function – Returns To A Factor And Returns To Scale; Producer's Equilibrium – Meaning; Supply, Law Of Supply; Market Supply; Determinants Of Supply; Supply Schedule; Supply Curve; Movements Along And Shifts In Supply Curve; Price Elasticity Of Supply; Measurement Of Price Elasticity Of Supply – Percentage And Geometric Method. Cost & Revenue – Concepts Of Costs, Short – Run Costs, Fixed And Variable Costs; Total, Average And Marginal Costs; Concepts Of Revenue, Total Revenue, Average & Marginal Revenue And Their Relationships.

Unit 3: Consumer's Equilibrium

Consumer's Equilibrium – Meaning; Demand, Law Of Demand; Market Demand; Determinants Of Demand; Demand Schedule; Demand Curve; Movement Along And Shifts In Demand Curve, Concepts Of Price Elasticity Of Demand, Measurement Of Price Elasticity Of Demand – Percentage, Total Expenditure And Geometric Methods.

Unit 4: Forms of Markets: Price Determination

Market: Meaning, Characteristics & Forms of Market; Perfect Competition; Monopoly; Monopolistic; Oligopoly (Meaning & Features); Price determination under - Perfect Competition; Monopoly; Monopolistic; Oligopoly. Effect of shift in Market Demand; Effect of shift in Supply.

Unit 5: Economic & Game Theory

Basics; Strategy; Payoff Matrix; Zero Sum Game; Prisoner's Dilemma, Kinked Demand Curve; Cartel; Sales Maximisation; Revealed Preference Theory.

Reference Books:

1. Pindyck, R.S., D. L. Rubinfeld and P. L. Mehta; *Microeconomics*, Pearson Education.
2. N. Gregory mankiw, *Principles of Micro Economics*, Cengage Learning
3. Maddala G.S. and E. Miller; *Microeconomics: Theory and Applications,* McGraw- Hill Education.
4. Salvatore, D. *Schaum's Outline: Microeconomic Theory,* McGraw-Hill, Education.
5. Case and Fair, *Principles of Micro Economics,* Pearson Education
6. Koutsiyannis, *Modern Micro Economic Theory.*
7. C Snyder*, Microeconomic Theory: Basic Principles and Extensions,* Cengage Learning
8. Bilas, Richard A., *Microeconomics Theory: A Graphical Analysis,* McGraw-Hill Education.
9. Paul A Samuelson, William D Nordhaus, *Microeconomics*, McGraw-Hill Education.
10. Amit Sachdeva, *Micro Economics*, Kusum Lata Publishers

Semester -IV

Organizational Behavior

BSB-401

Cr	L	T	P
3	3	0	0

Course Objectives

1.To help the students to develop cognizance of the importance of human behavior.

2. To enable students to describe how people behave under different conditions and understand why people behave as they do.

3. To provide the students to analyze specific strategic human resources demands for future action.

4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behavior

Course Outcomes (CO)

After completion of this course, the student will be able to:

CO1: To identify the concept of organizational behavior to understand the behavior of people in the organization.

CO2: To demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.

CO3: To explain the complexities associated with management of the group behavior in the organization.

CO4: To examine how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.

Course Contents

Unit-I

Conceptual Foundations and Importance of organization Behavior, Management Challenges, A Paradigm Shift, Individual Behaviour at Work, Perception and Attribution: Concept, Nature, Process, Attitude: Components, functions and changing attitudes; Personality: Concept, Types and Theories of Personality: Learning: Concept and Theories of Learning, reinforcement, Right and Left brain concept, Emotional Intelligence.

Unit-II

Motivation: Concepts and their application, Need (Maslow and Herzberg), Content & Process theories, Expectancy theory, Equity theory, goal Setting theory, Empowerment and economic incentives as motivational tools.

Unit-III

Leadership: Leaders and Leadership Process: Traits, Behaviours, and situations theories, Blake & Mouton's: Managerial grid, Hersey & Blanchards' situational Leadership Model, Likert's 4 system model, Fiedler's Leadership contingency theory, House's Path-goal theory, Contemporary Leadership issues: Charismatic, Transformational Leadership, Substitutes and Neutralizers for Leadership.

Unit-IV

Group Dynamics: Definition, Stages of Group Development, Group Cohesiveness, Formal and Informal Groups, Group Processes and Decision Making, Dysfunctional Groups, Importance of team work in organisations, developing team leadership skills, Analysis of Interpersonal Relationship: Transactional Analysis, Johari Window.

Unit-V

Organisational Power and Politics: Concept, Sources of Power, Nature of organisational politics Distinction between Power, Authority and Influence, Approaches to Power, Political Implications of Power: Dysfunctional Uses of Power, Guidelines for developing political skills, Negotiation process.

Unit-VI

Organisational Change: Concept, Nature, Resistance to change, Managing resistance to change, Implementing Change, Kurt Lewin Theory of Change.
Conflict: Concept, Sources, Types, Stages of conflict, Management of conflict.

Reference Books:

1. Robbins Stephen P.: *Organisational Behaviour*, Pearson Education, 12th Edition
2. Luthans Fred : *Organisational Behaviour*, Tata Mc Graw Hill
3. Davis, Keith: *Human Behaviour at Works*, Tata Mc Graw Hill, New Delhi.

CSC-402 Computer Organization and Architecture

L T P C 3 1 0 4

Course Objective

1. Discuss the basic concepts and structure of computers.
2. Understand concepts of register transfer logic and arithmetic operations.
3. Explain different types of addressing modes and memory organization.
4. Learn the different types of serial communication techniques.
5. Summarize the Instruction execution stages.

Course Outcomes

CO1: Recall basic structure of computer and microoperations like register transfer language, register transfer, bus and memory transfer.
CO2: Explain computer organization and its design.
CO3: Describe memory organization.
CO4: Explain input-output organization.
CO5: Define parallel processing.

CO6: Discuss multiprocessor organization and CISC & RISC architecture.

Course Content

Unit I

Basic Structure of Computer - Hardware and Software difference between organization & architecture Addressing notes and machine program sequencing. Register Transfer and Microoperation - Register transfer language, register transfer, bus and memory transfer. Computer arithmetic - Booth's algorithm, integer division, floating point number representation.

Unit II

Basic Structure of Computer - Hardware and Software difference between organization & architecture Addressing notes and machine program sequencing. Register Transfer and Microoperation - Register transfer language, register transfer, bus and memory transfer. Computer arithmetic - Booth's algorithm, integer division, floating point number representation.

Unit III

Basic Structure of Computer - Hardware and Software difference between organization & architecture Addressing notes and machine program sequencing. Register Transfer and Microoperation - Register transfer language, register transfer, bus and memory transfer. Computer arithmetic - Booth's algorithm, integer division, floating point number representation.

Unit IV

Input-Output Organizations - Accessing I/O devices, direct memory access (DMA), interrupts, interrupt handling, handling multiple devices, device identification, vectored interrupts, interrupt nesting, Daisy chaining, I/O interfaces, serial and parallel standards, buses, scheduling, bus arbitration.

Unit V

Parallel Processing -Introduction to parallel organizations, multiple processor organization, symmetric multiprocessors , cache coherences, non uniform memory access, vector computation, introduction to CISC& RISC architectures, comparison.

Reference Books:

1. Mano M, "Computer System and Architecture", Third Edition, Pearson Education.
2. Hamacher C V, "Computer Organization", Fifth Edition, *McGraw Hill.*
3. Stallings William, "Computer Organization and Architecture", Sixth Edition, Pearson Education.
4. Kai Hwang & Faye A Briggs "Computer Architecture and Parallel Processing", McGraw Hill.
5. Hayes, J.P. "Computer Architecture and Organization", Third Edition, McGraw Hill.

CSC-404 Design and Analyses of Algorithmes

L T P C 3 1 0 4

Course Objectives

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Course Outcomes

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

1. Explain the time and space complexity of the algorithm.

2. Describe elementary data structure like binary search tree, Red Black tree, binomial, B tree and Fibonacci heap.
3. Compare between design techniques of algorithm like Divide and Conquer, Dynamic algorithm, Greedy algorithm, backtracking and Amortized algorithm.
4. Demonstrate different graph traversal algorithm like BFS, DFS, Prim's, Kruskal's, single source shortest path and all pair shortest path .
5. Examine different string matching algorithm like naïve string matching, robin-karp algorithm, kurth-morrispratt algorithm.
6. Distinguish between NP-hard and NP-completeness problem.

Course Content

Unit I

Introduction to Algorithms Analysis of algorithm, Design of algorithm, complexity of algorithm, asymptotic notations, Recurrences. Sorting in polynomial time: Insertion sort, Merge sort, Quick sort, heap sort. Sorting in linear time: counting sort, bucket sort, radix sort. Medians and order statics.

Unit II

Elementary data structure binary search tree. **Advanced data structure** Red Black tree, Augmenting data structure, binomial heaps, B-tree, Fibonacci heap and data structure for disjoint sets.

Unit III

Advanced design and analysis techniques Dynamic programming, Greedy algorithm, Backtracking, Amortized analysis.

Unit IV

Graph algorithm Breadth first search, Depth first search, Minimum spanning tree, Kruskal's algorithms, Prim's algorithms, Single source shortest path, All pair shortest path, Maximum flow and Traveling salesman problem.

Unit V

String matching: The naïve String Matching algorithm, The Rabin-Karp Algorithm, String Matching with finite automata, The Knuth-Morris Pratt algorithm.

Randomized algorithms, string matching, NP-hard and NP-completeness, Approximation algorithms.

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, *Introduction to Algorithm,* Tata Mc-Graw Hill, 2nd Edition, 2003.
2. Horowitz Sahani, *Fundamentals of Computers Algorithm*, Golgotia Publications, 1998.
3. Parag H. Dave, Himanshu B. Dave, *Design and Analysis of Algorithms*, Pearson Education, 2008.

CSC 403 Operating Systems 3L:1T:04 Credits

Course Objectives

1. Recognize the concepts and principles of operating systems.
2. Provide comprehensive introduction to understand the underlying principles, techniques and approaches which constitute a coherent body of knowledge in operating systems.
3. To teach understanding how the various elements that underlie operating system interact and provides services for execution of application software.

Course Outcomes

CO1 Understand the basics of operating systems like kernel, shell, types and views of operating systems
CO2 Describe the various CPU scheduling algorithms and remove deadlocks.
CO3 Explain various memory management techniques and concept of thrashing
CO4 Use disk management and disk scheduling algorithms for better utilization of external memory.
CO5 Recognize file system interface, protection and security mechanisms.

CO6 Explain the various features of distributed OS like Unix, Linux, windows etc.

Course Content

Unit I:
Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Unit II:
Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching
Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,
Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit III
Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

Unit IV
Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Unit V
Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.
Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit VI
I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms
File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

Suggested books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Suggested reference books:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

Reference Books:

3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, *Introduction to Algorithm,* Tata Mc-Graw Hill, 2nd Edition, 2003.
4. Horowitz Sahani, *Fundamentals of Computers Algorithm*, Golgotia Publications, 1998.
3. Parag H. Dave, Himanshu B. Dave, *Design and Analysis of Algorithms*, Pearson Education, 2008.

CSC-401 Internet and Web Technology

L T P C 3 1 2 5

Course Objective

To make students design and develop their own web applications

Course Outcomes

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

1. Explain the server and client side programming technologies and development frameworks
2. Illustrate the basic web forms based on HTML, CSS and JavaScript
3. Compare the architecture details of JavaScript, Servelets and JSP.
4. Evaluate the Web Based Programming methodologies available on World Wide Web.
5. Create a Simple Website using HTML,CSS and JavaScript

Course Content

Unit-I

Internet Basics communicating on the internet, internet domains, establishing connection on the internet, client IP address, TCP/IP and its services, transmission control protocol, WWW, intranet, extranet.

Unit-II

Introduction to HTML commonly used HTML commands, text formatting, text styles, Lists – types of lists, adding graphics to HTML documents, tables, links – external document references, internal document references, frames.

Unit-III

Javascript javascript in web pages, the advantages of javascript, building javascript syntax – data types, type casting, creating variables, javascript array, operators and expressions, conditional checking, fuctions – build in functions, user defined functions, dialog boxes – alert dialog box, prompt dialog box, confirm dialog box, javascript document object model – understanding objects, forms object methods.

Unit-IV

JSP jsp execution model, components of jsp, using java beans in jsp, directives in jsp-page directive, include directive, taglib directive, standard action tags- <jsp:include>,<jsp:forward>,<jsp:init>, implicit objects in jsp-application, session, pagecontext, out, request, response, error handling in jsp, database connectivity using jsp.

Unit-V

Active Server Pages: Basics, Integrating Script, ASP Objects and Components, configuring and troubleshooting,: Request and response objects, Retrieving the contents of a an HTML form, Retrieving a Query String, Cookies, Creating and Reading Cookies. Using application Objects and Events.

References Books:

1. Ivan Bayross, "*HTML, DHTML, Java Script, Perl cgi*", BPB publication,
2. James Godwill, "*Pure JSP*", Sams publications, edition-2000
3. Bryan Basham, "*Head First in Servlets and Jsp*", O'Rielly publications, March 2008.

ECC-409: Fundamentals of Digital Signal Processing 3:0:0 [3]

Course Objective

- Identify the signals and systems (SO A)
- Apply the principles of discrete-time signal analysis to perform various signal operations (SO A, E)
- Apply the principles of z-transforms to finite difference equations. (SO A, E)
- Apply the principles of Fourier transform analysis to describe the frequency characteristics of discrete-time signals and systems (SO A, E)
- Apply the principles of signal analysis to filtering (SO A, C, E)
- Use computer programming tools to process and visualize signals (SO K)

Course Outcomes:

CO1: Ability to apply current knowledge and applications of mathematics, science, engineering and technology

CO2: Ability to creatively design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

CO3: Ability to identify, formulate, analyze and solve technical and engineering problems

CO4: Ability to use the techniques, skills and modern technical tools necessary for technical or engineering practice

Course Content

Unit I:

Introduction to signals and systems Discrete time signals and systems, Ztransforms, structures for digital filters, design procedures for FIR and IIR filters. Frequency transformations: linear phase design; DFT. Methods for computing FFT. Noise analysis of

digital filters, power spectrum estimation. Signals and signal Processing: characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signal Processing applications.

UNIT II:

Time Domain Representation of Signals & Systems- Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI Discrete-Time systems, state-space representation of LTI Discrete-Time systems, random signals.

UNIT III:

Transform-Domain Representation of Signals-The Discrete-Time Fourier Transform, Discrete Fourier Transform, DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse ztransform, properties of z-transform, transform domain representations of random signals. Transform-Domain Representation of LTI Systems: the frequency response, the transfer function, types of transfer function, minimum-phase and maximum-Phase transfer functions, complementary transfer functions, Discrete-Time processing of random signals.

UNIT IV:

Digital Processing of Continuous-Time Signals - sampling of Continuous Signals, Analog Filter Design, Anti-aliasing Filter Design, Sample-and Hold circuits, A/D & D/A converter, Reconstruction Filter Design.

UNIT V:

Digital Filter Structure and Design- Block Diagram representation, Signal Flow Graph Representation, Equivalent Structures, bone FIR Digital Filter Structures, IIR Filter Structures, State-space structure, all pass filters, tunable IIR Digital filters. cascaded Lattice realization of IIR and FIR filters, Parallel all pass realization of IIR transfer function, Digital Sine-Cosine generator. Digital Filter Design: Impulse invariance method of IIR filter design, Bilinear Transform method of IIR Filter Design, Design of Digital IIR notch filters, FIR filter Design based on truncated fonner sens, FIR filter design based on Frequency Sampling approach.

Text Books:

1. Proakis J.G., and Manolakis, Introduction to DSP, PHI, 2007
2. Sanjit K. Mitra, “Applications DSP a Computer based approach”, TMH, 2006

Reference Books:

1. Allan Y. Oppenhein & Ronald W. Schater , "Applications DSP”,.
2. C.Sydney Burrus (Eds), DSP and Digital Filter Design

MCC-401 ENVIRONMENTAL SCIENCE

L 2 Cr.0

Course Objective

Demonstrate a general understanding of the interdisciplinary nature of environmental issues and physical, chemical, and biological components of the earth's systems and show how they function.

Course Outcomes :

CO1:An **Environmental Science** major will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function

CO2: An **Environmental Science** major will be able to apply lessons from various courses through field experiences.

UNIT -1

Multidisciplinary Nature of environmental studies

UNIT – 2

Natural Resource : Renewable and Non- Renewable Resource

UNIT – 3

Ecosystem

- 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 , characteristics features, structure and function of the following ecosystem :
    a) Forest ecosystem
    b) Grassland ecosystem
    c) Desert ecosystem
    d) Aquatic ecosystem

UNIT -4

Environmental Pollution

Introduction to different types of pollution

- Causes , effects and control measures of :
    a) Air pollution
    b) Water pollution
    c) Soil pollution
    d) Marine pollution
    e) Noise pollution
    f) Nuclear hazards
- Solid waste Management
- Disaster management

UNIT – 5

Social Issues In Environment Climate change – Reasons , greenhouse effect , global warming , legal issues – environmental legislation (Acts and issues involved) , environmental ethics .

References:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.

2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela

Design and Analysis of Algorithms Lab

CSC 451	**Cr**	**L**	**T**	**P**
	1	**0**	**0**	**2**

1. Write a program showing the implementation of insertion sort algorithm using recursively problem solving approach.
2. Write a program showing the implementation of merge sort algorithm using divide-conquer-combine problem solving approach.

3. For a given array A= {234,233,455,423,567,656}, arrange the elements of the array A in increasing order using radix sort algorithm.
4. Write the implementation of the searching algorithm as described below-
   First of all arrange the elements of the given array in increasing order, then find the median element, if the key element is smaller then the median element then perform the searching on the left of the median element else perform the searching on the right of the median element as described above.
5. Create a linked list and show all the operations on the linked list such as – insertion, deletion and traversing.
6. Create a doubly linked list and show all the operations on the doubly linked list such as – insertion, deletion and traversing.
7. Create a binary search tree and perform the searching operation on binary search tree.
8. Consider the string s="abcdabcerfabcderabc", write a program using naïve string matching to find out how many times the pattern p="abc" found in the string s.
9. Given a text string t and a pattern string p, find all occurrences of p in t using rabin-krap algorithm.

Internet and Web Technology Lab

CSC 452

Cr	L	T	P
1	0	0	2

1. Create a registration form in html containing student name, student roll no, branch, session, email id, phone no., address etc.
2. Create a document with two links to an external document. The first link should lead to the beginning of the external document. The second link should lead to a particular section in the external document.
3. Create a specimen of corporate web page. Divide the browser screen into two frames, The frame on the left will be a menu consisting of hyper links. Clicking on one of these links will lead to a new page, which must open in the target frame, which is on the right hand side.
4. Using scripting language validate a registration form whether the user enter character in the username textfield, in the password filed the no. of characters not more than 6.
5. Create a web page using two image files, which between one another as the mouse pointer moves over the images.
6. Crate a web page which accepts user information and user comments on the web site. Design the web page using form elements and check if all the text fields have begin entered with data else display an alert.
7. Create a JSP for inserting a employee information in a database.
8. Create an application which displays how many times a JSP is visited.
9. Create a JSP showing the use of application implicit object.
10. Create a jsp showing the use of jsp error handling.

SEMESTER-V

Theory of Computation

CSC-501	Cr	L	T	P
	3	3	1	0

Course Objectives

1. introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
2. enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.

Course Outcomes

Upon successful completion of this course, you will be able to

- discuss key notions of computation, such as algorithm, computability, decidability, reducibility, and complexity, through problem solving.
- explain the models of computation, including formal languages, grammars and automata, and their connections.
- state and explain the Church-Turing thesis and its significance.
- analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
- solve computational problems regarding their computability and complexity and prove the basic results of the theory of computation.

Unit-I

Introduction Kleene closures, Arithmetic expressions, Finite Automata (FA), Nondeterministic finite Automata (NFA), Deterministic finite Automata (DFA), Construction of DFA from NFA and optimization, FA with output: Moore machine, Mealy machine, Construction of Moore machine from Mealy machine and vice-versa, Applications and Limitation of FA.

Unit-II

Introduction to Regular Expression, Arden Theorem and application, Regular expression to DFA, Regular Grammar, Pumping Lemma for regular set, DFA to regular grammar, Regular grammar to DFA

Unit-III

Context free grammar, defining grammar, Chomsky hierarchy, Derivation tree, Ambiguity, Simplification of CFGs: Removal of useless production, Removal of null production, Removal Unit-production, Normal forms for CFGs: Chomsky normal form, Greibach Normal form, Pumping lemma for CFLs, Ambiguous to Unambiguous CFG.

Unit-IV

Push Down Automata (PDA) Description and definition, Working of PDA, Acceptance of a string by PDA, Construction of PDA from Language, Construction of PDA from grammar, Construction of grammar from PDA, Introduction to auxiliary PDA and Two stacks PDA. Introduction of DPDA

Unit-V

Turing machines (TM) Basic model, definition and representation, Language acceptance by TM, TM and Type – 0 grammar, Halting problems of TM, Construction of TM from language, Properties of recursive and recursively enumerable languages, unsolvable decision problem, Undecidability of Post correspondence problem, Church's Thesis, Recursive function theory, Godel Numbering.

Reference Books:

1. K.L.P. Mishra and N. Chandrasekaran, *"Theory of Computer Science (Automata, Languages and Computation*)", Prentice Hall Inc., 2nd Edition, 2007.
2. Hopcroft, Ullman, "*Introduction to Automata Theory, Language and Computation*", Nerosa Publishing House", 3rd Edition, 2007.
3. Martin J. C.,"*Introduction to Languages and Theory of Computations*", Tata McGraw Hill", 3rd Edition, 2003.
4. Cohen D. I. A.,"*Introduction to Computer theory*", John Wiley & Sons", 2nd Edition, 1997.
5. P. Linz, "*An Introduction to formal Languages and Automata*", Jones and Bartlett", 5th Edition, 2011.

Software Engineering

CSC-502	Cr	L	T	P
	3	3	0	0

Course Objectives

The program will prepare our students to be successful professionals in the field with solid fundamental knowledge of software engineering.

- Be successful professionals in the field with solid fundamental knowledge of software engineering
- Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

Course Outcomes

At the time of graduation, all Software Engineering students will have demonstrated:

- How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
- An ability to work in one or more significant application domains
- Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
- Demonstrate an ability to use the techniques and tools necessary for engineering practice

Course Content

Unit-I

Introduction to software engineering Software Characteristics and Software Applications, Software life cycle, Classical and Modern life cycle models and their comparison. **Software Project Management** Overview of project management, Organization structure and Responsibilities of software Project Manager.

Unit-II

Software Requirement Analysis Requirement gathering and specification, Tools and techniques viz. SRS documents, Analysis Principles, Data Modeling, Functional Modeling, Data Dictionary, Other Classical Analysis Methods. Planning, Estimation and budgeting, Work Breakdown Structures, Staffing.

Scheduling and Implementation Recruitment patterns, PERT & Gantt charts, Risk and change management, Software Configuration Management, Documentation, Acceptance testing.

Unit-III

Software Design Function oriented and Object Oriented design paradigms, Modeling tools viz. DFD, ERD, HIPO and Menu charts, Class Diagram, User interface design methodology. **Software Architecture Design, Coding** Reviews and walkthroughs, Structured Vs. Object Oriented approach, Design Patterns and Component based Development.

Unit-IV

Testing Test plans and test specifications, Black-Box and White-Box Testing, Debugging, Use of Program analysis tools, Usability testing, Unit-and Integration Testing, System testing, Performance testing, Stress testing and Regression testing, Technical Metrics for Software.

Unit-V

Software Quality Management and Maintenance Product centric, Process centric and User centric QM, Verification and validation analysis, Formal Technical Reviews, People management, Quality Management Systems. **Quality certifications** ISO 9000, SEI Capability Maturity Model, TQM, Reverse Engineering and Re-engineering.

Reference Books:

1. Roger S. Pressman, "*Software Engineering: a practitioner's approach*", McGraw Hill Higher education, 7th Edition, 2010.
2. Pankaj Jalote,"*An Integrated Approach to Software Engineering*", Springer, 3rd Edition, 2005.
3. R. Mall,"*Fundamentals of Software Engineering*", Prentice Hall of India, 2nd Edition, 2007.
4. K.K.Aggarwal & Yogesh Singh,"*Software Engineering*",New Age International,3rd Edition,2005.
5. Aditya P Mathur*, " Foundation of Software Testing"*, Pearson Education, 1st Edition ,2008.

Database Management System

CSC 503	**Cr**	**L**	**T**	**P**
	5	**3**	**1**	**0**

Course Objectives:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the fundamentals of DBMS.
CO2: Prepare the design of database applications using ER model.
CO3: Utilize database languages for implementing database applications.
CO4: Explain the concepts of relational database design, transaction management & data storage structures.
CO5: Improve the database design using normalization technique.
CO6: Apply and Identify successful concurrent transaction execution and data recovery.

Unit-I

Introduction: Concept & Overview of Database management system(DBMS), Comparison of DBMS with file processing system, Data Models- Entity-Relationship, Network, Relational and Object Oriented Data

Models, Database Languages, Database Users, Three Schema architecture of DBMS, overall structure of DBMS. Entity-Relationship (ER) Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

Unit-II

Relational Database Design: Basic terminologies, integrity constraints, Functional Dependency, Different anomalies in designing a Database, Decomposition and its properties, Normalization using functional dependencies (1NF, 2NF, 3NF,BCNF), Normalization using multi-valued dependencies(4NF, 5NF).

Unit-III

Query Languages: Relational Algebra, characteristics and various operations, **Structured Query Language (SQL):** Characteristics of SQL, SQL data types and literals. Concept of Data definition language, Data manipulation language, Data Control Language. Basic Structure, Set operations, Aggregate Functions, Null Values, views, Nested Sub-queries.

Unit-IV

Transaction Processing: Transaction system, Testing of serializability, recoverable schedule, Concurrency control, Locking techniques for concurrency control, Time stamping protocols for concurrency control, Validation based protocol, Multiple granularity. Recovery from transaction failures, log based recovery, checkpoints, shadow paging, deadlock handling.

Unit-V

File Organization & Data warehousing: File & Record Concept, Fixed and Variable sized Records, Types of Single-Level Index, Multilevel Indexes, Dynamic Multilevel Indexes using B trees. Data warehousing: Introduction, basic concepts, data warehouse architecture, various models, basic operations.

Reference Books:

1. Henry F. Korth and Silberschatz Abraham, "*Database System Concepts*", Mc.Graw Hill.5th edition, 2006.
2. Elmasri Ramez and Novathe Shamkant, "*Fundamentals of Database Systems*", Addision Wesley Publishing Company, 6th edition, 2010.
3. Ramakrishnan: *Database Management System*, McGraw-Hill, 3rd edition, 2007.
4. Date C J, "*An Introduction To Database System*", Addision Wesley, 8th edition, 2004.
5. Ivan Bayross, "*SQL, PL/SQL: The programming language with oracle*" BPB

Object Oriented programming using C++

CSC-504	**Cr**	**L**	**T**	**P**
	3	**3**	**1**	**0**

Course Objectives:

The course is designed to provide complete knowledge of Object Oriented Programming through C++ and to enhance the programming skills of the students by giving practical assignments to be done in labs

Course Outcomes:

- After the completion of the course,
- To understand the basic concepts of the programming

- To identify the principles of object-oriented problem solving and programming
- Outline the essential features and elements of the C++ programming language.
- The students will gain knowledge about Object Oriented Programming through C++.
- Analyze, write, debug, and test basic C++ codes using the approaches introduced in the course.
- They can make their own Applications /Projects using C++.

Unit-I

Concepts of OOP : Introduction OOP, Procedural Vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP, C++ Basics : Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures .

Unit-II

C++ Functions : Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions Objects and Classes : Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion

Unit-III

Inheritance: Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class .Polymorphism : Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism

Unit-IV

I/O and File Management : Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators, File stream, C++ File stream classes, File management functions, File modes, Binary and random Files

Unit-V

Templates, Exceptions and STL : What is template? function templates and class templates, Introduction to exception, try-catchthrow, multiple catch, catch all, rethrowing exception, implementing user defined exceptions, Overview and use of Standard Template Library

Reference Books:

1. "*Object Oriented Programming with C++*", E Balagurusamy, TMH
2. "*C++ Programming, Black Book*", Steven Holzner, dreamtech
3. "*Object Oriented Programming in Turbo C++*", Robert Lafore, Galgotia
4. "*Object Oriented Programming with ANSI and Turbo C++*", Ashok Kamthane, Pearson
5. "*The Compete Reference C++*", Herbert Schlitz, TMH
6. "*C++ and Object Oriented Programming Paradigm*", PHI
7. "*C++ : How to Program*", 9th Edition, Deitel and Deitel, PHI
8. "*Object Oriented Programming with C++*", Saurav Sahay, Oxford

Database Management System Lab

CSC 551

Cr	L	T	P
1	0	0	2

Perform the following operations in SQL

1. Creating and managing tables.
2. Manipulating data.
3. Defining constraints

4. Functions
5. Joins
6. Aggregate Functions
7. Sub-queries
8. Views
9. Set operators

Reference Books:

1. Nidhi Tyagi, Mridul Vaish, "*Laboratory Manual on Oracle 9i*", Shobhit University Publications, 2010.
2. Ivan Bayross, "*SQL, PL/SQL: The programming language with oracle*"BPB, 2007.

Object Oriented Programming Lab.

CSC 552	**Cr**	**L**	**T**	**P**
	1	**0**	**0**	**2**

List of experiments:

1. Simple C++ Programs to Implement Various Control Structures.
   a. If statement
   b. Switch case statement and do while loop
   c. For loop
   d. While loop
2. Programs to Understand Structure & Unions.
   a. Structure b. union
3. Programs to Understand Pointer Arithmetic.
4. Functions & Recursion.
   a. Recursion b. function
5. Inline Functions.
6. Programs to Understand Different Function Call Mechanism. a. Call by reference & Call by Value
7. Programs to Understand Storage Specifiers.
8. Constructors & Destructors.
9. Use of "this" Pointer. Using class
10. Programs to Implement Inheritance and Function Overriding.
    a. Multiple inheritance –Access Specifiers
    b. Hierarchical inheritance – Function Overriding /Virtual Function
11. Programs to Overload Unary & Binary Operators as Member Function & Non Member Function.
    a. Unary operator as member function
    b. Binary operator as non member function
12. Programs to Understand Friend Function & Friend Class.
    a. Friend Function b. Friend class
13. Programs on Class Templates

SEMESTER-VI

JAVA Programming

CSC-601	Cr	L	T	P
	4	3	1	0

Course Objectives:

1: Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.

2: Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.

3: Understand the principles of inheritance, packages and interfaces.

Course Outcome

CO1: Identify classes, objects, members of a class and relationships among them needed for a specific problem

CO2: Write Java application programs using OOP principles and proper program structuring

CO3: Demonstrate the concepts of polymorphism and inheritance

CO4: Write Java programs to implement error handling techniques using exception handling

Unit-I

Introduction to Java: Importance and features of Java, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping: if..else, switch,?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance.

Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

Unit-II

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Run able interface, inter thread Communication, suspending, resuming and stopping threads.

Unit-III

Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. . Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming

Unit-IV

The Collection Framework: collection interfaces, collection classes(ArrayList, LinkedList, Hash set), Accessing a Collection via an Iterator, Vector, More utility class: StringTokenizer, Date.

Unit-V

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, Java Applet. Beans: Introduction to Java Beans and Swings, Servlets

Reference Books:

1. Patrick Naughton and Herbertz Schildt, "*Java-2 the Complete Reference*", TMH, 7th Edition, 2006.
2. E. Balaguruswamy, "*Programming with Java:* A Primer", TMH, First Reprint, 2007.
3. Horstmann, "*Computing Concepts with Java 2 Essentials*", John Wiley and sons inc, Third Edition, 2003.
4. Kathy Sierra, "*Head First Java*", O'Rielly, Second Edition, February 2005.

Artificial Intelligence

CSC-602

Cr	L	T	P
4	3	1	2

Prerequisite: Basic Math, Science and Computer programming

Course Objective

To provide a strong foundation of fundamental concepts in Artificial Intelligence2.To provide a basic exposition to the goals and methods of Artificial Intelligence3.To enable the student to apply these techniques in applications which involve perception, reasoning and learning

Course Outcomes

At the end of the course students will be able to

CO1: Define the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
CO2: Classify AI techniques in applications which involve perception, reasoning and learning.
CO3: Demonstrate about AI techniques for knowledge representation, planning, uncertainty management and exploration methods.
CO4: Distinguish the knowledge of real world Knowledge representation, the modern view of AI as the study of agents that receive precepts from the environment and perform actions
CO5: Defend a real world problem for implementation and understand the dynamic behavior of a system.
CO6: Formulate the machine learning techniques to design AI machine and enveloping applications for real world problems.

Course Content

Unit-I

Introduction: Problem Solving by Search-I: Introduction to AI, Intelligent Agents Problem Solving by Search –II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching wih Partial Observations, Online Search Agents and Unknown Environment .

Unit-II

Processing and understanding Natural Languages: Understanding Natural Languages: Applications of Natural Languages, Natural Language processing, Parsing techniques: Rules of parsing, Top down parsing, Bottom up parsing, Transformational grammars, Context free grammar, Transition networks, Fillmore's grammars, Shanks Conceptual Dependency.

Unit-III

Knowledge Representation: Graphs, Frames structures and related structures, Semantic Nets and Partitioned Nets, Scripts, Introduction to PROLOG, Production Rules, Knowledge Based systems, Inference engine, Forward deductions and backward deductions, Matching production rules against working memory.

Unit-IV

Expert System Existing Expert Systems (DENDRAL, MYCIN), Architecture of expert system, Features of Expert system, Genetic algorithm, Fuzzy logic, Neural Networks, Intelligent Agents, Meta Knowledge, Expertise Transfer, Self Explaining System, User and expert systems.

Unit-V

Pattern Recognition Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception, Semantic & Model, Object Identification, Speech Recognition. **Programming Language** Introduction to programming Language, LISP, PROLOG.

Reference Books:

1. Char Nick, "*Introduction to Artificial Intelligence"*, Addision Wesley, 2007.
2. Stuart Russell and Peter Norvig, ``*Artificial Intelligence: A Modern Approach*.'', Prentice Hall, Third Edition, 2010.
3. Elaine Rich, Kevin Knight and Shivashankar B.Nair, "*Artificial Intelligence*", Tata McGraw-Hill, Third edition, 2009.
4. Patrick Henry Winston and Berthold Horn, " *LISP"*, Addison Wesley, Third Edition, 2010.
5. Marcellous, "*Expert Systems Programming"*, Prentice Hall Inc., Third Edition,2009.
6. Elamie, "*Artificial Intelligence"*, Academic Press, Third Edition, 2007.
7. Dan W. Patterson, *"Artificial Intelligence and Expert Systems*",PHI Learning Private Limited, Third Edition, 2009.

Computer Graphics

CSC-603	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**2**

Course Objectives

1. To provide comprehensive introduction about **computer graphics** system, design algorithms and two dimensional transformations.

2.To make the students familiar with techniques of clipping, three dimensional **graphics** and three dimensional transformations

Course Outcomes

At the end of the course students will be able to

CO1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.

CO2. To learn the basic principles of 3- dimensional computer graphics.

CO3. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.

CO4. Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.

CO5. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

CO6. To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and applications.

Course Content

Unit-I

Transformation, Projections, and Clipping Algorithm: Bresenham's Line Drawing Algorithm, Homogeneous Coordinates system for 2D AND 3D , Various 2D, 3D, Transformation matrices(Translation, Scaling, Rotation , Shear), Rotation about an arbitrary point(2D), Rotation about an arbitrary axis(3D), Computing location of V.P., Clipping algorithms, Sutherland-Cohen Clipping Algorithm, Bresenham's Circle Drawing Algorithm.

Unit-II

Curves and Surfaces Bezier Curves, 4 point and 5 point Bezier curves using Berstein Polynomials , Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors. Testing for first and second order continuities, Effect of multiple control points at same location, Geometrical Construction, Computing control points given end slopes for a specified curve segment.

Unit-III

Projection and Solid Modeling Parallel Projection, Oblique Projection on xy plane, Isometric Projection, Perspective Projection, One Vanishing Point(V.P.) projection from a point on z axis, Generation of 2 V.P. Projection , Solid Modeling, Sweeping a polygon or a surface patch along a path to form solids, Boundary Representations (B-Rep), octrees, CSG-Constructive Solid Geometry.

Unit-IV

Shading Illumination Model for diffused Reflection ,Effect of ambient lighting, distances, Specular Reflection Model, Computing Reflection Vector, Curved Surfaces, Polygonal Approximations, Gourard Shading, Phong Model.

Unit-V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specification Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

Reference Books:

1. Donald Hearn and M. P. Baker, "*Computer Graphics"*, Prentice Hall Inc., 3rd Edition, 2003.
2. Foley, Van Dam, "*Computer Graphics Principles & Practice"*, Pearson Education, 2nd Edition, 2001.
3. David F. Rogers, "*Procedural Elements for Computer Graphics"*, Tata McGraw-Hill , 2nd Edition, 2001.
4. Roy A. Plastock and Zhigang Xiang, "*Computer Graphic"s*, Tata McGraw-Hill, Second Edition, Special Indian Edition, 2006.

Compiler Construction and Design

CSC-604	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Objectives

1. To learn about different types of grammars used in Compilers and Different Phases of Compiler

Course Outcomes

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

1. Describe the lexical structure of grammars
2. Design the compilers of High Level Languages
3. Implement LEX and YACC for designing Syntax Analyzers and Lexical Analyzers
4. Construct Parsing Tables from Grammars like CFG
5. Evaluate the code blocks and optimize them

Content

Unit-I

Compiler Structure: Compilers and Translators, Various Phases of Compiler, Pass Structure of Compiler, Bootstrapping of Compiler, Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer, The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG

Unit-II

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers SLR, Canonical LR, LALR),Syntax Analyzer Generator: YACC, Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic Expressions, procedure calls, case statements, postfix translation.

Unit-III

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation Schemes, Symbol Table management

Unit-IV

Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Unit-V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, "*Principles of Compiler Design*", Narosa Publication, 2002
2. A.V. Aho, R. Sethi and J.D Ullman, "*Compiler: principle, Techniques and Tools*", Addision Wesley, 2nd Edition, 2006.
3. H.C. Holub, "*Compiler Design in C*", Prentice Hall Inc, Second Edition, Digitized Edition, 2010.
4. O.G. Kakde, "*Compiler Design*", Laxmi Publication, Seventh Edition, 2007.

JAVA Programming Lab.

CSC 651

Cr	L	T	P
1	0	0	2

List of Practicals:

1. Create a simple program to compute the amount of interest that is earned on Rs. 17,000 invested at an interest rate of 0.07 for one year.
2. Write a program for method overloading for an area method.
3. Create an interface Area having the prototype of the function area() and then implements the interface to calculate the area of the circle and rectangle.
4. Write a program showing the use of static and this keyword.
5. Create a package “pack” and then create a subpackage “subpack”.Now import these packages in a class.
6. Create an abstract class “Sum” having a defined function public void display() showing show message to the user and an undefined function public void add(), now extends “Sum” in class abs_impl and gives the definition of the undefined function.
7. Create two threads First and Second respectively by extending Thread superclass, the two threads printing the values from 5 to 1 simultaneously.
8. Now create the two threads as mentioned in the above question by implementing Runnable interface.
9. Create a function that prints a message send by three threads simultaneously, now using method synchronization access the function and print the message.
10. For a text string=”abcdabddabab” and a pattern string p=”ab”, find out how many times the pattern string exists in the text string and the indexes at which the pattern string find out.
11. Write a program to copy the contents of one file into another using Byte stream.
12. Write a simple chat application between server and client using TCP/IP.
13. Create a application consisting of three textfields one labeled first ,the second labeled second , the third labeled sum and a “add” button as a user enters the values in the first and second textfield and clicks the add button the third text field shows the sum of the two values.
14. Create an application for handling mouse event and key events.
15. Create an applet showing the following graphics : oval, arc, rectangle e.t.c.

Computer Graphics Lab.

CSC 652

Cr	L	T	P
1	0	0	2

Course Outcomes

CO1 Understand the basic concepts of computer graphics.

CO2 Design scan conversion problems using C++ programming.

CO3 Apply clipping and filling techniques for modifying an object.

CO4 Understand the concepts of different type of geometric transformation of objects in 2D and 3D.

CO5 Understand the practical implementation of modeling, rendering, viewing of objects in 2D.

1. Write a program to draw a line using DDA.

2. Write a program to draw a line using Bresenham's algorithm.
3. Write a program to draw a circle using Bresenham's algorithm.
4. Write a program to Translate a triangle using 2-D transformation.
5. Write a program to Rotate a triangle by 45o using 2-D transformation.
6. Write a program to Scale triangle using 2-D transformation.
7. Write a program to Translate a triangle using 3-D transformation.
8. Write a program to Rotate a triangle using 2-D transformation.
9. Write a program to Scale a triangle using 2-D transformation.
10 Write a program to clip the line whose co. ordinate (2, 3) and (8, 4) and whose lower left corner is (1, 2) and upper right corner (9,8).using Cohen-sutherland line clipping algorithm.
11. Write the program for pendulum using Bezier curve.

Artificial Intelligence Lab.

CSC 653	**Cr**	**L**	**T**	**P**
	1	**0**	**0**	**2**

Students will try to learn:

CO1. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can
be designed to solve problems
CO2. To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques.
CO3. To make students understand various AI methods like searching and game playing and how to apply them to solve real applications
CO4. To explain to students the basic issues of knowledge representation and Logic so as to build inference engines
CO5. To impart a basic understanding of some of the more advanced topics of AI such as planning.
CO6. To understand Bayes networks, natural language processing and introduce concept of cognitive computing.

1. Write a program in prolog to implement simple facts and Queries.
2 Write a program in prolog to implement simple arithmetic.
3. Write a program in prolog to solve Monkey banana problem.
4. Write a program in prolog to solve Tower of Hanoi.
5. Write a program in prolog to solve 8 Puzzle problems.
6. Write a program in prolog to solve 4-Queens problem.
7. Write a program in prolog to solve Traveling salesman problem.
8. Write a program in prolog for Water jug problem.

SEMESTER-VII

Advanced Computer Architecture

CSC-701	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Course Objectives

To make students know about the Parallelism concepts in Programming

1. To give the students an elaborate idea about the different memory systems and buses.
2. To introduce the advanced processor architectures to the students.
3. To make the students know about the importance of multiprocessor and multi-computers.
4. To study about data flow computer architectures

Course Outcomes

CO1: Demonstrate concepts of parallelism in hardware/software.
CO2 : Discuss memory organization and mapping techniques.
CO3 :Describe architectural features of advanced processors.
CO4 : Interpret performance of different pipelined processors.
CO5: Explain data flow in arithmetic algorithms

Content

Unit-I

Parallel computer model: Evolution of computer architecture, system performance attributes, Multiprocessors and Multicomputer: shared memory multiprocessors and distributed memory multicomputer, Vector supercomputers, Program and network properties: conditions of parallelism, program partitioning and scheduling, program flow mechanism, Dynamic interconnection network.

Unit-II

Principles of scalable performance: Performance metrics and measures: parallelism profile in programs, harmonic mean performance, efficiency utilization and quality, standard performance measure, scalability of parallel algorithms, Speedup performance laws: Amdahl's law for fixed workload, Gustafson's law for scaled problems, Memory bounded speedup model.

Unit-III

Processor and Memory hierarchy: Advanced processor technology, superscalar and vector processor, memory hierarchy technology, virtual memory technology, Bus, cache and shared memory: Backplane bus system: bus specification, addressing and timing protocol, arbitration, transaction, and interrupt, cache memory organization: addressing model, direct and associative mapping, set associative and sector cache, shared memory organization: Interleaved memory organization.

Unit-IV

Pipelining: Linear and non linear pipeline processors, Multiprocessors: Multiprocessor system interconnects, cache coherence and synchronization mechanism, Scalable and multithreaded architectures: Principles of multithreading, scalable and multithreaded architectures.

Unit-V

Parallel models, languages and compilers: Parallel programming models, parallel languages and compiler, dependence analysis of data arrays, code optimization and scheduling loop parallelization and pipelining.

Reference Books:

1. Kai Hwang, "*Advanced Computer Architecture*", McGraw-Hill, Revised Edition, 01/Feb/2003
2. Hwang and Briggs, "*Computer Architecture and Parallel Processing*", McGraw Hill, International Edition, 1986.
3. Moreshwar R. Bhujade, "*Parallel Computing*", New Age International(P) Ltd, Publishers, First Edition Reprint, 2004.
4. John L. Hennessy, David A. Patterson, "*Computer Architecture: A Quantitative Approach*", Elsevier Inc., Fifth Edition, 2011
5. Sima, Terence Fountain, Péter Kacsuk, "*Advanced Computer Architecture*", Pearson Education, Seventh Impression, 2009.

6. Michael J. Quinn, "*Parallel Computing: Theory and Practice*", Tata McHill-Edition, Twelfth Reprint, Second Edition, 2008.
7. Michael Jay Quinn, "*Parallel Programming in C with MPI and Open MP*",McGraw-Hill Higher Education, 2004.

Mobile Computing

CSC-702	Cr	L	T	P
	4	3	1	0

Course Objectives

1.To provide an overview of Wireless Communication networks area and its applications in communication engineering

2. To appreciate the contribution of Wireless Communication networks to overall technological growth.

3. To explain the various terminology, principles, devices, schemes, concepts, and different methodologies used in Wireless Communication Networks.

4. To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks

Course Outcomes

CO1: Understand fundamentals of wireless communications.

CO2: Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.

CO3: Demonstrate basic skills for cellular networks design.

CO4: Apply knowledge of TCP/IP extensions for mobile and wireless networking.

Content

Unit-I

Introduction, issues and challenges in mobile computing, overview of wireless telephony: cellular concept, UMTS, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, policy based handoff process, channel allocation in cellular systems, CDMA, GPRS.

Unit-II

ISM band, Spread Spectrum, physical layer accessing techniques – FHSS, DSSS, OFDM, (IEEE 802.11a) HR-DSSS, OFDM (IEEE 802.11g)Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, Wireless applications, data broadcasting, Mobile IP-entities and terminology, IP Packet delivery, Agent discovery, Registration, Tunneling and encapsulation, optimization and reverse tunneling WAP: Architecture, protocol stack, application environment, applications.

Unit-III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system-consistency, CODA, Ficus, MIO-NFS, Rover, Disconnected operations.

Unit-IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment, TCP over wireless-Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast recovery, Transmission-time out Freezing, selective retransmission, Transaction oriented TCP, TCP over 2 G and 3 G wireless network.

Unit-V

Ad Hoc networks, localization, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS Parameters in Ad Hoc Networks-

routing, bandwidth, delay, Jitter, Location management, handoff and energy management, fault tolerance in MANET, MANET applications.

Reference Books:

1. Jochen Schiller, "Mobile *Communications"*, Pearson Education, Second Edition, Second Impression, 2007.
2. Asha Mehrotra, "*GSM System Engineering*", Artech House, Second Edition Illustrated, 1997.
3. M. V. D. Heijden, M. Taylor, "*Understanding WAP Wireless Applications, Devices and Services*" , Artech House, July 2000.
4. Raj Kamal, "*Mobile Computing*", OxfordUniversity Press, First Published 2007.
5. Asoke K. Talukder, Roopa R. Yavagal, "*Mobile Computing: Technology, Applications and Service Creation*", Tata McGraw-Hill Publishing Company Limited, New Delhi, Fifth Reprint, 2007.

.Net Framework

CSC-703	Cr	L	T	P
	4	3	1	2

Course Objective

The student will use Visual Basic.Net to build Windows applications using structured and object-based programming techniques

Course Outcomes

At the end of the course students will be able to

CO1 Learn about MS.NET framework developed by Microsoft.

CO2. You will be able to using XML in C#.NET specifically ADO.NET and SQL server

CO3. Be able to understand use of C# basics, Objects and Types, Inheritance

CO4. To develop, implement and creating Applications with C#.

CO5. To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web

CO6. To understand and be able to explain Security in the .NET framework and Deployment in the .NET.

CO7. To develop Assemblies and Deployment in .NET, Mobile Application Development.

Content

Unit-I

The .NET framework Introduction, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, The .NET class library Intermediate language, Justin-Time compilation, garbage collection, Application installation & Assemblies, Web Services, Unified classes.

Unit-II

C# Basics Introduction, Data Types, Identifiers, variables & constants, C# statements, Object Oriented Concept, Object and Classes, Arrays and Strings, System Collections, Delegates and Events, Indexes Attributes, versioning.

Unit-III

C# Using Libraries Namespace-System, Input Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling.

Unit-1V WINDOW BASED APPLICATIONS, WCF AND WWF

Window based applications – Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)- Introduction to Web Services – .Net Remoting – Windows Service – Windows Workflow Foundation (WWF) – Activities – Workflows

Unit-V .NET FRAMEWORK AND COMPACT FRAMEWORK

Assemblies – Shared assemblies – Custom Hosting with CLR Objects – Appdomains – Core XAML – Bubbling and Tunneling Events- Reading and Writing XAML – .Net Compact Framework – Compact Edition Data Stores – Errors, Testing and Debugging – Optimizing performance – Packaging and Deployment – Networking and Mobile Devices

Reference Books:

1. Shibi Panikkar and Kumar Sanjeev, "*C# with .NET Frame Work*", Firewall Media, 2004.
2. Herbert Shildt, "*C# 4.0: The Complete Reference*", Tata McGraw Hill, First Edition, 2010.
3. Jeffrey Richter, "*Applied Microsoft Windows .Net Framework Programming*", Wintellect, 2003.
4. Fergal Grimes, "*Microsoft .Net for Programmers*", Manning Publication, 2002.
5. TonyBaer, Jan D. Narkiewicz, Kent Tegels, Chandu Thota, Neil Whitlow, "*Understanding the .Net Framework*", Apres, 2002.
6. E. Balagurusamy, "*Programming with C#*", Tata McGraw Hill, Second Edition,2008.

Distributed Systems

CSC-704	Cr	L	T	P
	3	3	0	0

Course Objectives

1. To introduce concepts related to distributed computing systems
2. To get knowledge in distributed architecture, naming, synchronization, consistency and Replication , fault tolerance, security, and distributed file systems
3. To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analysed.

Course Outcomes

CO1:Understand the principles and desired properties of distributed systems on which the Internet and other distributed systems are based

CO2: Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving

CO3: Recognize the inherent difficulties that arise due to distributed-ness of computing resources

CO4:Identify the challenges in developing distributed applications

CO5: Design a distributed system that fulfills requirements with regards to key distributed systems properties

Content

Unit-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models.

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.

Unit-II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: System model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, Hierarchical dead lock detection.

Unit-III

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem.

Security: Overview of security techniques, Cryptographic algorithms, DES, RSA, Digital signatures

Unit-IV

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote Method Invocation, Remote procedure call, Events and notifications, Java RMI case study.

Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances. CORBA Case Study: CORBA RMI, CORBA services. Election algorithm.

Unit-V

Transactions and Concurrency Control Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency controls.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Reference Books:

1. Mukesh Singhal and Niranjan G Shivaratri, "*Advanced Concept in Operating Systems*", Tata McGraw Hill, Fifth Edition, 2007.
2. George. Coulouris, Jean. Dollimore & T. Kindberg, "*Distributed System: Concepts and Design*", Pearson Education, Forth Edition,2009.
3. Gerald Tel, "*Distributed Algorithms*", CambridgeUniversity Press, Second Edition,2000.

.Net Framework Lab.

CSC 751

Cr	L	T	P
1	0	0	2

PREREQUISITES: Knowledge of C and C++.

AIM: To gain programming knowledge in .Net Framework.

OBJECTIVES: This Lab course will help students to achieve the following objectives:

1.Introduce to .Net IDE Component Framework.

2.Programming concepts in .Net Framework.

3.Creating website using ASP.Net Controls.

OUTCOMES: At the end of this Lab course students will be able to:

1.Create user interactive web pages using ASP.Net.

2.Create simple data binding applications using ADO.Net connectivity.
3. Performing Database operations for Windows Form and web applications.

LIST OF EXPERIMENTS

1. Find the sum of series 1^2+2^2+ ----------n^2 Input n from the integer. ^ Represents square. a. Using function. b. Using Procedure
2. Write a program Sort an array of 10 numbers using any sorting techniques.
3. Use a program to search student record using student id to see if record of that student already exists. If yes then display the details of that student.
4. Write a program that takes a month and year from user as input in integer form and display that month in character form and tell whether the year is leap or not. Use the select statement.
5. Write a program to create a calculator that performs addition, subtraction, multiplication and division.
6. Create a window form that contains 4 buttons,1 textbox and 1 label and upon clicking on any button a text must be appeared in textbox, label and in a message box. E.g. on clicking button1 the text “you have clicked button1” should be appeared in textbox, label and in message box.
7. Create a web form for registration for a distance-learning site. On clicking the submit button the data should be inserted in a table and the message should be displayed to user that you are registered. Also use the appropriate validators.
8. Create a web form that is divided in to two parts. First part takes employee details as input and inserts it in a table and the second part takes the id of the employee as input and displays the details of employ.
9. Modify the above form to include two more parts. The third part updates the details of employ and the fourth part deletes the record of a particular employ.
10. Write a program that takes the user name and password from the user and then redirect the user to the next form if they match and the next from contains the radio buttons and redirect the user to the appropriate pages based on radio button selected.
11. Write a program that takes user id and password as input and save in a cookie if they match and display the details of user in the next from by using the user id from the cookie.
12. Create a Web from that contains a data grid and a drop down list and display the detail of the students (stored in a table) having branch as selected from drop down list. B. Tech. CSE 6th Semester, Syllabus 2010-11.
13. Create a web form that contains an ad rotator.
14. Create a window form that takes date from the user and display the day corresponding to that date in a label.
15. Create a web form that contains a button. On clicking that button a question and a text box to put answer should be appeared and also a timer is started and user must be given 1 minute to answer the question and after that a form containing the message “your time is over” should be appeared.

Discipline Specific Electives (DCS)

Software Project Management

DCS-401	Cr	L	T	P
	4	3	1	0

Course Outcomes:

1. Identify the different project contexts and suggest an appropriate management strategy.
2. Practice the role of professional ethics in successful software development.
3. Identify and describe the key phases of project management.
4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

Unit-I

Introduction and Software Project Planning: Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

Unit-II

Project Organization and Scheduling: Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

Unit-III

Project Monitoring and Control: Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming.

Unit-IV

Software Quality Assurance and Testing: Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Clean room process.

Unit-V

Project Management and Project Management Tools: Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Reference Books:

1. M. Cotterell, "*Software Project Management*", Tata McGraw-Hill Publication.
2. Royce, "*Software Project Management*", Pearson Education
3. Kieron Conway, "*Software Project Management*", Dreamtech Press
4. S. A. Kelkar, "*Software Project Management*", PHI Publication.
5. Harold R. Kerzner, Project Mangment "*A Systems Approach to Planning, Scheduling, and Controlling*"Wiley.
6. Mohapatra, "*Software Project Management*", Cengage Learning.

Principles of Programming Language

DCS-402	Cr	L	T	P
	4	3	1	0

Course Objective:

- To develop simple algorithms for arithmetic and logical problems.
- To know the basics of Computer System and Hardware Organization.
- To learn the different tests of Memory Units, Input and Output Devices and Input Output Ports
- To introduce Number system, Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
- To equip Problem Solving and Programming Methodology, Arrays and Structures.

Course Outcomes:

1.Understand the basics of Computer System and Hardware Organization
2.Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.
3.Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
4.Solve Programming Methodology, Arrays and Structures
5.Apply techniques of Operations and Expressions.

Unit-I

Introduction to Programming Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

Unit-II

Elementary and Structured Data Types: Data object variables, constants, data types, elementary data types, declaration, assignment and initialization, enumeration, characters, strings. Structured data type and objects: Specification of data structured types, vectors and arrays, records, variable size data structure, pointers and programmer constructed data structure, Sets files. Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programs, abstract data types.

Unit-III

Perl - Introduction , First Script, Syntax , Variables, Strings, Numbers, Operators , Arrays , If ,For , While , Hashes, File Management , File Handles , Open , Create , Input TCL: Introduction , Running Tcl, Simple Text Output, Assigning values to variables, Evaluation & Substitutions 1: Grouping arguments with "", Evaluation & Substitutions 2: Grouping arguments with{}, Evaluation & Substitutions 3: Grouping arguments with [], Results of

a command - Math 101, Computers and Numbers, Numeric Comparisons 101 - if, Textual Comparison - switch, Looping 101 - While loop.

Unit-IV

Advantages of these windows-based operating systems, Programming Windows, windows based programming tools, creation of frames, dialog boxes, menus, panels, content pane in java. Operating and Programming Environment: Batch Processing Environments, Embedded system requirements.

Unit-V

Theoretical models, Introduction to Functional Programming, Lambda calculus, Data flow language and Object Oriented language, Comparison in various general and special purpose programming languages e.g. Fortran, C, Pascal, Lisp, etc.

Reference Books:

1. Terrance W Pratt, "*Programming Languages: Design and Implementation*" PHI, Fourth Edition, 2000.
2. Sebesta, "*Concept of Programming Language*", Addison Wesley, Seventh Edition, 2011.
3. Randal L Schwartz "*Learning Perl*", O'Rielly publication, Fourth Edition. 2005.
4. Ellis Horowitz"*Fundamentals of Programming Languages*", Galgotia, 2008.
5. Brent Welch, Ken Jones,Jeff Hobbs", *Practical Programming in Tcl and Tk*", fourth edition,2003.

Reconfigurable Computing

DCS-403	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Course Objectives and Expected Learning Outcomes: By the end of this course, the student will be able to:

1. Understand the fundamentals of the reconfigurable computing and reconfigurable architectures
2. Articulate the design issues involved in reconfigurable computing systems with a specific focus on Field Programmable Gate Arrays (FPGAs) both in theoretical and application levels
3. Understand the performance trade-offs involved in designing a reconfigurable computing platform with a specific focus on the architecture of a configurable logic block and the programmable interconnect
4. Discuss the state of the art reconfigurable computing architectures spanning fine grained (look up table based processing elements) to coarse grained (arithmetic logic unit level processing elements) architectures.
5. Understand both how to architect reconfigurable systems and how to utilize them for solving challenging computational problems.

Unit-I

Reconfigurable Computing: Introduction and history, hardware and software system for reconfigurable computing run time reconfiguration, reconfigurable programming architecture.

Unit-II

Field-Programmable Gate Array (FPGA): FPGA Architecture, FPGA Design Cycle, Technology-independent optimization Technology Mapping , Placement, Routing.

Unit-III

Fine-grained architecture, Coarse-grained Reconfigurable Devices, FPGAs vs. Multicore architectures, Multi-FPGA Systems.

Unit-IV

Advanced Topics: Dynamic Reconfiguration, Partial Reconfiguration.

Unit-V

Reconfigurable Computing Applications: Molecular Dynamics, Image processing, Video processing, Bioinformatics, Cryptography, Fault tolerant systems.

Reference Books:

1. "*Reconfigurable Computing: The Theory and Practice of FPGA-Based Computation*" by Scott Hauck

Modeling and Simulation

DCS-404	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Objectives

This subject provides students with

1. the basic system concept and definitions of system;
2. techniques to model and to simulate various systems;
3. the ability to analyze a system and to make use of the information to improve the performance.

Intended Learning Outcomes

Upon completion of the subject, students will be able to

1. understand the system concept and apply functional modeling method to model the activities of a static system;
2. understand the behavior of a dynamic system and create an analogous model for a dynamic system;
3. simulate the operation of a dynamic system and make improvement according to the simulation results.

Unit-I

System definition and components, stochastic activities, continuous and discrete System, system modeling, types of models, static and dynamic physical models, Static and dynamic mathematical models, full corporate models, types of system.

Unit-II

System simulation, why to simulate and when to simulate , basic nature of simulation , technique of simulation ,comparison of simulation and analytical methods, types of system simulation , real time simulation, hybrid simulation, simulation of pure pursuit problem single server queuing system and an inventory problem,

Unit-III

Monte Carlo simulation, Distributed Lag methods Simulation of continuous Systems, analog Vs. Digital simulation, simulation of water reservoir system, simulation of a servo system, simulation of an autopilot. Discrete system simulation, fixed time-step vs event-to event model, generation of random numbers, test for randomness, Generalization of non – uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

Unit-IV

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, System dynamics diagrams, feedback in socio-Economic systems, world model. Simulation of PERT networks, Critical path computation, uncertainties in Activity duration, Resource allocation and consideration.

Unit-V

Simulation software, Simulation language, continuous and discrete simulation languages, expression based languages, object-oriented simulation, general –purpose vs application –oriented simulation packages, CSMP-III, MODSIM-III.

Reference Books:

1. Geofrey Gordon "*System Simulation*",PHI, 2nd edition, 2006.
2. Narsingh Deo,"*System Simulation with Digital Computer*", PHI, 2nd edition, 2004.

Data Warehousing & Data Mining

DCS-501	Cr	L	T	P
	4	3	1	0

Course objective:

CO1: To Understand data mining principles and techniques.

CO2: To introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modelling, and identifying application and new trends in data mining.

Course outcomes (CO):

At the end of course, Students will be able to

CO1: Describe the basic concepts and techniques of Data Warehouse and Data Mining.

CO2: Demonstrate the gathering and analysis of large sets of data to gain useful business understanding.

CO3: Differentiate the data generalization and frequent pattern mining that can be discovered by association rule mining,

CO4: Explain the classification, clustering and prediction in Data mining.

CO5: Identify business applications and trends of data mining.

Unit-I

Introduction: Data-ware housing: Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Stars, Snow Flakes, Fact Constellations, Data marts, 3 Tier Architecture of Data Warehouse, OLAP Servers: ROLAP, MOLAP, HOLAP.

Unit-II

Data Mining: Motivation (for Data Mining), Definition & Functionalities, knowledge discovery steps, Architecture, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description.

Data Processing: Requirement for pre processing, Data Cleaning and its various techniques, Data Integration and Transformation,Data Reduction:- Data Cube Aggregation, attribute subset selection, Numerosity Reduction, Concept hierarchy generation. Attribute oriented induction Concept Description and Data Generalization, implementation of AOI, Mining Class comparisons. Mining frequent patterns, A priori Algorithm, F P Growth, Mining various kind of Association rule: correlation analysis,.

Unit-III

Classification and Predictions: Basics and issues regarding Classification & Prediction, Classification by Decision tree induction, Bayesian Classification, Rule- based Classification, Classification by Back propagation; Multilayer feed-forward Neural Network, Back-propagation Algorithm, Classification methods K-nearest neighbor classifiers, Genetic Algorithm, constraints based mining,accuracy and error measure.

Unit-IV

Cluster analysis: requirement of clustering in data mining, Data types in cluster analysis, Categories of clustering methods, partitioning methods: K-mean and K- mediods. Hierarchical Clustering: agglomerative and divisive clustering, BIRCH, and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method – expectation- maximization, Outlier Analysis: statistical distribution method, distance based method.

Unit-V

Applications and Trends in data mining: Benefits of data mining, Data Mining Applications: in retail industry banking and finance, and telecommunication industry Social impact on data mining,, data mining interfaces.

Reference Books:

1. Jiawei Han, Micheline Kamber,"*Data Mining Concepts & Techniques*" Elsevier,2nd edition 2010.
2. M.H.Dunham, "*Data Mining :Introductory and Advanced Topics*", Pearson Education,1st edition ,2007.
3. Sam Anahory, Dennis Murray, "*Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems* ", Pearson Education, 1st edition, 2008.
4. Pieter Adriaans, Dolf Zantinge, " *Data Mining*", Pearson Education, 4th edition,2009.

Advances in Database Technology

DCS-502	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Course Objectives:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1:Describe the fundamental elements of relational database management systems

CO2:Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

CO3:Design ER-models to represent simple database application scenarios

CO4:Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

CO5:Improve the database design by normalization.

CO6:Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

Unit-I

RELATIONAL MODEL ISSUES: ER Model - Normalization – Query Processing – Query Optimization – Transaction Processing - Concurrency Control – Recovery - Database Tuning.

Unit-II

DISTRIBUTED DATABASES: Parallel Databases – Inter and Intra Query Parallelism – Distributed Database Features – Distributed Database Architecture – Fragmentation – Distributed QueryProcessing – Distributed Transactions Processing – Concurrency Control – Recovery –Commit Protocols.

Unit-III

OBJECT ORIENTED DATABASES:Introduction to Object Oriented Data Bases - Approaches - Modeling and Design -Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks, Recovery – POSTGRES – JASMINE –GEMSTONE - ODMG Model.

Unit-IV

EMERGING SYSTEMS: Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining -Web Databases – Mobile Databases- XML and Web Databases.

Unit-V

CURRENT ISSUES: Rules - Knowledge Bases - Active and Deductive Databases - Multimedia Databases– Multimedia Data Structures – Multimedia Query languages - Spatial Databases.

Reference Books:

1. Thomas Connolly and Carlolyn Begg, "*Database Systems, A Practical Approach to Design, Implementation and Management*", Third Edition, Pearson Education 200
2. R. Elmasri, S.B. Navathe, "*Fundamentals of Database Systems*", Fifth Edition, Pearson Education, 2006.
3. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "*Database System Concepts*", Fifth Edition, Tata McGraw Hill, 2006.
4. C.J.Date, A.Kannan, S.Swamynathan, "*An Introduction to Database Systems*", Eighth Edition, Pearson Education, 2006.

Embedded Systems

DCS-503

Cr	L	T	P
4	3	1	0

Course Outcomes Expected: After completing the course, students will able to:
CO1: Design real time embedded systems using the concepts of RTOS.
CO2: Describe the embedded system architecture and instruction set of ARM7.
CO3: Write structured, well-commented, understandable programs in assembly language.
CO4: Use interrupts types of filters in ARM7 processor
CO5: Interface I/O devices and memory to ARM processors.

Unit-I

Introduction to embedded systems: Classification, Characteristics and requirements, Applications

Unit-II

Timing and clocks in embedded systems, Task Modeling and management, Real time operating system issues.

Unit-III

Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing. Modeling and Characterization of Embedded Computation System.

Unit-IV

Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

Unit-V

Fault-Tolerance, Formal Verification, Trends in Embedded Processor, OS, Development Language

Reference Books:

1. Prasad, "*Embedded /Real Time System, Concept, Design and Programming Black Book*", Wiley India
2. R.Gupta, "*Co-synthesis of Hardware and Software for Embedded Systems*", Kluwer
3. Shibu K.V., "*Introduction to Embedded Systems*", TMH
4. Marwedel, "*Embedded System Design*", Springer

Foundation Languages for Machine Learning: Python and R Programming

DCS-504

Cr	L	T	P
4	4	0	0

Course Objective:

- To learn how to design and program in Python and R Language.
- To learn how to use lists, tuples, and dictionaries in Python.
- To learn how to identify Python and R data structures.
- To understand why Python and R Language are useful language for developers.

Course Outcomes: At the end of the course, the student will be able to:

CO 1 To read and write simple Python and R programs.
CO 2 To develop Python and R programs with conditionals and loops.
CO 3 To define Python and R functions.

CO 4 To use Python and R data structures

Course Contents		**Contact Hours**
Unit-1	Introduction: Introduction to Python and Installation, Python IDE, Interacting with Python Programs, Elements of Python, Expressions, Assignment Statement, Arithmetic Operators. Conditionals: Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python.	L-8
Unit-2	Loops: Purpose and working of loops, While loop including its working, For Loop, Nested Loops. Function: Functions in Python.	L-6
Unit-3	Python Data Structure: Strings, Tuples, Lists, Sets, Dictionaries. Classes: Class definition and other operations in the classes, Special Methods.	L-6
Unit-4	Introduction: Introduction to "R" Programming and Installation, R & R Studio, Data Types. Conditionals: Conditional statement in R (if-else statement, its working and execution).	L-8
Unit-5	Loops and Functions: While loop including its working, For Loop and Functions in R. R Data Structure: Vectors, Lists, Matrices, Arrays and Data Frames.	L-8

Reference Books:

1. *Think Python: How to Think Like a Computer Scientist'',* 2nd edition, Updated for Python 3, Allen B. Downey, ``Shroff/O'Reilly Publishers, 2016.
2. *An Introduction to Python – Revised and updated for Python 3.2,* Guido van Rossum and Fred L. Drake Jr, Network Theory Ltd., 2011.
3. *Introduction to Computation and Programming Using Python'',* Revised and expanded Edition, John V Guttag, MIT Press , 2013.
4. *Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R",* Robert Knell, Amazon Digital South Asia Services Inc, 2013.

Knowledge Management

DCS-601	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

At the end of the course **Students will able to:**

CO1To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.

CO2. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems

CO3. To review the different stages of development of the AI field from human like behavior to Rational Agents.

CO4. To impart basic proficiency in representing difficult real life problems in a state space

representation so as to solve them using AI techniques like searching and game playing.
CO5. To create an understanding of the basic issues of knowledge representation and Logic and blind and heuristic search, as well as an understanding of other topics such as minimal, resolution, etc. that play an important role in AI programs.
CO6. To introduce advanced topics of AI such as planning, Bayes networks, natural language processing and Cognitive Computing. natural language processing and Cognitive Computing.

Unit-I

Introduction: An Introduction to Knowledge Management - The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management: From Information Management to Knowledge Management - Key Challenges Facing the Evolution of Knowledge Management - Ethics for Knowledge Management.

Unit-II

Organization and Knowledge Management - Building the Learning Organization. Knowledge Markets: Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance.

Unit-III

Telecommunications and Networks in Knowledge Management - Internet Search Engines and Knowledge Management - Information Technology in Support of Knowledge Management - Knowledge Management and Vocabulary Control - Information Mapping in Information Retrieval - Information Coding in the Internet Environment - Repackaging Information.

Unit-IV

Components of a Knowledge Strategy - Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries).

Unit-V

Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life -cycles of an organization.

Reference Books:

1. Srikantaiah, T.K., Koenig, M., "*Knowledge Management for the Information Professional*" Information Today, Inc., 2000.
2. Nonaka, I., Takeuchi, H., "*The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*", Oxford University Press, 1995.

Pattern Recognition

DCS-602	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Learning Outcomes

1. Ability to formulate high dimensional feature vectors from observations.
2. Ability to select an appropriate pattern analysis tool for analysing data in a given feature space.
3. Ability to apply pattern analysis tools to practical applications and detect patterns in the data.

Unit-I

Introduction: Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra,

Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

Unit-II

Statistical Patten Recognition: Bayesian Decision Theory, Classifiers, Normal density and discriminant functions

Unit-III

Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods -Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization(EM), Hidden Markov Models (HMM), Gaussian mixture models.

Unit-IV

Nonparametric Techniques: Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.

Unit-V

Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partition clustering –K means, agglomerative hierarchical clustering, Cluster validation.

Reference Books:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "*Pattern Classification*", 2nd Edition, John Wiley, 2006.
2. C. M. Bishop, "*Pattern Recognition and Machine Learning*", Springer, 2009.
3. S. Theodoridis and K. Koutroumbas, "*Pattern Recognition*", 4th Edition, Academic Press, 2009.

Cloud Computing

DCS-603	Cr	L	T	P
	4	3	1	0

Objectives

1. To provide the understanding of Cloud Computing Concepts and their Implementation at various learning levels.

Course Learning Outcomes

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

1. Describe various service and deployment models used in cloud computing
2. Explain the Web Services available and its architectural modules and structure
3. Illustrate the VM-Ware and Virtualization concepts
4. Demonstrate Case Studies based on PaaS and SaaS Platforms
5. Examine the Private and Public Cloud Environment Models.
6. Evaluate the Working and Methodology of SaaS , PaaS and IaaS Cloud Computing Models.

Course Content

Unit-I

Introduction to Cloud Computing: Cloud computing, Properties & Characteristics, Service models, Deployment models, Virtualization concepts.

Unit-II

Cloud as IaaS (Infrastructure as a Service)

Introduction to IaaS, Private Cloud Environment, Public Cloud Environment, Managing Hybrid Cloud environment

Unit-III

Platform as a Service (PaaS)

Introduction to PaaS, Cloud platform & Management, Computation, Storage, Case studies

Unit-IV

Software as a Service (SaaS)

Introduction to SaaS, Web services, Web 2.0, Web OS, Case studies

Unit-V

Cloud issues and challenges

Cloud provider Lock-in, Security and Privacy issues in the Cloud, VM-Ware ESX Memory Management Capacity Planning and Disaster Recovery in Cloud Computing

Reference Books:

1. Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah "*Cloud Computing Black Book"* Kogent Learning
2. Dr. Kumar Saurabh , "*Cloud Computing"* , Wiley
3. "*Cloud Computing"*, Das Gupta, et al., PHI Learning
4. "*Cloud Computing: Concepts, Technology & Architecture"* (The Prentice Hall Service Technology Series from Thomas Erl) Kindle Edition
5. "*Cloud Computing Explained: Implementation Handbook for Enterprises"* 2nd ed. Edition by John Rhoton

Machine Learning

DCS-604	Cr	L	T	P
	4	3	1	0

Learning Outcomes The student will be able to:

1. Identify the machine learning algorithms which are more appropriate for various types of learning tasks in various domains
2. Implement machine learning algorithms on real datasets

Unit-I

Introduction to Machine Learning, supervised learning, learning multiple classes, regression, model selection and generalization, Bayesian decision theory, losses and risks, discriminant functions, utility theory, association rules.

Unit-II

Data Pre-processing and understanding, parametric methods, maximum likelihood estimation, bias and variance, multivariate data, parameter estimation, estimating missing values, multivariate normal distribution, multivariate classification and regression, dimensionality reduction, subset selection, PCA,LDA, Isomaps, LLE .

Unit-III

Clustering, mixture densities, K-means algorithm, EMalgorithm, hierarchical clustering, choosing number of clusters. Non-parametric methods, non-parametric density estimation,
non-parametric classification and regression.

Unit-IV

Classification Techniques, decision trees, pruning, ruleextraction from trees, learning rules from data, Lineardiscrimination, two classes, multiple classes, pairwiseseparation. Perceptrons, multilayer perceptrons, backpropagationalgorithm, training procedures and network tuning. Competitivelearning, Radial basis functions, Incorporating rule based knowledge.

Unit-V

Bayesian Estimation, estimating parameter of Distributions andFunctions. Graphical models, conditional independence, desperation,belief propagation, Markov random fields, learning the structure of a graphical model, influence diagrams.

Hidden Markov Models, discrete markov processes, HMM,three problems of HMM, evaluation problem, finding statesequence, learning model parameters, HMM with input.

Reference Books:

1. Ethem Alpaydin "*Introduction to Machine Learning*" Second Edition,PHI Learning2012
2. Christopher M. Bishop "*Pattern Recognition and Machine Learning*",Springer2013
3. Trevor Hastie R. Tibshirani, J. Friedman "*The Elements of Statistical Learning*" Second Edition, Springer2008

Real Time Systems

DCS-701	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

COURSE OUTCOMES

- On completion of this course, the students will be able to
- understand concepts of Real-Time systems and modeling
- recognize the characteristics of a real-time system
- understand and develop document on an architectural design of a real-time system
- develop and document Task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems.

Unit-I

Introduction

Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processingetc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real TimeSystems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters ofReal Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

Unit -II

Real Time Scheduling

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round RobinApproach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm,Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

Unit-III

Resources Sharing

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit-Resources, Controlling Concurrent Accesses to Data Objects.

Unit-IV

Real Time Communication

Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines forSwitched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource, Reservation Protocols.

Unit-V

Real Time Operating Systems and Databases

Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristic of Temporal data, Temporal Consistency, Concurrency Control, Overview of Commercial Real Time databases

Reference Books:

1. "*Real Time Systems"* by Jane W. S. Liu, Pearson Education Publication.
2. Phillip A Laplanta,SeppoJ.Ovaska "*Real time System Design and Analysis Tools for Practitioner"*, Wiley
3. Mall Rajib, "*Real Time Systems*", Pearson Education
4. Albert M. K. Cheng , "*Real-Time Systems: Scheduling, Analysis, and Verification*", Wiley.

Virtual Reality

DCS-702	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Course Learning Outcomes

Upon successful completion of this course, students should be able to:

1	Differentiate between Virtual, Mixed and Augmented Reality platforms.
2	Identify appropriate design methodologies for immersive technology development, especially from a physiological perspective.
3	Demonstrate foundational literacy in game engine use.
4	Effectively categorise the benefits/shortcomings of available immersive technology platforms.

Unit-I

Introduction: History of VR technology, commercial VR technology and the five classic components of a VR system.

Unit-II

Input Devices: Trackers: Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces: Tracker-Based Navigation Manipulation Interfaces, Trackballs, Three-Dimensional Probes, Gesture Interfaces: The Pinch Glove, The 5DT Data, The Didjiglove.

Unit-III

Output Devices: Graphics Displays: The Human Visual System, Personal Graphics Displays, Large-Volume Displays, Sound Displays: The Human Auditory System, the Convolvotron, Speaker-Based Three-Dimensional Sound, Haptic Displays: The Human Haptic System, Tactile Feedback Interfaces.

Unit-IV

Modeling and Programming: Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management, Introduction to JAVA 3D.

Unit-V

Human Factors in VR and applications of VR: Human Factors in VR : Methodology and Terminology, , User Performance Studies, VR Health and Safety Issues, VR and Society, Applications of VR: Medical Applications, Military, Manufacturing, Robotics, Information Visualization.

Reference Books:

1. Gregory C. Burdea& Philippe Coiffet, "*Virtual Reality Technology*", Second Edition John Wiley & Sons,Inc
2. Steven M. LaValle, "*Virtual Reality"*, University of Illinois
3. Philippe Fuchs, Guillaume Moreau, Pascal Guitton, "*Virtual Reality: Concepts and Technologies"*, CRCPress, 2011
4. Tony Parisi, "*Learning Virtual Reality"*, O'Reilly Media

Digital Image Processing

DCS-703	**Cr**	**L**	**T**	**P**
	4	**3**	**1**	**0**

Course Outcomes

CO1: Review the fundamental concepts of a digital image processing system.
CO2 : Analyze images in the frequency domain using various transforms.
CO3 : Evaluate the techniques for image enhancement and image restoration.
CO4 : Categorize various compression techniques.
CO5: Interpret Image compression standards.
CO6 : Interpret image segmentation and representation techniques.

Unit-I

Introduction and Fundamentals : Motivation and Perspective, Applications, Components of Image Processing System, Element ofVisual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Frequency Domain: Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Lowpass,High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; SmoothingFrequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters –Gaussian Highpass Filters; Homomorphic Filtering.

Unit-II

Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: ContrastStretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement usingArithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering;Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

Unit-III

Image Restoration : A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-SpatialFiltering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – MedianFilter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – BandpassFilters; Minimum Mean-square Error Restoration.

Unit-IV

Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing,Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of ConnectedComponents, Convex Hull, Thinning, Thickening

Unit-V

Registration: Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging –Algorithms to Establish Correspondence, Algorithms to Recover Depth

Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding,Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern FittingApproach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, EdgeDetector Performance, Line Detection, Corner Detection.

Reference Books:

1. "*Digital Image Processing*" 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
2. "*Digital Image Processing and Computer Vision*", R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. "*Fundamentals of Digital Image Processing*", A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.
4. Sonka, "*Digital Image Processing and Computer Vision*", Cengage Learning
5. Gonzalez and Woods, "*Digital Image Processing*", Addison Wesley.

Asp .Net

DCS-704	Cr	L	T	P
	4	3	1	0

Goals for students in this course are the following.

- Understand the difference between desktop and dynamic web applications.
- Understand the ASP.NET web application execution model.
- Create and modify multi-page Web Form applications that involve and demonstrate features such as flow control, the use of style sheets, state management, data access, data binding, security, and data verification and validation.
- Understand web application configuration and demonstrate the ability to manage basic configuration issues.
- Define and describe what a web service is and how web services are used.
- Create and modify simple web services.
- Create desktop and web applications that consume simple web services.

Unit-I

Web Architecture, Setting up and Installing ASP.NET Installing, Internet Information Server IIS Manager Creating virtual/home directory Folder Settings Adding a virtual directory to your neighborhood installing .Net Framework SDK Overview of the ASP.NET Framework.Asp.net and the .NET Framework. Common Language Runtime.Net Framework Class Library Understanding NamespacesThe Structure of asp.net Page Directives Code Declaration Blocks Code Render BlockC # fundamentals

Unit-II

Using the Standard Controls Control Accepting User Input Textbox controls Radio Button And Radio Button List Controls Check Box And Check Box List Controls Submitting Form Data Button controls Link Button Control Im Displaying information Label Controls Literalage Button Control Displaying Images Image Control Using Panel Control Using Hyperlink Control Using the Rich Controls Accepting File Uploads. Saving files to file system. Saving files to database. Uploading Large

Unit-III

Designing Websites with master page Creating master pages. Creating default contents. Nesting master pages Using images and hyperlinks in master pages. Registering master pages in web configuration. Summary Designing websites with Themes Creating Themes Adding skins to themes Creating named skins Themes versus Style Sheet Themes Disabling Themes Registering Overview of Data Access Using SQLData Source Control Creating database connections Connecting to MSSQL Server Connecting to ORACLE and MS Access. Storing connection String in web configuration file Executing Database Commands.

Unit-IV

Using List Controls, Using the Grid View Control Grid View Control fundamentals, Displaying Data., Selecting Data. Using Data Keys, Sorting Data., Paging through Data, Editing Data Displaying Empty Data, Formatting the Grid View Control, Using the Details View and Form View Controls Using the Details View control, Displaying data with the Details View control, Using Fields with the Details View control, Displaying Empty data with the Details View control

Unit-V

Using Repeater And Data List Controls Displaying data with the Repeater Control Using Templates with the Repeater Control Displaying Data with the Data List Control Displaying Data with Multiple Columns Using The List View and Data Pager Controls

Reference Books:

1. Kathleen Kalata, "*Web application using Asp.Net 2.0*", CENGAGE Learning, Second Edition, 2008
2. E. Balagurusamy, "*Programming in C#",* Tata McGraw Hill Publication, Second Edition, Fifth Reprint, 2008.
3. Kogent learning solutions Inc. ,"Asp. Net 4.0: Black book", Dreamtech Press, Second Edition, 2010.

Neural Networks

DCS-705

Cr	L	T	P
4	3	1	0

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts

- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

Course Outcomes:

- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modeling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

UNIT-I Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT - III Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - IV Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - V Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second Order Methods, Optimization Strategies and Meta-Algorithms Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.