DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SCHEME OF INSTRUCTION AND EXAMINATION

with effect from 2010 – 2011

B.TECH(Computer Science and Engineering) Course Structure – VR10

First Year – Semester I

S.No	Sub. Code	Subject Title	L	T	P	C	I	E	T
1	FY 1001	Engineering Mathematics - I	4	1	--	4	30	70	100
2	FY 1002**P**	Engineering Physics	3	1	--	3	30	70	100
3	FY 1003**E**	Technical English and Communication Skills	2	--	2	3	30	70	100
4	FY1004**EM**	Engineering Mechanics- I **(for ME only)**	4	1	--	4	30	70	100
	FY1004**M**	Mechanics for Engineers **(for ECE & CSE only)**							
5	FY 1005	Introduction to Computing	2	--	--	2	30	70	100
6	FY 1051**P**	Engineering Physics Lab.	--	--	3	2	25	50	75
7	FY 1052	Basic Computing Lab.	--	--	3	2	25	50	75
8	FY 1053**G**	Engineering Graphics	2	--	6	5	30	70	100
			17	**3**	**14**	**25**	**230**	**520**	**750**

First Year – Semester II

(Common to ECE,CSE & ME)

S.No	Sub. Code	Subject Title	L	T	P	C	I	E	T
1	FY 2001	Engineering Mathematics- II	4	1	--	4	30	70	100
2	FY 2002**C**	Engineering Chemistry	3	1	--	3	30	70	100
3	FY 2003**B**	Basics of Civil and Mechanical Engineering	4	--	--	4	30	70	100
4	FY2004**EM**	Engineering Mechanics – II **(for ME only)**	3	1	--	3	30	70	100
	FY2004**EN**	Environmental Science **(for ECE & CSE only)**							
5	FY 2005	Programming in C	3	1	--	3	30	70	100
6	FY 2006	Professional Ethics	2	--	--	2	30	70	100
7	FY 2051**C**	Engineering Chemistry Lab.	--	--	3	2	25	50	75
8	FY 2052	C Programming Lab.	--	--	3	2	25	50	75
9	FY 2053**W**	Basic Workshop	--	--	3	2	25	50	75
			19	**4**	**9**	**25**	**255**	**570**	**825**

*Final Examination with internal evaluation (25 marks: continuous+50 marks: final assessments)

L: Lecture **T**: Tutorial **P**: Practical **C**: Credits

I: Internal Assessment **E**: End Semester **T**: Total Marks

II/IV B.TECH(Computer Science and Engineering) – Semester III

S.No	Sub. Code	Subject Title	L	T	P	C	I	E	T
1	CS 3001	Engineering Mathematics–III	4	1	-	4	30	70	100
2	CS 3002	Basic Electrical Engineering	4	-	-	4	30	70	100
3	CS 3003	Discrete Mathematical Structures	3	1	-	3	30	70	100
4	CS 3004	Data Structures	4	1	-	4	30	70	100
5	CS 3005	Basic Electronics	4	-	-	4	30	70	100
6	CS 3006	Digital Logic Design	3	1	-	3	30	70	100
7	CS 3051	Data Structures Lab	0	0	3	2	25	50	75
8	CS 3052	Basic Electronics & DLD Lab	0	0	3	2	25	50	75
			22	4	6	26	230	520	750

II/IV B.TECH(Computer Science and Engineering) – Semester IV

S.No	Sub. Code	Subject Title	L	T	P	C	I	E	T
1	CS 4001	Probability and Statistics	4	1	-	4	30	70	100
2	CS 4002	Microprocessor & Interfacing	4	1	-	4	30	70	100
3	CS 4003	Design and Analysis of Algorithms	4	1	-	4	30	70	100
4	CS 4004	Object Oriented Programming	4	1	-	5	30	70	100
5	CS 4005	Computer Organization	4	-	-	4	30	70	100
6	CS 4051	Micro Processor and Interfacing Lab	0	0	3	2	25	50	75
7	CS 4052	Object Oriented Programming Lab	0	0	3	2	25	50	75
8	CS 4053	Communication Skills Lab	0	0	2	1	25	50	75
			20	4	8	26	225	500	725

L: Lecture T: Tutorial P: Practicles C: Credits
I: Internal Assessment E: End Semester T: Total Marks

III/IV B.TECH (Computer Science and Engineering) – Semester V

S.No	Sub. Code	Subject Title	L	T	P	C	I	E	T
1	CS 5001	Software Engineering	4	0	-	4	30	70	100
2	CS 5002	Theory of Computation	3	1	-	3	30	70	100
3	CS 5003	Operations Research	4	0	-	4	30	70	100
4	CS 5004	Data Base Management Systems	4	1	-	4	30	70	100
5	CS 5005	Operating Systems	4	1	-	4	30	70	100
6	CS 5006	Computer Graphics	3	1	-	3	30	70	100
7	CS 5051	DBMS Lab	0	0	3	2	25	50	75
8	CS 5052	Operating Systems Lab	0	0	3	2	25	50	75
			22	4	6	26	230	520	750

III/IV B.TECH (Computer Science and Engineering)- Semester VI

S.No	Sub. Code	Subject Title	L	T	P	C	I	E	T
1	CS 6001	Object Oriented Analysis and Design	4	-	-	4	30	70	100
2	CS 6002	Data Mining	4	-	-	4	30	70	100
3	CS 6003	Engineering Economics and Management	3	1	-	3	30	70	100
4	CS 6004	Computer Networks	4	1	-	4	30	70	100
5	CS 6005	Web Technologies	4	1	-	4	30	70	100
6	CS 6051	Software Engineering Lab	0	0	3	2	25	50	75
7	CS 6052	Computer Networks Lab	0	0	3	2	25	50	75
8	CS 6053	Web Technologies Lab	0	0	3	2	25	50	75
9	CS 6054	Term Paper*	-	1	-	1	25	50	75
			19	4	9	26	250	550	800

*Term paper evaluation – Internal

L: Lecture, T: Tutorial, P: Practical, C: Credits, I: Internal Assessment, E: End Semester, T: Total Marks

*** Personality Development Course is included in 3-1 and 3-2 with 1 credit and 2 tutorial hours**

IV/IV B.TECH(Computer Science and Engineering) – Semester VII

S.No	Sub.Code	Subject Title	L	T	P	C	I	E	T
1	CS 7001	Cryptography& N/W Security	4	1	0	4	30	70	100
2	CS 7002	Embedded Systems	4	1	0	4	30	70	100
3	CS 7003	Compiler Design	3	1	0	3	30	70	100
4	CS 7004	Mobile Computing	4	1	0	4	30	70	100
5	CS 7005	Elective Course – I A - Human Computer Interaction B - Digital Signal Processing C - Software Project Management D – Adv. Computer Architecture E - Middleware Technologies F- Ind. Need based Elective	3	0	0	3	30	70	100
6	CS 7006	Elective Course – II A - Digital Image Processing B - Real Time Systems C - Advanced DBMS D - Bioinformatics E - Artificial Intelligence F - Industry Need Based Elective	3	0	0	3	30	70	100
7	CS 7051	. Net Technologies Lab	0	0	3	2	25	50	75
8	CS 7052	Embedded Systems Lab	0	0	3	2	25	50	75
9	CS 7053	Mini Project	0	1	0	1	25	50	75
			21	5	6	26	255	570	825

IV/IV B.TECH(Computer Science and Engineering) – Semester VIII

S.No	Sub. Code	Subject Title	L	T	P	C	I	E	T
1	CS 8001	Software Testing Methodologies	4	1	0	4	30	70	100
2	CS 8002	Elective Course – III* A: Information Retrieval Systems B: Elective C: Virtual Reality D: E-Commerce E: Grid Computing	4	0	0	4	30	70	100
3	CS 8003	Elective Course-IV* A: Soft Computing B: Advanced Embedded Systems C: Principles of TCP/IP D.. Neural Networks E: Pattern Recognition	4	0	0	4	30	70	100
4	CS 8051	Software Testing Tools Lab	0	0	3	2	25	50	75
5	CS 8052	Major Project	2	6	0	12	50	100	150
			14	7	3	26	165	360	525

L: Lecture, T: Tutorial, P: Practical, C: Credits, I: Internal Assessment E:End Semester, T:Total Marks

CATEGORIES OF COURSES AND THEIR DISTRIBUTION

S.No.	Courses	Category	Minimum Credit Requirements
1.	Basic Science Core Courses	BS	>= 24
2.	Basic Engineering Sciences Courses	BE	>= 24
3.	Humanities and Social Sciences Courses	HU	>= 08
4.	Programme Core Courses	PC	>= 105
5.	Elective Courses	EL	>= 13
6.	Department/Programme Major Project	MP	>= 10
7.	Mandatory Learning courses	ML	=> 05
8.	Research Orientation / Industry practice / Self learning / co-curricular participation / extra-curricular participation / NSS /NCC / Social Service / Rural development / Yoga / Educational tour / Summer Term Course / Practice School	**SP**	**>=2**

Basic Sciences Courses (BS) >= 24

Course name		L-T-P: C
FY 1001	Engineering Mathematics – I	4-1-0 : 4
FY 2001	Engineering Mathematics – II	4-1-0 : 4
FY 1002(P)	Engineering Physics	3-1-0 : 3
FY 2002(C)	Engineering Chemistry	3-1-0 : 3
FY 2004 EN	Environmental Science	3-1-0 : 3
FY 1051 P, 2051C	Basic Sciences Lab	0-0-6 : 4
CS 3001	Mathematics – III	4-1-0 : 4
CS 4001	Probability and Statistics	4-1-0 : 4

Basic Engineering Sciences Courses (BES) >= 24

Course name		L-T-P : C
FY 1005	Introduction to Computing	2-0-0 : 2
FY 1004M	Mechanics for Engineers	4-1-0 : 4
FY 1052	Basic Computing Lab	0-0-3 : 2
FY 1053G	Engineering Graphics	2-0-6 : 5
FY 2003B	Basics of Civil & Mechanical Engg.	4-0-0 : 4
FY 2005	Programming in C	3-1-0 : 3
FY 2052	C Programming Lab	0-0-3 : 2
FY 2053W	Basic Workshop	0-0-3 : 2
CS 3005	Basics of Electrical Engineering	4-0-0 : 4
CS 3002	Basic Electronics	4-0-0 : 4
CS 3052	Basics Electronics & DLD Lab	0-0-3 : 2

Humanities and Social Sciences Courses (HU) >= 07

Course name		L-T-P : C
FY 1003F	Technical English & Communication skills	2-0-2 : 3
CS 4053	Communication Skills Lab	0-0-2 : 1
CS 6003	Engg. Economics and Management	3-1-0 : 3

Mandatory Learning Courses (ML) >= 05

Course name	L-T-P : C
CS 5003 Operations Research	4-0-0 : 4
FY 2006 Professional Ethics	2-0-0 : 2

Student Practice courses (SP) >= 2*

Course name	L-T-P : C
SPA 901 Research orientation	0-1-1 : 1
SPA 902 Industry practice	0-2-1 : 1
SPA 903 Self learning	0-0-3 : 1
SPA 904 Co-curricular participation	0-0-3 : 1
SPA 905 Extra- curricular participation	0-0-3 : 1
SPA 906 NSS	0-0-3 : 1
SPA 907 NCC	0-0-3 : 1
SPA 908 Social Service	0-0-3 : 1
SPA 909 Rural development	0-0-3 : 1
SPA 910 Yoga	0-0-3 : 1
SPA 911 Educational tour	0-0-3 : 1
SPA 912 Practice School	0-2-2 : 1
SPA 913 Personality Development	0-2-1 : 2

***** Students will have to earn a minimum of 4 credits during the entire tenure of the degree programme, out of which personality Development course is mandatory.

S.NO	COURSE CATEGORY	NO. OF CREDITS	%
1.	Basic Sciences Courses	29	13.81
2.	Basic Engineering Sciences	32	15.24
3.	Humanities & Social Sciences Courses	7	3.33
4.	Professional Courses and Electives	120	57.14
5.	Major Project	12	5.71
6.	Mandatory Learning Course	6	2.86
7.	Student Practice Courses	2	0.95
8.	Personality Development Courses	2	0.95

Course Distribution – Category Wise

Year/Semester	BS	BES	HU	PC	EL	MP	ML	SP	Total Credits
I year Semester I	FY 1001, FY1002(P), FY1051(P) **=9**	FY1004 M, FY1005, FY1052, FY1053 G **= 13**	FY1003E **=3**	-	-	-	-	-	**25**
Semester II	FY2001, FY2002(C), FY2004 EN FY2051(C) **=12**	FY2003 B, FY2005, FY2052, FY2053(W) **=11**					FY2006 **=2**		**25**
II Year, Semester III	CS3001, **= 4**	CS3002 CS3005 **= 8**		CS 3003, CS 3004, CS 3006, CS 3051, CS 3052 **= 14**	-	-	-	-	**26**
Semester IV	CS 4001 **= 4**		CS 4053 **=1**	CS 4002 CS 4003, CS 4004, CS 4005 CS 4051, CS 4052, **= 21**	-	-	-	-	**26**
III Year , Semester V	-	-	-	CS 5001, CS 5002, CS 5004, CS 5005 CS 5006 CS 5051 CS 5052, **= 22**	-	-	CS5003 **=4**	-	**26**
Semester VI	-	-	CS 6003 **= 3**	CS 6001 CS 6002 CS 6005 CS 6051, CS 6052 CS 6053 CS 6054 **= 23**		-	-	-	**26**
IV Year , Semester VII	-	-	-	CS 7001, CS 7002, CS 7003, CS 7004, CS 7051, CS 7052, CS 7053 **=20**	CS 7005, CS 7006 **= 6**	-	-	-	**26**
Semester VIII	-	-		CS 8001 CS 8051 **= 6**	CS 8002, CS 8003 **= 8**	CS8052 **=12**	-	-	**26**
Student Practice Courses	-	-	-	-	-	-	-	04	**04**
Total credits	**29**	**32**	**07**	**106**	**14**	**12**	**06**	**04**	**210**

Marks Distribution:

Year/Semester	I	E	Total
I year I Semester	230	520	750
I year II Semester	255	570	825
II Year I Semester	230	520	750
II Year II Semester	225	500	725
III Year I Semester	230	520	750
III Year II Semester	250	550	800
IV Year I Semester	255	570	825
IV Year II Semester	165	360	525
Total Marks	1840	4110	5950

DETAILED SYLLABUS

FY 1001
ENGINEERING MATHEMATICS – I

Lecture :	4 hrs/ week	**Internal Assessment:**	30 Marks
Tutorial :	1 hr/ week	**Semester End Examination:**	70 Marks
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understand the nature of solutions of system of linear equations.
2. Apply Gauss-Jordan method, Caley-Hamilton theorem to find inverse of a matrix and Eigen vectors to find canonical form of a quadratic form.
3. Analyze the nature of infinite series.
4. Solve first order and higher order linear differential equations and use these methods to solve applied problems.
5. Explain the formation of partial differential equations and solve them.

UNIT – I

Matrices: Rank of a matrix, Elementary transformations, Echelon-form of a matrix, normal form of a matrix, Inverse of a matrix by elementary transformations (Gauss – Jordan method). Solution of system of linear equations: Non homogeneous linear equations and homogeneous linear equations. Linear dependence and linear independence of vectors.
Characteristic equation – Eigen values – Eigen vectors – properties of Eigen values. Cayley-Hamilton theorem (without proof). Inverse of a matrix by using Cayley-Hamilton theorem.

UNIT – II

Reduction to diagonal form – Modal matrix orthogonal transformation. Reduction of quadratic form to canonical form by orthogonal transformations. Nature of a quadratic form – Hermitian and skew-Hermitian matrices.

Sequences and series: Convergence of series – comparison test – D'Alemberts Ratio test – Cauchy's Root Test – Alternating series – Absolute convergence – Leibnitz's Rule.

UNIT – III

Ordinary differential equations – Formation – separable equations – exact equations – integrating factors – linear first order differential equations – Bernoulli's equation - orthogonal trajectories. Newtons Law of Cooling, Heat Flow - Linear equations of higher order with constant coefficients.

UNIT – IV

Linear dependence of solutions, method of variation of parameters – equations reducible to linear equations – Cauchy's homogeneous linear equation – Legendre's linear equation simultaneous linear equations with constant coefficients.
Partial Differential Equations: Formation of Partial Differential Equations, Solutions of a Partial Differential Equation – Equations solvable by direct integration – Linear Equation of First order.

Learning Resources:

Text Books:

1. A text book of Higher Engineering Mathematics by Dr.B.S.Grewal, 40th Edition, 2007, Khanna Publishers.

Reference Books:

1. Advanced Engineering Mathematics by Krezig., 8th Edition, 2007, John Wiley & Sons
2. Advanced Engineering Mathematics by Peter.V.O.Neil, Thomson, Canada, 7th Edition, 2011 Hardcover
3. Advanced Engineering Mathematics by R.K.Jain and S.R.K.Iyengar, 3rd Edition - Reprint, 2012, Narosa Publishers.
4. A Text book of Engineering Mathematics by N.P.Bali, Manish Goyal, 1st Edition, 2011 Laxmi Publications (P) Limited.
5. A text book of mathematics by B.V.Ramana, 6th reprint, 2008,Tata MC Graw Hill.

FY 1002P
ENGINEERING PHYSICS

Lecture :	3 hrs/ week	**Internal Assessment:**	30 Marks
Tutorial :	1 hr/ week	**Semester End Examination:**	70 Marks
Practical :	-	**Credits:**	3

Course Outcomes

1. Impart the knowledge of electricity and electromagnetism to various engineering applications.
2. Explain the wave particle dualism, matter waves and learn concepts of semiconductors, superconductors and opto-electronic devices.
3. Understand the basic principle and working of different types of lasers and optical fibres.
4. Explain nanomaterial, carbon nanotubes and their properties and applications.

UNIT – I

Electricity, Electromagnetism and Semiconductors: Gauss law in electricity (Statement and proof) and it's applications: Coulomb's law from Gauss law, spherically distributed charge, Hall effect, Biot-Savart's law: B due to a current carrying wire and a circular loop, Faraday's law of induction, Lenz's law, Induced electric fields, Gauss' law for magnetism, Maxwell equations (Qualitative treatment), Electromagnetic oscillations in LC circuit (quantitative), A.C. circuit containing series LCR circuit (Resonance condition).

Semiconductors: Carrier transport, Carrier drift, Carrier diffusion, generation and recombination process (qualitative), classification of materials based on energy diagram.

UNIT – II

Modern Physics: Dual nature of light, Matter waves and Debroglie's hypothesis, Davisson & Germer experiment, Heisenberg's uncertainty principle and its application (Non existence of electron in nucleus, Finite width of spectral lines), Classical and quantum aspects of particle. One dimensional time independent Schrodinger's wave equation, physical significance of wave function, Particle in a box (One dimension).

Optoelectronic Devices: LED, LCD, Photo emission, Photo diode, Photo transistor and Solar cell and its applications.

UNIT – III

Superconductors and Advanced Physics:

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

Advanced physics: Lasers: Spontaneous emission, stimulated emission, population inversion, Solid state (Ruby) laser, Gas (He – Ne) laser, Semiconductor (Ga As) laser, Applications of lasers, applications of Infrared radiation.

Fiber optics: Propagation of light through optical fiber, types of optical fibers, Numerical aperture, Fiber optics in communications and its advantages.

UNIT - IV

Nanotechnology: Introduction, Physical & Chemical properties. Fabrication: AFM, SEM, TEM, STM, MRFM. Production of nanoparticles: Plasma Arcing, Sol-gel, Chemical vapour deposition.

Carbon nanotubes: SWNT, MWNT. Formation of carbon nanotubes: Arc discharge, Laser ablation; Properties of carbon nanotubes, Applications of CNT's & Nanotechnology.

Learning Resources:

Text Books:

1. Physics Part-II-Halliday and Resnick, 5th Edition,2001 John wiley and sons.Inc
2. Engineering Physics – Gaur and Gupta, 8th Edition, 2008, Dhanapatrai publishers.

Reference Books:

1. Solid State Physics – S.O.Pillai, 6th Edition, 2005, New age International Limited.
2. Engineering Physics – M.Armugam, 2nd Edition, 2003, Anuradha publishers.
3. Modern engineering physics – A.S.Vasudeva, 2nd Edition, 2003, S.Chand publications
4. Engineering Physics – P.K. Palanisamy, 2nd Edition, 2010, Scitech publications.

FY 1003E
TECHNICAL ENGLISH AND COMMUNICATION SKILLS

Lecture :	2 hrs/ week	**Internal Assessment:**	30 Marks
Tutorial :	-	**Semester End Examination:**	70 Marks
Practical :	2 hrs/ week	**Credits:**	3

Course Outcomes:

1. Demonstrate in both oral and written work a discipline-specific critical facility through convincing and well-supported analysis of related arterial.
2. Demonstrate fluency in a grammatically accurate and rhetorically engaging style of writing.
3. Conceive, arrange, and articulate ideas logically and clearly.
4. Ability to produce correct and effective professional-level academic writing.
5. Understand workplace colleague's roles and responsibilities.

UNIT – I

written communication skills

This area exposes the learners to the basic tenets of writing; the style and format of different tools of written communication

(I) Description (through Paragraph Writing)
(II) Reflection (through Essay Writing)
(III) Persuasion (through indented Letter Writing)

UNIT – II

Reading Comprehension:

This area exposes the learners to the techniques of deciphering and analyzing longer texts pertaining to various disciplines of study.

(I) Types of Reading
(II) Sub skills of Reading
(III) Eye span – fixation
(IV) Reading Aloud & Silent Reading
(V) Vocalization & Sub-vocalization.

UNIT – III

A) Vocabulary and Functional English:

This area attempts at making the learners withstand the competition at the transnational technical environment so as to enable them to undertake various professional operations.

(I) Vocabulary – a basic word list of one thousand words.
(II) Functional grammar, with special focus on Common Errors in English.
(III) Idioms & Phrasal verbs.

B) **Listening and Speaking:**

This area exposes the learners to the standard expressions including stress, rhythm and various aspects of isolated elements and connected speech.

(I) The use of diphthongs
(II) Elements of spoken expression
(III) Varieties of English
(IV) Towards accent neutralization

UNIT – IV

Technical Communication Skills:

This area falls under English for Specific Purposes (ESP) which trains the learner in Basic Technical Communication.

(I) Technical Report Writing (Informational, Analytical & Special reports)

(II) Technical Vocabulary

Learning Resources:

1. Use of English – Randolph Quirk, Longman, 2nd Edition, 2004.
2. Practical English Grammar– Thomson A.J & Martinet A.V, Oxford University Press,4th Edition, 2001
3. Common Errors in English – Thomas Eliot Berry, 1st Edition, TMH, 2001.
4. Structural Patterns & Usage in English – B.S.Sarma, Poosha Series, 4th edition, 2007.
5. College Writing Skills - John Langan, 8th Edition, McGraw Hill, 2004.
6. English for Academic and Technical Purposes – Sellinkar, Larry et. al., Newbury House Publishers, 1st Edition, 1981.
7. Oxford guide to Plain English – Martin Cutts, Oxford University Press, 3rd Edition, 2004.
8. Phonetics and spoken English – V.Sethi and P.V. Dhamija, Orient Longman, 2nd Edition 2004.
9. Technical Communication- Principles and Practice- Meenakshi Raman& Sangeet Sharma, Oxford University Press, 1st Edition 2009.

FY 1004M
MECHANICS FOR ENGINEERS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 Hr/Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Solve for the resultants of any force systems.
2. Determine equivalent force systems and internal forces in axial members and support reactions.
3. Solve the mechanics problems associated with friction forces.
4. Use the equation of motion to describe the accelerated motion of a particle.
5. Analyse the forces causing the motion of a particle in rectilinear translation and curvilinear translation.

UNIT I:

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

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

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

UNIT – II

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

Friction: Introduction, Classification of friction, Laws of dry friction. Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Wedge friction.

Moment of Inertia of Plane Figures & Rigid Bodies: Moment of Inertia of a plane figure with respect to an axis in its plane and an axis perpendicular to the plane of the figure, Parallel axis theorem. Concept of Mass moment of inertia.

UNIT – III

Kinematics of Rectilinear Translation: Introduction, displacement, velocity and acceleration. Motion with Uniform acceleration.

Kinetics of Rectilinear Translation: Equations of rectilinear motion. Equations of Dynamic Equilibrium: D'Alembert's Principle. – Work and Energy, Conservation of energy.

UNIT – IV

Kinematics of Curvilinear Motion: Introduction, rectangular Components of velocity & acceleration. Normal and Tangential acceleration, Motion of projectiles.

Kinetics of Curvilinear Translation: D'Alembert's Principle in curvilinear motion-Rectangular components, Normal & tangential components - Simple problems.

Learning Resources:

Textbooks:

1. S. Timoshenko and D.H.Young, *Engineering Mechanics.* TMH
2. A.K.Tayal, *Engineering Mechanics Static's and Dynamics.* Umesh Publication.

Reference books:

1. Beer and Johnston, *Vector Mechanics for Engineers Statics and Dynamics. TMH.*
2. S.S. Bhavikatti and K. G. Rajasekharappa, *Engineering Mechanics.*
3. K.Vijaya Kumar Reddy and J Suresh Kumar, *Singer's Engineering Mechanics Static's and Dynamics*. 3 ed, BS Publications.

Web Resources:

http://openlibrary.org/books/OL22136590M/Basic_engineering_mechanics
http://en.wikibooks.org/wiki/Engineering_Mechanics
http://nptel.iitm.ac.in/video.php?courseId=1048
http://imechanica.org/node/1551
http://emweb.unl.edu/

FY 1005
INTRODUCTION TO COMPUTING

Lecture :	2 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	2

Course Outcomes:
1. Know the basic components of the computer and working of each device.
2. Understand the representation of data in computer.
3. Know the difference between Assembly and High level programming Languages.
4. Design Algorithms and Flowcharts
5. Understand the functions of Operating System.
6. Know the fundamentals of Computer Networking.

UNIT I:

Introduction: Algorithms, Simple model of a computer, Characteristics of a computer, Problem solving using computers.

Data Representation: Representation of characters in computer, representation of Integers, fractions, number systems, binary system, octal system, hexadecimal system, organizing of memories, representation of numbers, alpha numeric characters, error detection codes.

Computer Generation and Classification: Computer generations, Classifications of computers.

UNIT II:

Computer Architecture: Interconnection of units, Input Units: Keyboard, VDU, OMR, MICR, OCR and BAR Coding. Output Units: Types of Printers, Plotters,

Computer memory: Memory cell, Organization, Read-Only-Memory,Magnetic Hard Disk, CDROM.

UNIT III:

Computer Languages: Why programming Language, Assembly language, Higher Level Programming Languages, Compiling High Level Languages.

Algorithm and Flowcharting: Introductory programming techniques, Algorithms, Structure of Algorithms, Types of Algorithms, Structure of a Flowchart, Terminal Symbol Off page connector symbol, Modification Symbol, Group instruction symbol, Connection symbol, Drawing efficient flowcharts.

UNIT – IV

Introduction to operating system, functions of operating system, basic introduction to DOS, LINUX, WINDOWS –XP.

Definition and Applications of Computer Network, LAN, MAN and WAN, Intranet, Internet.

Learning Resources:

Text Book:

1. V. Rajaraman, *Fundamentals of Computers*. 4 ed, PHI.

Reference Books:

1. S. Govindaraju, M. Chandrasekaran, A. Abdul Haq and T. R. Narayanan, *Introduction to Computer Science*. Wiley Eastern Limited
2. PK Sinha, *Computer Fundamentals*. BPB Publications.

FY 1051P
ENGINEERING PHYSICS LABORATORY

Lecture :	---	**Internal Assessment:**	25
Tutorial :	---	**Final Examination:**	50
Practical :	3 Hrs/week	**Credits:**	2

Course Outcomes:

1. Impart the knowledge of electricity and electromagnetism to various engineering applications.
2. Explain the wave particle dualism, matter waves and learn concepts of semiconductors, superconductors and opto-electronic devices.
3. Understand the basic principle and working of different types of lasers and optical fibres.
4. Explain nanomaterial, carbon nanotubes and their properties and applications.

Minimum of 8 Experiments to be Completed out of the following

1. AC Sonometer – Verification of Laws
2. Sensitive Galvonometer –Figure of merit
3. Photo tube-study o f V-I Characteristics,determination of work function
4. Torsional Pendulum-Rigidity modulus calculation
5. Variation of magnetic field along the axis of current-carrying circular coil
6. Fibre Optics-Numerical aperture calculation
7. Compound pendulum-Measurement of 'g'
8. Solar cell – Determination of Fill Factor
9. Losses in Optical Fibres
10. LCR circuit-Resonance
11. Newton's Rings-Radius of curvature of plano convex lens
12. Hall effect- Study of B & I Variation
13. Photovoltaic cell-Energy gap
14. Measurement of thickness of a foil using wedge method
15. Diffraction grating-Measurement of wavelength

Learning Resources:

1. Indu Prakash and Rama Krishna, *A text book of Practical Physics.* Kitab Mahal.
2. J.C. Mohanty and D.K. Mishra, *University Practical Physics.* Kalyani Publishers.
3. D P Khandelwal, *A Laboratory Manual of Physics.* Vani Educational Books.
4. Dr. Y. Aparna, Dr. K. Venkateswara Rao, *Laboratory Manual of Engineering Physics*. VGS

FY 1052
BASIC COMPUTING LABORATORY

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:
1. Know the basic components of the computer and working of each device.
2. Understand the representation of data in computer.
3. Know the difference between Assembly and High level programming Languages.
4. Design Algorithms and Flowcharts
5. Understand the functions of Operating System.
6. Know the fundamentals of Computer Networking.

LIST OF PROGRAMS

1. Execution of Simple DOS Commands COPY, REN, DIR, TYPE, CD, MD, BACKUP
2. Create your Bio-Data in MSWord giving Educational and Personal Details.
3. Create an Excel Worksheet entering marks in 6 subjects of 10 Students. Give ranks on the basis of Total marks and also generate graphs.
4. Create a Database in MS-Access for Storing Library Information. Ex Fields: Book name, author, book code, subject, rack no, price, volumes Enter Sample data of 15 books in to database.
5. Design a PowerPoint presentation with not less than 10 slides on any of your interesting topic. Ex: Literacy, Freedom Struggle, Siddhartha Engineering College, Evolution of Computers, Internet etc.
6. Register for new Email address with any free Email provider and send Email using Internet to your friends, parents, teachers etc.
7. Search Internet using Search Engines like Google.com, Yahoo.com and ask.com for files, pictures, power point presentations etc. Downloading files, EBooks, EContent from Internet.
8. Practice in installing a Computer System by giving connection and loading System Software and Application Software.
9. Accessing and Changing BIOS settings.
10. Installing Windows XP operating System.
11. Assembling of PC.
12. Disassembling of PC.

Learning Resources:

Text Books :

1. *Familiarity With the computer, Software, Internet and their uses*
2. Alexis Leon and Mathews Leon, *Introduction to Computers with MSOffice*, TATA McGraw HILL.
3. Alexis Leon and Mathews Leon, *Internet for Every One*. Vikas Publishing House Pvt. Ltd.

Reference Books:

1. SK Basandra, *Computers Today*, Galgotia Publication Pvt. Ltd.
2. Leon and Leon, *Fundamentals of Information Technology*. Vikas Pub House Pvt. Ltd.
3. Anushka Wirasinha, *Surviving in an E-World*. PHI.

FY 1053G
ENGINEERING GRAPHICS

Lecture :	2 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	6 hrs/ Week	**Credits:**	5

Course Outcomes:
1. Explain and demonstrate the use of freehand drawing techniques
2. Draw a two-dimensional view of engineering components according to a selected scale.
3. Explain the principles of first and third angle orthographic projection.
4. Interpret and draw an oblique projection of a single engineering component.

UNIT – I

General: Use of Drawing instruments, Lettering - Single stroke letters, Dimensioning, Representation of various type lines - Geometrical Constructions.

Scales: Construction and use of plain and diagonal scales.

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

Curves: Curves used in Engineering practice - Cycloidal curves - Cycloid, Epicycloid and Hypocycloid; Involute of circle.

UNIT – II

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

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

UNIT – III

Projections of Solids: Projections of simple solids such as Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

Sections of Solids: Sections of solids such as Cubes, Prisms, Pyramids, Cylinders and Cones. true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).

UNIT – IV

Development of Surfaces: Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones.

Isometric Projections: Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only). Introduction to Isometric Projections to Orthographic Projections.

Learning Resources:

Text Book:

1. N.D. Bhatt and V.M. Panchal, *Elementary Engineering Drawing*. 49 ed, Charotar Publishing House, 2006.

Reference Books:

1. Prof. K. L. Narayana and Prof. P. Kannaiah, *Text Book on Engineering Drawing*. 2 ed Scitech Publications(India) Pvt. Ltd. 2006.

Web Resources:

http://www.youtube.com/watch?v=XCWJ_XrkWco
http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html#isodrawing

FY 2001
ENGINEERING MATHEMATICS – II

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understand Mathematical concepts of limit continuity, derivative and apply them for Taylor series expansion of functions, curvature and extremum of functions.
2. Acquire knowledge of double and triple integrals in evaluation of area, volumes of plane and solid regions.
3. Understand the principles of application in vector functions.
4. Understand concept of interpolation and apply it to construct a new function.

UNIT – I

Differential Calculus: Limit, continuity, differentiability – Rolle's Theorem – Lagrange's Mean Value Theorem – Taylor's Series (without proof) – Maxima and Minima of functions of two variables – Lagrange's multipliers – Curvature – radius of curvature – Centre of curvature.

UNIT – II

Integral Calculus: Double integrals – Evaluation in Cartesian and Polar coordinates – Changing the order of integration – Evaluation of areas using double integrals – Evaluation of triple integrals – Evaluation of volume using triple integrals, change of variables.

UNIT – III

Vector Calculus: Scalar and Vector fields – Differentiation of scalar and vector point functions – gradient of Scalar fields – directional derivatives – divergence and curl of vector fields – vector identities.

Line and surface integrals – Green's theorem in a plane (without proof) – Gauss' divergence theorem (without proof) – Stoke's theorem (without proof).

UNIT – IV

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

Learning Resources:

Text Books:

1. Dr. B. S. Grewal, *A text book of Higher Engineering Mathematics.* 40 ed. Khanna Publishers.
2. N.P.Bali and Manish Goyal, *A Text book o Engineering Mathematics.* Laxmi Publications (P) Limited.
3. B.V.Ramana, *A text book of Mathematics.* Tata MC Graw Hill.

Reference Books:

1. Krezig, *Advanced Engineering Mathematics.*, 8 ed, John Wiley & Sons.
2. Peter.V.O.Neil, *Advanced Engineering Mathematics.* Canada: Thomson.
3. R.K.Jain and S.R.K.Iyengar, *Advanced Engineering Mathematics.* 3 ed, Narosa Publishers.

FY 2002C
ENGINEERING CHEMISTRY

Lecture :	4 hrs/ week	**Internal Assessment:**	30 Marks
Tutorial :	1 hr/ week	**Semester End Examination:**	70 Marks
Practical :	-	**Credits:**	3

Course Outcomes:
1. Understand the role of boilers in industry.
2. Explain the technology of purification of sea water.
3. Implement the mechanism of conducting polymers.
4. Understand the mechanisms of global problems like corrosion.
5. Explain the method of Spectroscopy.

UNIT - I

Water technology: Water treatment for drinking purpose - sedimentation, coagulation, filtration, various methods of disinfection and concept of break-point chlorination.

Boiler troubles: scales, sludges, caustic embrittlement and boiler corrosion – causes and prevention.

Desalination of brakish water: Principle and process of electrodialysis and reverse osmosis,

Polymer technology: Conducting polymers – Examples, classification-intrinsically conducting polymers and extrinsically conducting polymers- mechanism of conduction of undoped, p-doped and n-doped polyacetylenes – applications of conducting polymers – structure, importance and applications of polyaniline.

UNIT - II

Electrochemistry and Electrochemical energy systems

Reference electrodes: Calomel electrode, silver-silver chloride electrode, quinhydrone electrode and glass electrode, determination of pH using glass electrode, concept of concentration cells. Conductivity – Conductometric titrations and Potentiometric titrations.

Electrochemical energy systems: Types of electrochemical energy systems – Storage cells – Zinc-air battery, Ni-Cd battery, Lithium batteries – Li/MnO_2, $Li/SOCl_2$, Li/TiS_2 and $Li_xC/LiCoO_2$ – Advantages of lithium batteries – Electrochemical sensors – Principle, working and applications – Simple introduction to the terms – polarization, decomposition potential and overvoltage.

UNIT – III

Corrosion and its control

Introduction – chemical and electrochemical corrosion – electrochemical theory of corrosion – corrosion due to dissimilar metals, galvanic series – differential aeration corrosion – concept of passivity.

Forms of corrosion –pitting, crevice, stress corrosion cracking and microbiological corrosion. Factors affecting corrosion: Relative anodic and cathodic areas, nature of corrosion product, concentration of D.O., pH and temperature.

Protection methods: Cathodic protection (impressed current and sacrificial anode), anodic protection, corrosion inhibitors – types and mechanism of inhibition.

Electrolytic methods in electronics: Electroplating – principle and process of electroplating of copper on iron – Electroless plating – principle and electroless plating of copper, Self assembled monolayers.

UNIT - IV

Instrumental techniques in chemical analysis

Introduction of spectroscopy – interaction of electromagnetic radiation with matter.

UV-visible (electronic) spectroscopy: Frank-Condon principle – types of electronic transitions. Lambert-Beer's law, numericals (simple substitution) – Instrumentation-Single beam UV-visible spectrophotometer. Applications of UV-visible spectroscopy: qualitative analysis, quantitative analysis, detection of impurities, determination of molecular weight and dissociation constants.

Infrared (vibrational) spectroscopy: Principle of IR spectroscopy, types of molecular vibrations-stretching and bending vibrations, vibrational spectra diatomic molecules, selection rule for harmonic vibrational transition – Instrumentation. Applications of IR spectroscopy: Determination of force constant – numericals (simple substitution), detection of impurity and identification of nature of hydrogen bonding.

Learning Resources:

Text Books:

1. Engineering Chemistry, *P.C. Jain*, 15th edition, 2005, Dhanpat Rai Publishing Company (P) Limited, New Delhi.

Reference Books:

1. A text book of Engineering Chemistry, S.S. Dara, 11th Reprint, 2008, S. Chand & Company Limited, New Delhi.
2. A text book of Engineering Chemistry, Shashi Chawla, 3rd Edition, Dhanpat Rai & Company Pvt. Ltd., New Delhi.
3. Essentials of Physical Chemistry, B.S. Bahl and G. D. Tuli, 2nd Edition,S.Cahand& Company
4. Text book of analytical chemistry, Y.Anjaneyulu, K. Chandrasekhar and Valli Manickam, 1st Edition, 2006, Pharma Med press.
5. Engineering Chemistry, O. G. Palanna, 1st Edition, 2009 Tata McGraw Hill Education Pvt. Ltd., New Delhi.

Web References:

1. http://www.cip.ukcentre.com
2. http://corrosion-doctors.org
3. http://chemwiki.ucdavis.edu
4. http://teaching.shu.ac.uk
5. http://www.prenhall.com

FY 2003B
BASICS OF CIVIL AND MECHANICAL ENGINEERING

Lecture :	4 hrs/ week	**Internal Assessment:**	30 Marks
Tutorial :	--	**Semester End Examination:**	70 Marks
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understanding about various building materials used in construction industry, road transportation, and bridges.
2. Explain the working of power plants, refrigeration, air conditioning and IC engines.
3. Understand the basic principles of surveying and structures of bridges and roads.

Part – A Civil Engineering

UNIT – I

Simple stress and strains: Definition of Mechanics- External and Internal forces-Stress and Strain-Elasticity and Hook's Law- Relations between elastic constants.

Civil Engineering Materials: Bricks, Stones, Cement, Steel and Cement Concrete.

Sub-structure and Super structure: Soil, Types of Foundations, Bearing capacity of Soil, Brick Masonry, Stone Masonry, Flooring, Roofing and Plastering.

UNIT – II

Surveying: Objectives, Types, Principles of Surveying. Measurement of distances, angles – Levelling. **Civil Engineering Structures:** Roads- Classification, Cross section of roads.

Bridges- Necessity, Components, Classification.

Dams- Purpose, Classification

Part – B Mechanical Engineering

UNIT – III

Basic Manufacturing Methods : Principles of casting , green sand moulds , Advantages and applications of casting ; Principles of gas welding and arc welding, Soldering and Brazing ; Hot working – hot rolling , Cold working – cold rolling ; Description of basic machine tool- Lathe – operations – turning, threading, taper turning and drilling ;

Power Transmission : Introduction to belt and gears drives , types of gears , Difference between open belts and cross belts, power transmission by belt drives ; (theoretical treatment only) .

UNIT – IV

Power Plants : Introduction , , working principle of nuclear power plant and steam power plant, Alternate sources of energy – solar , wind and tidal power;

Refrigeration& Air Conditioning : Definition – COP , Unit of Refrigeration , Applications of refrigeration system, vapour compression refrigeration system , simple layout of summer air conditioning system ;

IC Engines : Introduction , Main components of IC engines , working of 4-stroke petrol engine and diesel engine , working of 2- stroke petrol engine and diesel engine , difference between petrol and diesel engine , difference between 4- stroke and 2- stroke engines.

Learning Resources:

Text Books

1. **Basic Civil Engineering** by M. S. Palanichamy, 3rd Edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi. 2002
2. **Basic Mechanical Engineering,** by T S Rajan, 3rd Edition, New Age International Ltd. First Reprint 1999.

References:

1. **Refrigeration and Air Conditioning** by Zakria Baig, Radiant Publishing House, Hyd.
2. **Basic Civil and Mechanical Engineering** by G.Shanmugam and M S Palanichamy, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
3. **Thermal Engineering,** by R Rudramoorthy, 4th reprint 2006,Tata McGraw-Hill Publishing Company Ltd. New Delhi. (2003)

Web references :

1. www.result.khatana.net
2. www.engiblogger.com
3. www.indiastudychannel.com

FY 2004EN
ENVIRONMENTAL SCIENCE

Lecture :	3Hrs/Week	**Internal Assessment:**	25
Tutorial :	1 Hr/Week	**Final Examination:**	75
Practical :	--	**Credits:**	3

Course outcomes :

1. Explain the natural resources and their management.
2. Understanding the Classification and functioning of Ecosystems.
3. Remembering the Importance of biodiversity and its conservation.
4. Understanding the problems related to environmental pollution and management.
5. Apply the role of information technology, Analyze social issues and Acts associated with environment.

UNIT – I

Introduction: Definition, Scope and Importance of Environmental Sciences Present global issues

Natural resources management: **Forest resources** – use and over exploitation, Mining and Dams their effects on Forest and Tribal people,

Water resources: Use and over utilization of surface and ground water, Floods, Droughts, Water logging and Salinity, Water conflicts.

Energy resources- Energy needs, renewable and Non renewable Energy sources, use of alternate Energy sources, Impact of Energy use on Environment;

UNIT – II

Ecosystems: Introduction, characteristic features, structure and functions of Ecosystem – Forest, Grass land, Desert, Aquatic.

Biodiversity and Conservation:

Value of Biodiversity- Consumptive and Productive use, Social, Ethical, aesthetic and option values, Bio-geographical classification of India- India as a mega diversity Habitat; Threats to Biodiversity- Hot spots, Habitat Loss, Poaching of Wildlife, loss of species, seeds, etc., In-situ and Ex- situ conservation of Biodiversity.

UNIT – III

Environmental Pollution

Causes, effects and control measures of Air pollution, Indoor Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution,

Solid waste management Urban, Industrial, nuclear and e-waste management

UNIT – IV

Information technology and Environment: Role of information technology in environmental sciences

Social issues and Environment: Effects of human activities on the Quality of Environment: Urbanization, Transportation, Industrialization, Green revolution; Water scarcity and Ground

water depletion, Population growth and Environment: Environmental Impact Assessment
Environmental Acts- Water (Prevention and control of pollution) act, air (prvention and control of pollution) act, Environmental Protection Act, Forest conservation act,

Learning Resources

Text Books:

1. Anjaneyulu Y. *Introduction to Environmental Sciences*. B S Publications PVT Ltd.
2. Anjireddy. M, *Environmental Science and Technology*, BS Publications PVT Ltd.
3. Benny Joseph, *Environmental Studies*, The Tata McGraw- Hill publishing , 2005
4. P.Venu Gopala Rao, *Principles of Environmental Science and Engineering.*, Prentice-Hall of India Pvt. Ltd., 2006.
5. Santosh Kumar Garg, Rajeswari Garg and Rajani Garg, *Ecological and Environmental Studies.* Khanna Publishers, 2006.
6. Kurian Joseph & R Nagendran, *Essentials of Environmental Studies*. Pearson Education publishers, 2005

Reference Books:

1. A.K Dee – *Environmental Chemistry*, New Age India Publications
2. Bharucha Erach- *Biodiversity of India*. Mapin Publishing Pvt.Ltd..

FY 2005
PROGRAMMING IN C

Lecture :	3 Hrs/week	**Internal Assessment:**	30
Tutorial :	1 Hr/week	**Final Examination:**	70
Practical :	---	**Credits:**	3

Course Outcomes:
1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Implement different Operations on arrays.
4. Use functions to solve the given problem.
5. Understand pointers, structures and unions.
6. Implement file Operations in C programming for a given application.

UNIT – I

Constants, Variables and Data Types: Character Set, , Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning values to Variables, Declaring variable as a constant.

Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Increment and decrement operators, Conditional Operators, Bitwise Operators Special Operators. Precedence of Arithmetic Operators.

Managing Input and Output Operations: Introduction, reading a character, writing a character, formatted I/O.

UNIT – II

Decision Making and Branching: Introduction, Decision Making with IF statement. Simple IF Statement, the IF ELSE Statement, Nesting of IF ELSE Statement. The ELSE IF Ladder. The Switch Statement, the GOTO Statement, break and continue

Decision Making and Looping: Introduction, the WHILE statement, the DO Statement, the FOR statement, Jumps in Loops.

UNIT – III

Arrays: Introduction, One Dimensional Arrays, Declaration of one dimensional arrays, Initialization of one dimensional arrays, two-dimensional arrays, initializing two dimensional arrays, multi dimensional arrays.

Character Arrays and Strings: Introduction, Declaring and Initializing string variables. Reading strings from Terminal. Writing string to screen. Arithmetic operations on characters.

Putting strings together, Comparison of two strings, string handling functions.

User Defined Functions: Introduction, user defined functions, storage classes, a multi function program, elements of user defined functions, definition of functions, return values and their types, function calls, function declaration, parameter passing techniques, recursion.

UNIT – IV

Structures and Unions: Introduction, defining a structure, declaring structure variables, accessing structure members, structure initialization, operations on individual members, Unions.

Pointers: Introduction, Understanding Pointers, accessing the address of the variable, declaring pointer variables, Initialization of pointer variables. Accessing a variable through its pointer.

File Management in C: Introduction, defining and opening a file, closing a file, Input/Output operations on files, pre processor directives and macros.

Learning Resources:

Text Book:

1. E. Balagurusamy, *Programming in ANSI C*. 4 ed., TMH Publishers

Reference Books:

1. Byron Gottfried, *Programming with C* (Schaum's Outlines) Tata Mcgraw-Hill.
2. Kernighan B W and Ritchie O M, *The C programming Language.* PHI.
3. K R Venugopal & Sudeep R Prasad, *Programming with C*. TMH.

Electronic Materials, Websites

- www.cprogramming.com
- http://en.wikiversity.org/wiki/Topic:C
- http://www.learn-c.com

FY 2006
PROFESSIONAL ETHICS

Lecture :	2Hrs/week	**Internal Assessment:**	30 Marks
Tutorial :	---	**Semester End Examination :**	70 Marks
Practical :	--	**Credits:**	2

Course outcomes :

1. Understand different approaches to legal ethics.
2. Debate current ethical issues and think critically about existing practices.
3. Apply ethical rules to practical scenario.
4. Understand the moral and characterization to be an example of faith, character and high professional ethics.

UNIT – I

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

UNIT –II

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

UNIT –III

Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

Safety, Responsibilities and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies.

Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT – IV

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

Learning Resources:

Text books

1. Mike Martin and Roland Schinzinger, "Ethics in engineering", 3rd Edition McGraw Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

FY 2051C
ENGINEERING CHEMISTRY LABORATORY

Lecture :	---	**Internal Assessment:**	25 Marks
Tutorial :	---	**Semester End Examination:**	50 Marks
Practical :	3 Hrs/week	**Credits:**	2

Course Outcomes:
1. Understand the role of boilers in industry.
2. Explain the technology of purification of sea water.
3. Implement the mechanism of conducting polymers.
4. Understand the mechanisms of global problems like corrosion.
5. Explain the method of Spectroscopy.

List of Experiments

1. Determination of total alkalinity of water sample
   a) Standardisation of HCl solution
   b) Determination of total alkalinity
2. Determination of chlorides in water sample
   a) Standardisation of $AgNO_3$ solution
   b) Determination of chlorides in the water sample
3. Determination of hardness of water sample
   a) Standardization of EDTA solution
   b) Determination of total hardness of water sample
4. Determination of available chlorine in bleaching powder
   a) Standardisation of sodium thiosulphate
   b) Determination of available chlorine
5. Estimation of Mohr's salt – Dichrometry
   a) Standardization of $K_2Cr_2O_7$ solution
   b) Estimation of Mohr's salt
6. Estimation of Mohr's salt – Permanganometry
   a) Standardization of $KMnO_4$ solution
   b) Estimation of Mohr's salt
7. Conductometric determination of a strong acid using a strong base
8. pH metric titration of a strong acid vs. a strong base
9. Determination of corrosion rate of mild steel in the absence and presence of an inhibitor
10. Electroplating of Nickel on iron article
11. Chemistry of Blue Printing
12. Colorimetric determination of potassium permanganate
13. Preparation of Phenol-Formaldehyde resin
14. Spectrophotometry

Learning Resources

1. "Experiments in Applied Chemistry" by Sunitha Rattan, 2nd Edition 2003, S.K.Kataria & Sons
2. "Laboratory Manual on Engineering Chemistry" by S.K.Bhasin and Sudha Rani, 2nd Edition 2002, Dhanpak Rai publishing company, New Delhi.

FY 2052
C-PROGRAMMING LABORATORY

Lecture :	---	**Internal Assessment:**	25
Tutorial :	---	**Final Examination:**	50
Practical :	3 Hrs/week	**Credits:**	2

Course Outcomes:
1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Implement different Operations on arrays.
4. Use functions to solve the given problem.
5. Understand pointers, structures and unions.
6. Implement file Operations in C programming for a given application

List of Lab Exercises

WEEK-I
1) Write a C-Program to perform the simple arithmetic operations.
2) Write a C-Program to calculate area and circumference of the triangle and rectangle.
3) Write a C-Program to swap the two numbers without using third variable.

WEEK-II
1) Write a C-Program to find the biggest of the given three numbers.
2) Write a C-Program to find the roots of the given quadratic equation.
3) Write a C-Program to implement the calculator application (using switch)

WEEK-III
1) Write a C-program to convert given Decimal number to Binary number.
2) Write a C-Program to check the given number is Palindrome or not.
3) Write a C-Program to check the given Armstrong or not.

WEEK-IV
1) Write a C-Program to find the sum first N natural numbers.
2) Write a C-Program to generate the Fibonacci series.
   Ex: 0,1,1,2,3,5,8,13,21,n^i , n^{i+1} , $n^i + n^{i+1}$
3) Write a C-Program to print the prime numbers between 1 to N.

WEEK-V
1) Write a C-Program to find the biggest and smallest numbers in the given array.
2) Write a C-Program to find the sum, mean and standard deviation by using arrays.

WEEK-VI
1) Write a C-program to remove duplicate elements in the given array.
2) Write a C-program to insert an element at the specified location of the array.
3) Write a C-program to store the polynomial using arrays and differentiate it.

WEEK-VII
1) Write a C-Program to perform the Matrix addition, subtraction and multiplication using arrays.
2) Write a C-Program to print the transpose of the given Matrix without using the second matrix.

WEEK-VIII
1) Write a C-Program to find the given element is exist in the given list or not.
2) Write a C-Program to arrange the given elements in the ascending order.

WEEK-IX

1) Write a C-Program to check the given string is Palindrome or not.
2) Write a C-Program to perform the following operations with and without using String handling functions
   i) Length of the string ii) Reverse the given string
   ii) Concatenate the two strings iv) Compare the two strings

WEEK-X

1) Write a C-Program to swap the two number using call by value and call by reference.
2) Write a C-Program to find the factorial of the given number using recursion.
3) Write a Program to find NCR using functions.
4) W rite a Program to find Mean and standard deviation of a given set of numbers.(Define functions for mean and standard deviation)

WEEK-XI

1) Write a 'C' program to read name of the student, roll number and marks obtained in subjects from keyboard and print name of the student, roll number, marks in 3 subjects, and total marks by using structures concept.
2) Write a C-program to count number of characters, spaces, words and lines in given file.
3) Write a 'C' Program to copy the contents of one file into another file.

Learning Resources

Text Book:

1. E. Balagurusamy, *Programming in ANSI C*. 4 ed., TMH Publishers

Reference Books:

1. Byron Gottfried, *Programming with C* (Schaum's Outlines) Tata Mcgraw-Hill.
2. Kernighan B W and Ritchie O M, *The C programming Language.* PHI.
3. K R Venugopal & Sudeep R Prasad, *Programming with C*. TMH

FY 2053W
BASIC WORKSHOP

Lecture : --	**Internal Assessment:**	25 Marks
Tutorial : -	**Semester End Examination:**	50 Marks
Practical : 3 hrs/ week	**Credits:**	2

List of Experiments:

1. Carpentry

To make the following jobs with hand tools

a) Lap joint
b) Lap Tee joint
c) Dove tail joint
d) Mortise & Tenon joint
e) Cross-Lap joint

2. Welding using electric arc welding process / gas welding.

The following joints to be welded.

a) Lap joint
b)Tee joint
c)Edge joint
d)Butt joint
e)Corner joint

3. Sheet metal operations with hand tools.

a) Saw edge
b) Wired edge
c) Lap seam
d) Grooved seam
e) Funnel

4. House wiring

a) To connect one lamp with one switch
b) To connect two lamps with one switch
c) To connect a fluorescent tube
d) Stair case wiring
e) Go down wiring

Learning Resources:

Reference Books:

1. Kannaiah P. & Narayana K. C., "Manual on Work Shop Practice", Scitech Publications, Chennai.1999

CS 3001
ENGINEERING MATHEMATICS – III

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understand and solving the engineering problems. Apply Laplace transforms and Fourier Transforms to evaluate indefinite integrals and Engineering problems
2. Analyse general periodic functions in the form of an infinite convergence series of sines & cosines.
3. Solve algebraic, transcendental, system of equations and definite integrals numerically.
4. Solve initial and boundary value problems numerically.
5. Understand the basic knowledge of computational techniques for formulating.

UNIT I:

LAPLACE TRANSFORMS: Definition and basic theory – Linearity property – condition for existence of Laplace transform. First & Second Shifting properties, Laplace Transform of derivatives and integrals; Unit step functions, Dirac delta-function. Differentiation and Integration of transforms, Convolution Theorem, Inversion. Periodic functions. Evaluation of integrals by Laplace Transform. Transforms of periodic function. Unit impulse function (Dirac delta function). Applications to differential equations with constant coefficients, variable coefficients..

UNIT II:

FOURIER SERIES: Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, odd and even functions, Expansions of odd and even periodic functions, Half - range series, Parseval's formula, complex form of Fourier series.

UNIT III:

FOURIER SERIES : Practical harmonic analysis.

FOURIER TRANSFORMS: Introduction, Definition, Fourier integrals, Fourier sine and cosine integrals - complex form of Fourier integrals. Fourier transforms, Fourier sine and cosine transforms - Finite Fourier sine and cosine transforms, Fourier transforms of the derivatives of a function.

UNIT – IV

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

NUMERICAL DIFFERENTIATION AND INTEGRATION : Finding first and second

order differentials using Newton's formulae. Trapezoidal and Simpsons 1/3rd Rule, Numerical solutions of ordinary and partial differential equations, Euler's method, Taylor's series method Picard's method. Runge - Kutta method of 4th order, Predicator and Corrector method, Milne's method, Adams - Bashforth method (for first order equations only). Boundary value problems, Solution of Laplace's and Poisson's equations by iteration.

Learning Resources:

Text Book:

1. B.S. Grewal, *Higher Engineering Mathematics.* 37 ed, Khana Publishers.

Reference Book:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*. 8 ed, Wiley publishers.
2. Jain Iyengar, *Advanced Engineering Mathematics*, 3 ed, Narosa Publishers.
3. B.V.Ramana, *A text book of Mathematics,* Tata MC GrawHill.
4. N.P.Bali, Manish Goyal, *Engineering Mathematics,* 7 ed, Lakshmi Publications(U-1,2,3)
5. S.S.Sastry, *Introductory Methods of Numerical Analysis*(U-IV)

CS 3002
BASIC ELECTRICAL ENGINEERING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Identify the basic elements of the electrical engineering.
2. Understand the basic theorems in Electrical Engineering.
3. Understand the basic operation of transformers and various electrical machines.

UNIT I:

Introduction to Electrical Engineering: Electric current, potential and potential difference, electromotive force, electric power, ohm's law, basic circuit components, electromagnetism related laws, Magnetic field due to electric current flow, force on a current carrying conductor placed in a magnetic field, Faradays laws of electromagnetic induction. Self-inductance and mutual inductance, Types of induced e.m.f, Kirchhoff's laws. Simple problems.

Network Analysis: Basic definitions, types of elements, types of sources, resistive networks, inductive networks, capacitive networks, and series parallel circuits, star delta and delta star transformation (simple problems on above topics).

UNIT II:

Network theorems (only on DC and independent sources) - Superposition, Thevenins's, Maximum power transfer theorems and simple problems.

Alternating Quantities : Principle of ac voltages , waveforms and basic definitions, relationship between frequency, speed and number of poles, root mean square and average values of alternating currents and voltage, form factor and peak factor, phasor representation of alternating quantities, the 'j' operator and phasor algebra, analysis of AC circuits with single basic network element, single phase series circuits, single phase parallel circuits, single phase series parallel circuits, power in ac circuits.

UNIT III:

Transformers : Principles of operation, Constructional Details, Ideal Transformer and Practical Transformer, EMF equation, Losses, Transformer tests (OC and SC), efficiency and regulation calculations (All the above topics are only elementary treatment and simple problems)

DCMachines:

DC Generator: Principle of operation of dc generator, lap and wave windings, EMF equation of a dc generator (Simple problems on e.m.f.).

DC Motor: principle of operation of DC motor, back emf, Torque equation (only theory).

UNIT – IV

A.C Machines:

Three phase induction motor: construction and principle of operation, slip and rotor frequency.

Alternator: Principle of operation of AC generator, e.m.f. equation (Simple problems on e.m.f.), regulation by synchronous impedance method.

Learning Resources:

Text Books:

1. T K Nagasarkar, and M.S. Sukhija, *Basic Electrical Engineering*, Oxford University Press.
2. M.S.Naidu and S. Kamakshiah, *Basic Electrical Engineering*. TMH.

Reference Books:

1. D P Kothari and I.J. Nagrath, *Theory and solutions of Basic Electrical Engineering.* PHI.
2. B L Thereja, *Electrical Technology.*
3. David V. Kerns, JR. J. David Irwin, *Essentials of Electrical and Computer Engineering.* Pearson

CS 3003
DISCRETE MATHEMATICAL STRUCTURES

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Analyze the statements presented in DNF and determine their validity.
2. Examine the validity of argument by using propositional and predicate calculus.
3. Apply basic counting techniques to solve the combinatorial problems.
4. Apply sets, relations and digraphs to solve applied problems.
5. Understand the basic concepts of graph theory and some related theoretical problems.

UNIT I:

Fundamentals of Logic: Propositions, Connectives, Propositional functions, Truth tables, Tautology, Contradiction, Logical equivalences, Normal forms, Logical inferences, Methods of proof of an implication,

First Order Logic: Predicate, Quantifiers, Rules of Inference for Quantified Propositions.

UNIT II:

Basics of Counting: Sum and Product rules, indirect counting, One to One correspondence, Combinations and Permutations, Enumerating Combinations and Permutations with and without repetitions

Advanced Counting Techniques: Generating function of Sequences, Recurrence relations, Solving recurrence relations-Substitution-Generating functions-The method of Characteristic roots, Solution of In-homogeneous recurrence relations

UNIT III:

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

UNIT – IV

Basic concepts, Sum of degrees theorem, Isomorphism and sub graphs, Planar graphs, Euler's formula, Multi graphs and Euler circuits, Hamiltonian graphs, Grin-bergs theorem, Graph coloring, Chromatic numbers

Learning Resources:

Text Books:

1. Mott, Kandel and Baker, *Discrete Mathematics for Computer Scientists & Mathematicians.* PHI
2. Trembly J P and Manohar P, *Discrete Mathematical Structures with Applications to Computer Science*. TMH.

Reference Books:

1. Rosen, *Discrete Mathematics and its Applications.* TMH.
2. Malik and Sen, *Discrete Mathematical Structures : Theory and Applications.* Thomson

CS 3004
DATA STRUCTURES

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Explain fundamental concepts of Data structures, space complexity and time complexity.
2. Design linear data structures stacks, queues and linked lists.
3. Design nonlinear data structures trees and Graphs, and implement their operations.
4. Apply appropriate data structure for a given application.
5. Implement different searching and sorting techniques.
6. Compare different searching and sorting techniques.

UNIT I:

Introduction: Basic Concepts, Algorithm Specification Data Abstraction, Performance Analysis-Time complexity, Space complexity.

Stacks: Definition and examples, Representing stacks, Applications: Infix, Postfix and Prefix, Recursion, Towers of Hanoi problem.

Queues: Queue and Its Sequential Representation**,** Queue as an abstract data type, implementation of queues, insert operation, circular queue, implementation and operations.

Linked lists: Singly Linked Lists and Chains, Representing Chains, linked stacks and queues, polynomials, Doubly Linked List, Circularly Linked List, Operations on a Circular Linked List. Insertion, deletion, traversal.

UNIT II:

Trees: Introduction: Terminology, Representation of Trees

Binary Trees: Properties of binary trees, binary tree representation, Complete Binary Tree, Expression trees construction and evaluation.

Binary Tree Traversals: Inorder, Preorder and Postorder – recursive and non-recursive.

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

UNIT III:

Graphs: Terminology, Graph Representations: Adjacency Matrix, Adjacency List

Elementary Graph Operations: Depth First Search and Breadth First Search, Spanning Trees: Prims and Kruskals algorithms.

Shortest Paths and Transitive Closure: Dijsktshtra's Algorithm, Warshal's Algorithm, Floid's Algorithm.

UNIT – IV

Efficient Binary and Multi Search Trees: AVL trees- rotations, insertion and deletion, Introduction to m-way Search Trees, B Trees-insertion and deletion.

Searching: Sequential search, Binary Search, Comparison and analysis.

Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort, Practical consideration for Internal Sorting.

Hashing: Hash Functions, Collision Resolution Strategies

Learning Resources

Text Books:

1. Horowitz Sahni and Anderson-Freed *Fundamentals of Data Structures in C.* 2 ed, Universities Press.
2. Yedidyah Langsam , Moshe J. Augenstein and Aaron M. Tenenbaum, *Data Structures using C and C++*. 2 ed, Pearson Education.

Reference Books:

1. Mark Allen Weiss, *Data structure and Algorithm Analysis in C.* Addison Wesley Publication.
2. Jean Paul Trembley and Paul G. Sorenson, *An Introduction to Data Structures with Applications*, McGraw Hill.
3. Thomas Cormen, C. Leiserson, R. L. Rivest and C. Stein, *Introduction to Algorithms.* 2 ed, PHI.

CS 3005
BASIC ELECTRONICS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand basic atomic structure of semi-conductors.
2. Understand the construction, operations, characteristics and applications of diodes, bipolar junction transistors, optical devices and unipolar devices.
3. Design and analysis of various feedback amplifiers, oscillators and power amplifiers
4. Understand the basic operation of operational amplifiers and voltage regulators

UNIT I:

Semiconductor Diodes: Semiconductor Diode, Resistance levels, Diode Equivalent circuits, Zener diodes, Load line Analysis, Series diode configurations with D.C Inputs, Half-Wave rectification, Full-Wave rectification.

Bipolar Junction Transistor: Transistor construction, Transistor operation, Common base configuration. Transistor amplifying action, Common emitter configuration, Common collector configuration, Operating Point, Fixed Bias circuit, Emitter Stabilized Bias circuit, Voltage divider Bias.

UNIT II:

Unipolar Devices: Construction and characteristics of JFETs, Transfer characteristics. Depletion type MOSFETs, Enhancement type MOSFETs, Fixed bias configuration, Self-bias configuration, Uni junction Transistor.

Optical Devices: Light Emitting Diodes, Liquid Crystal Display, Photo Diodes, Photo Conductive Cells, Solar Cells, and Principles of Cathode Ray Tube.

UNIT III:

Feedback and Oscillator Circuits: Feedback concepts. Feedback -Connection types, Barkhaussen Criteria, Phase-Shift Oscillator, Wien Bridge Oscillator, Harteley Oscillator, Colpitts Oscillator.

Power Amplifiers: Amplifier types, Series-fed Class A Amplifiers, Class B Amplifier operation, Class C and D Amplifiers

UNIT – IV

Operational Amplifiers: Differential and Common Mode operation, Op-Amp basics. Op-Amp specifications, Voltage Summing, Voltage Buffer, Differentiator and Integrator.

Linear I.C's - Timer IC unit operation. Voltage Controlled Oscillator. **Voltage Regulatores**: I.C. Voltage regulators.

Learning Resources:

Text Book:

1. Robert Boylestad and Louis Nashelsky, *Electronic Devices and Circuit Theory*. 9 ed, PHI

Reference Books:

1. Milliman and Halkies, *Integrated Electronics*',Tata McGraw Hill Pubs.
2. S.Salivahanan and Vallavaraj, *Electronic Devices and Circuits*', Tata McGraw Hill.
3. NN Bhargava & Kulasresta, *Basic Electronics*. Tata McGraw Hill Pubs.
4. Sanjeev Gupta, *Electronic Devices & Circuits.* Dhanpat Rai Publications
5. V.K. Mehta, *Principles of Electronics.* 11 ed, S.CHAND

CS 3006
DIGITAL LOGIC DESIGN

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Understand different Number systems, Codes, Logic Gates, Boolean laws &theorems.
2. Simplify the Boolean functions to the minimum number of literals.
3. Design & implement different types of combinational logic circuits using Logic gates.
4. Design & implement different types of sequential logic circuits using Flip Flops.
5. Design & implement different types of Counters,

UNIT I:

Number Systems: Review of Number systems & codes, Representation of integers and Floating point numbers, Accuracy. Introduction to integer arithmetic operations.

Boolean Algebra and Logic Gates: Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and Properties of Boolean Algebra, Boolean functions, Canonical and Standard Forms, Other operations, Digital Logic Gates.

Simplification of Boolean Functions: The Map Method, Two and three variable Maps, Four-variable Map, Five and six-variable Maps, Product of Sums Simplification, NAND and NOR implementation, other two-level implementations, Don't-Care conditions, The Tabulation Method, Determination of Prime Implicants, Selection of Prime-Implicants.

UNIT II:

Combinational Logic: TTL family, Voltage levels, Positive and negative logics., Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure.

Combinational Logic with MSI and LSI: Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers.

UNIT III:

Sequential Logic: Flip Flops, Triggering of Flip-Flops, Sequential machines; Classification, Synchronous and Asynchronous machines. Synthesis and Analysis of Clocked Sequential Circuits, State tables and State diagrams. State Reduction and Assignment, Flip-Flop Excitation tables, Design Procedure, Design of Counters, Design with state equations.

Introduction to Asynchronous Sequential circuits, synthesis and flow tables. Minimization and realizations. Introduction to Races and Hazards.

UNIT – IV

Registers, Counters: Registers, Shift Registers, Asynchronous Counters, Synchronous Counters, Ring Counter, Johnson Counter, Timing Sequences.

Memories: Classification of ROMs, EProms, EEProms, RAMs, Static and Dynamic Memories.

Programmable Logic: Read – Only Memory (ROM), Programmable Logic Device (PLD), Programmable Logic Array (PLA), Programmable Array Logic (PAL).

Learning Resources:

Text Book:

1. M. Morris Mano, *Digital Logic and Computer Design*. 3 ed Prentice Hall of India/Pearson Education.

Reference Books:

1. Donald e Givone, *Digital Principles and Design.* Tata McGraw Hill.
2. V. Rajaraman and T.Radha Krishnan , *Digital Logic and Computer Organization.* Prentice Hall of India/ Pearson Education.

CS 3051
DATA STRUCTURES LAB

Lecture :	-	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Explain fundamental concepts of Data structures, space complexity and time complexity.
2. Design linear data structures stacks, queues and linked lists.
3. Design nonlinear data structures trees and Graphs, and implement their operations.
4. Apply appropriate data structure for a given application.
5. Implement different searching and sorting techniques. Compare different searching and sorting techniques.

LIST OF PROGRAMS

Week 1:

Write a program to implement the operations on stacks.

Write a program for converting a given infix expression to postfix form

Write a program for evaluating a given postfix expression

Week 2:

Write a program to implement the operations on queues

Write a program to implement the operations on circular queues

Week 3:

Write a program to implement stack operations using singly linked list .

Write a program to implement the operations on doubly linked list.

Week 4:

Write a program to implement the operations on circular linked list.

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

Week 5:

Write a program to create a binary search tree operations and also implementing the tree traversal techniques using recursion.

Week 6:

Write a program to create a binary search tree operations and also implementing the tree traversal techniques using non-recursion.

Week 7:

Write a program to implement graph traversal techniques.

Write a program for finding the shortest path from a given source to any vertex in a digraph using Dijkstra's algorithm

Week 8:

Write a program to perform the following operations Insertion into an AVL-tree and Deletion from an AVL-tree

Week 9:

Write a program to implement searching techniques.

Write a program to implement hashing techniques.

Week 10:

Write a program to implement all sorting techniques

Bubble sort

Selection sort

Quick Sort

Week 11:

Write a program to implement all sorting techniques

Merge Sort

Insertion sort

Heap sort

Learning Resources:

Text Books :

1. R. Kruse etal, *Data Structures and Program Design in C.* Pearson Education.
2. Lipschutz, *Data Structures.* Schaum's Outline Series, TMH.

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CS 3052
BASIC ELECTRONICS AND DIGITAL LOGIC DESIGN LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Understand different Number systems, Codes, Logic Gates, Boolean laws &theorems.
2. Simplify the Boolean functions to the minimum number of literals.
3. Design & implement different types of combinational logic circuits using Logic gates.
4. Design & implement different types of sequential logic circuits using Flip Flops.
5. Design & implement different types of Counters,

LIST OF PROGRAMS

Part A- BASIC ELECTRONICS

Characteristics of PN junction diode.
Characteristics of zener diode.
Half wave rectifier
Full wave rectifier
Transistor characteristics in CB configuration
Transistor characteristics in CE configuration
Characteristics of FET
Realization of logic gates using discrete components

PART-B DIGITAL LOGIC DESIGN

Realization of logic gates using NAND &NOR gates
Implementation of arithmetic circuits.
Implementation of code converters
Implementation of decoders and multiplexers.
Verification of flip-flops
Implantation of synchronous counters
Implementation of asynchronous counters
Implementation of shift registers

Note: Students should complete at least 5 from each part

Learning Resources:

Text Books

1. NN Bhargava and Kulasresta, Basic Electronics. Tata McGraw Hill Pubs
2. M. Morris Mano, Digital Logic and Computer Design. Prentice Hall of India/Pearson Education.

CS 4001
PROBABILITY AND STATISTICS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Explain various types of distributions in Quality Improvement.
2. Understand probabilities of events and expectations of random variables for elementary problems such as games of chance.
3. Compare situations in which it is appropriate to consider the relevance of the Normal distribution and/or Exponential distribution.
4. Compute fault coverage and reliability in simple hardware and software applications.
5. Formulate hypothesis and carryout appropriate tests to checks its acceptability

UNIT I:

Discrete Distributions: Random variables (discrete and continuous), Expectation, variance and standard deviation of discrete random variable, binomial distribution, poisson distribution.

Continuous Distributions: Expectations, variance and standard deviation of continuous random variable, Normal distribution, Normal approximation to the Binomial distribution, other probability densities, Uniform distribution, log normal distribution, Gamma distribution, Beta distribution, Weitall distribution.

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

UNIT II:

Inferences Concerning Means: Point Estimation – Interval Estimation –Bayesian Estimation – Test of Hypothesis – Null Hypothesis and significance tests – Hypothesis concerning one mean – Relation between tests and confidence internals-Operating characteristic curves – Inferences concerning two means.

UNIT III:

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

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

UNIT – IV

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

Applications to Reliability and Life Testing: Reliability – Failure – Time Distributions – The Exponential Model in Reliability.

Learning Resources:

Text Book:

1. Richard A. Johnson, *Probability and Statistics for Engineers.* Prentice Hall of India

Reference Books:

1. R.E. Walpole, R.H.Myers and S.L.Myers, *Probability and Statistics for Engineers and Scientist.* 6 ed, Prentice Hall of India/Pearson Education.
2. Purna Chandra Biswal, *Probability and Statistics*. Pearson Education/ Prentice Hall of India 2007.

CS 4002
MICROPROCESSORS AND INTERFACING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understand the concepts of microcomputer and microprocessors and internal architecture of 8086 microprocessor.
2. Write and implement efficient structured assembly language programs to solve the problems using 8086 microprocessor.
3. Understand the concepts of 8086 microprocessor interrupts
4. Write and implement programs to interface the 8086 Microprocessor with Analog and Digital devices.
5. Understand motherboard circuitry and programmable peripheral devices such as 8254, 8259, 8251, RS232C, DMA controller.

UNIT I:

Microprocessor: Introduction to Microcomputers and Microprocessors, Introduction to 8086 microprocessor family, 8086 internal architecture, Addressing modes, Programming the 8086, Instruction descriptions, Assembler directives.

UNIT II:

8086 Programming and System Connections: Program development steps, Constructing the machine codes for 8086 instructions, Writing programs for use with an assembler, Assembly language program development tools, Writing and using procedures and assembler macros.

An example minimum mode system: SDK 86, Addressing memory and ports in Microcomputer system.

UNIT III:

Interrupts: 8086 Interrupts and Interrupt Responses

Digital Interfacing: Programmable parallel ports and Handshake input/output, interfacing a microprocessor to keyboards.

Analog Interfacing: D/A converter operation, Interfacing and applications,
A/D converter specifications, Types and interfacing.

UNIT – IV

Programmable Devices: Introduction to programmable peripheral devices: 8253/8254, 8259, 8251. The 8086 maximum mode, The DMA data transfer, RS 232 C serial data standard.

Learning Resources:

Text Book:

1. Douglas V Hall, *Microprocessor and Interfacing: Programming and Hardware*. 2 ed, TMH, 2003

Reference Books:

1. Yu-cheng Liu, Glenn A Gibson, *Microcomputer Systems: The 8086/8088 Family, Architecture, Programming and Design*. 2 ed, PHI, 2003.
2. Barry B Brey, *The Intel Microprocessors 8086 / 8088, 80186 / 80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium IV: Architecture, Programming and Interfacing*. 6 ed, PHI, 2003.

CS 4003
DESIGN AND ANALYSIS OF ALGORITHMS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Explain fundamental concepts of asymptotic notations of an algorithm divide and conquer techniques.
2. Know various design and analysis techniques such as greedy algorithms, dynamic programming.
3. Understand the techniques used for designing of different graph algorithms.
4. Apply backtracking, branch and bound techniques for real time problems.
5. Know the concepts of P, NP and NP-Complete problems.

UNIT I:

Introduction: Algorithm, Algorithm Specification, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation,

Divide and Conquer: General method, Application-Binary Search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT II:

Greedy method: General method, Applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Optimal storage on tapes, Optimal merge patterns, Single source shortest path problem,

Dynamic Programming: General method, applications-Matrix chain multiplication, Multi stage graph problem, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem.

UNIT III:

Basic Traversal and Search Techniques: Techniques for binary trees, graphs, connected components and spanning trees, Bi-connected components and DFS.

Backtracking: General method, applications- n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles, 0/1 knapsack problem.

UNIT – IV

Branch and Bound: General method, applications - Traveling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, classes NP Hard and NP Complete, Cook's theorem.

Text Book:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia Publications Pvt. Ltd.

Reference Books:

1. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John Wiley and sons.
2. Introduction to Algorithms, 2/e ,T.H.Cormen,C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd. / Pearson Education
3. Data structures and Algorithm Analysis in C++, Allen Weiss, Second Edition, Pearson Education.
4. Design and Analysis of algorithms, Tulasi.B, SuvarnaVani. K Tulip Publications.

CS 4004
OBJECT ORIENTED PROGRAMMING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	5

Course Outcomes:
1. Understand and Apply Object oriented features and C++ concepts.
2. Apply the concept of polymorphism and inheritance.
3. Implement exception handling and templates.
4. Develop applications using Console I/O and File I/O.

UNIT I:

An Overview of C++: Origins of C++, What is Object Oriented Programming, Overview of OOP features: Encapsulation, Inheritance and Polymorphism, C++ fundamentals: Sample C++ program, I/O Operators, Declaring Local variables, bool data type, old style vs Modern C++, new C++ headers, namespaces, Introducing C++ classes, function overloading, operator overloading, C++ keywords

Classes and Objects: Classes, structures and classes are related, Unions and classes are related, Anonymous unions, friend functions, friend classes, inline functions, defining inline functions within a class, constructors, destructors, parameterized constructors, static class members, static member functions, scope resolution operator, passing objects to functions, returning objects, object assignment

UNIT II:

Arrays, Pointers, References and the dynamic allocation operators: Arrays of objects, pointers to objects, this pointer, pointers to class members, passing references to objects, returning references, C++ dynamic allocation operators, initializing allocated memory, allocating arrays, allocating objects

Copy Constructors and default arguments: Overloading constructors, Copy constructors, address of an overloaded function, default function arguments, default arguments vs overloading, function overloading and ambiguity

Operator Overloading: Creating a member operator function, creating prefix and postfix forms of the increment and decrement operators, overloading shorthand operators, operator overloading restrictions, overloading new and delete, overloading special operators like [],(),->, comma operator

UNIT III:

Inheritance: Base-class access control, inheritance and protected members, inheriting multiple base classes, constructors and destructors in inheritance, passing parameters to base class constructors, granting access, virtual base classes

Virtual functions and polymorphism: Virtual functions, calling a virtual function through a base class reference, virtual attribute is inherited, virtual functions are hierarchical, pure virtual functions, abstract classes, early vs late binding

Templates: Generic Functions, A function with two generic types, overloading generic functions, overloading function template, generic function restrictions, Generic classes, an example with two generic data types, Applying template classes

UNIT – IV

Exception Handling: Exception handling fundamentals, catching class types, using multiple catch statements, handling derived class exceptions, catching all exceptions, restricting exceptions, Re-throwing an exception, uncaught_exception() function

C++ I/O system basics: C++ stream classes, C++ predetermined streams, formatting using ios members, setting the format flags, clearing format flags, using width(), precision() and fill(), using manipulators to format I/O

C++ File I/O: Opening and closing a file, reading and writing text files, unformatted and binary I/O: put(), get(), read(), write(), getline(), detecting EOF, Random Access, obtaining the current file position

Introducing the standard Template Library: Introducing STL items: Containers, algorithms, iterators

Learning Resources:

Text Book:

1. Herbert Schildt, *The Complete Reference C++*. 4 ed, Tata McGraw-Hill.

Reference Books:

1. E.Balaguruswamy, *Object Oriented Programming in C++*. 4 ed, Tata McGraw-Hill.
2. Bjarne Stroustrup, *Programming: Principles and Practice Using C++*. 4 ed, Addison-Wesley.

CS 4005
COMPUTER ORGANIZATION

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Describe Register transfer and various micro-operations.
2. Understand the design of a basic computer.
3. Describe address sequencing and microprogramming concepts.
4. Explain the organization and architecture of CPU
5. Compute computer arithmetic operations and show the procedures for implementing them with digital hardware.
6. Differentiate different kinds of memories and to know their performance.
7. Discuss various concepts in input and output organization.

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

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

UNIT – IV

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

Learning Resources:

Text Book:

1. Morris M. Mano, *Computer Systems Architecture*.3 ed, Prentice Hall India.

Reference Books:

1. Carl Hamachar and Vranesic, *Computer Organization*. McGraw Hill.
2. John P. Hayes, *Computer Architecture and Organization*. TMH.

CS 4051
MICRO PROCESSORS AND INTERFACING LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Understand the concepts of microcomputer and microprocessors and internal architecture of 8086 microprocessor.
2. Write and implement efficient structured assembly language programs to solve the problems using 8086 microprocessor.
3. Understand the concepts of 8086 microprocessor interrupts
4. Write and implement programs to interface the 8086 Microprocessor with Analog and Digital devices.
5. Understand motherboard circuitry and programmable peripheral devices such as 8254, 8259, 8251, RS232C, DMA controller.

LIST OF PROGRAMS

WEEK 1

16- bit data Addition and Subtraction

Sum of the N Series of given data

Finding the Average of given N series of data.

WEEK 2:

Generation of Fibonacci Series starting from 01 H

16-bit data Multiplication

16-bit data Division

WEEK 3:

Finding the Largest/Smallest data number in the given array of data

Finding the Factorial of a given data

WEEK 4:

Finding the Square and Square root of the given Number.

Finding NCR for a given N and R values.

WEEK 5:

Program to arrange the given numbers in Ascending order/ Descending Order

Program to convert Binary to Gray code/ Gray code to Binary.

WEEK 6:

Finding the Count of Positive, Negative and Zero values in the given Signed data array.

Program to covert Decimal number to Hexadecimal number

WEEK 7:

Digital to Analog Converter Interface Program.

WEEK 8:

Keyboard Interfacing Program

WEEK 9:

Stepper Motor Program

WEEK 10:

Traffic Light Controller

Learning Resources:

Text Books :

1. Douglas V Hall, *Microprocessor and Interfacing: Programming and Hardware*. TMH, 2003.

Reference Books:

1. Microprocessor Lab Manual

CS 4052
OBJECT ORIENTED PROGRAMMING LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:
1. Understand and Apply Object oriented features and C++ concepts.
2. Apply the concept of polymorphism and inheritance.
3. Implement exception handling and templates.
4. Develop applications using Console I/O and File I/O.

LIST OF PROGRAMS

Week l.
a) Write a C++ program to exchange the contents of two variables using a call by value and call by reference.
b) inline functions

Week 2
Define the matrix ADT using a class. The operations supported by this ADT are:
i) Reading a matrix. ii) Printing a matrix. iii) Addition of matrices.
iv) Subtraction of matrices. v) Multiplication of matrices.

Week 3
Design an application for the maintenance of library information system using Static data Members, Static member function, Friend function& Dynamic memory allocation

Week 4
a) Write a C++ program to generate a Fibonacci series by Operator overloading of
(i) Prefix operator (ii) Postfix operator.
b) Write a C++ Program to implement function Overloading

Week 5
Write a C++ program to implement
(i) inserter and extractors, (ii)Formatting I/O, (iii) File I/O, (iv) Unformatted and Binary I/O.

Week 6
Write a C++ program to implement
(i) Single Inheritance (ii) Multiple Inheritance (iii) Hybrid Inheritance

Week 7
Write programs to demonstrate
(i) Virtual functions (ii) Virtual constructor (iii) Abstract base class.
(iv) Pure virtual functions (v) virtual destructor

Week 8
a) Write a C++ program to implement sorting using function templates.
b) Write a C++ program to implement linked list using Class Templates.

Week 9

a) Write a C++ program to implement Queue using Exception Handling
b) Write a C++ program to implement Stack using Exception Handling.

Week 10

Write C++ programs to demonstrate command line arguments
a) Copies one file to another.
b) Counts the characters, lines and words in the Text file.

Learning Resources:

Text Books :

1. Robert Lafore, *Object-Oriented Programming in C++*. 4 ed, Sams publishers

Reference Books:

1. W.Savitch, *Problem solving with C++, The OOP*. 4 ed, Pearson education
2. Dietel and Dietel, *C++ - How to Program*. 4 ed, Pearson Education.

CS 4053
COMMUNICATION SKILLS LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	--	**Final Examination:**	50
Practical :	2 hrs/ Week	**Credits:**	1

Objectives: This course endeavors to make the learners develop communicative competence in the light of the global expectations specific objectives are

- To expose the learners to Functional aspects of spoken expression.
- To expose the learners to phonetic standardization based on the sounds of English and their combinations
- To train the learners to career-oriented communication
- To offer opportunity to the learners to develop group dynamics
- To expose the learners academic and competitive examinations conducted at national and international levels

Course Outcomes:

- It is expected that the course would refurbish and fortify the linguistic abilities of the learners
- It is expected that the learners would develop familiarity with different linguistic patterns including forms of writing
- It is expected that the aplomb of learners would develop by multifold

ORAL COMMUNICATION:

FLUENCY VS ACCURACY

Constructing authentic sentences
Contextual use of Rhetoric
Audience Orientation
Contextual Determination of scope and extent of speech acts, including job interviews.

Pre-programmed Presentation VS Spontaneous delivery of expressions

Sentence patterns(Technical & Semi-Technical)
Modes of Reference
Process of Argumentation & Substantiation

Discourse Analysis

Across the table discussion
Interactive Presentation
Modeling

PRACTICALS:

Brief and interludes, Group Discussions, MOCK press, MOCK Interviews, Seminar Presentations.

WRITING COMMUNICATION:

LETTER WRITING

Letters of Persuasion
Letters of Direction
Letters of Corporate Interaction
Announcements

ARTICLES

Types of Articles
Means of Literature search
Administering Questionnaires
Personal Interviews
Triangulation of Data & Composition

PRACTICALS:

Compilation of
Letters & Announcement: Business Letters, Letters of enquiry, acceptance & refusal, job Applications.

Articles: Technical, Semi-Technical & popular articles

PREPARATIONS OF
Visual aids like Transparencies
Electronic presentations using power point, flash etc.,

PROJECT
Technical paper / Report Writing

EVALUATION:
Presentation of Technical Paper 15 min. duration using OHP/LCD.

Learning Resources:

Reference Books:

1. JOD CONNOR, *Better English Pronunciation.* CUP, 2001
2. Daniel Jones, *English Pronouncing Dictionary*, (EPD), CUP, 2001
3. VR Narayanan Swamy, *Strengthen Your Writing*. Orient Longman, 2004
4. Text, Context, Pretext, Critical issues in Discourse Analysis, 2004, Black well.

CS 5001
SOFTWARE ENGINEERING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand basic concepts of software engineering.
2. Compare different software engineering process models.
3. Analyze the principles of requirement Engineering.
4. Create architectural design for a given project.
5. Apply different testing techniques

UNIT I:

Introduction to Software Engineering: The Evolving Role of Software, Software, The Changing Nature of Software, Legacy Software, Software Myths.

A Generic View of Process: Software Engineering - A Layered Technology, A Process Framework, The CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Process Technology, Product and Process.

Process Models: Prescriptive Models, The Waterfall Model, Incremental Process Models, Evolutionary Models, Specialized Process Models, The Unified Process

An Agile View of Process: What Is Agility? , What Is an Agile Process? , Agile Process Models.

UNIT II:

Software Engineering Practice: Software Engineering Practice, Communication Practices, Planning Practices, Modeling Practices, Construction Practice, Deployment.

Requirements Engineering: A Bridge To Design and Construction, Requirements Engineering Tasks, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use-cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

Building the Analysis Model: Requirements Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Flow-Oriented Modeling, Creating a Behavioral Model.

UNIT III:

Design Engineering: Design within the Context of Software Engineering, Design Process and Design Quality, Design Concepts, The Design Model, Pattern-Based Software Design.

Creating an Architectural Design: Software Architecture, Data Design, Architectural Styles and Patterns, Architectural Design, Assessing Alternative Architectural Designs, Mapping Data Flow into Software Architecture.

Modeling Component-Level Design: What Is a Component? , Designing Class-Based Components, Conducting Component-Level Design, Designing Conventional Components.

Performing User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

UNIT – IV

Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Validation testing, System testing, The art of debugging.

Testing Tactics: Software Testing Fundamentals, Black-Box and White-Box Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Object-

Oriented Testing Methods, Testing Methods Applicable at the Class Level, Interclass Test Case Design, Testing for Specialized Environments, Architectures, and Applications**,** Testing Patterns**.**

Estimation: Observations on estimation, The project planning process, Software project estimation, Decomposition techniques, Empirical estimation models, Estimation for O-O Projects, Specialized Estimation techniques, The make/buy decision.

Learning Resources:

Text Book:

1. Roger S.Pressman, *Software Engineering- A Practitioner's Approach*. 6 ed, Tata McGraw-Hill International

Reference Books:

1. Ian Somerville, *Software Engineering*. 6 ed, Pearson Education.
2. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandrioli, *Fundamentals of Software Engineering*. 2 ed, PHI.
3. RajibMall, *Fundamentals of Software Engineering*. 2 ed, PHI.

CS 5002
THEORY OF COMPUTATION

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Understand the basic concepts of formal languages of finite automata techniques.
2. Solve regular expressions and various problems to minimize FA.
3. Apply various languages to construct context free grammar.
4. Solve various problems of applying normal form techniques, Push down automata and Turing Machines.

UNIT I:

Finite Automata & Regular Expressions: Finite State Systems- Basic Definitions- Deterministic Finite Automata- Non-Deterministic Finite Automata and their equivalence- Finite Automata with ε Moves-Regular Expressions- Finite Automata with output.

UNIT II:

Properties of Regular Sets: The Pumping Lemma for regular sets - Closure Properties of Regular Sets-Decision Algorithms for regular sets.

The Myhill – Nerode Theorem and minimization of Finite Automata.

Context Free Grammars: Context Free Grammars- Derivation Trees-Simplification of context free grammars.

UNIT III:

Chomsky Normal Form-Greibach Normal Form-Pushdown Automata-Informal Description-Definitions-Pushdown Automata Context Free Languages- Properties of Context Free Languages- The Pumping Lemma for CFL's. Closure Properties of CFL's- Decision Algorithms for CFL's.

UNIT – IV

Turing Machines: Introduction- Turing Machine Model-Computable Languages and functions-Techniques of Turing Machine Construction.

Undecidability: Properties of Recursive and Recursively Enumerable languages- Universal Turing Machines (with out any reference to undecidable problems).

Learning Resources:

Text Book:

1. John E Hopcroft, Jeffery D Ullman, *Introduction to Automata Theory & Languages and Computation*. Narosa Publishing House.

Reference Books:

1. Harry R.Lewis and Christos H.Papadimitriou, *Elements of the Theory of Computation.*,2 ed.
2. Cohen, *Computer Theory*. Pearson Education.
3. K. L. P Mishra and N. Chandrasekharan, *Theory of Computation*. Prentice Hall India.
4. Sipser, *Introduction to the Theory of Computation.* Cengage Publications.

CS 5003
OPERATIONS RESEARCH

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Explain the methods of Operations Research
2. Understand the linear and nonlinear programming search techniques.
3. Explain probabilistic models and dynamic programming.

UNIT I:

Introduction to Operation Research: Introduction, Modeling in Operations Research, Phases of OR study, Scope of OR, Limitations of OR.

Linear Programming and its Applications: Linear Programming Problem – Formulation of LPP, Graphical solution of LP Problem. Simplex method, Artificial Variable Techniques (Big-M and Two-Phase Method), Dual Simplex method.

UNIT II:

Transportation and Assignment Models: Introduction – Methods of basic feasible solution (NWC, Least Cost and VAM) Optimality test, Degeneracy in transportation problem, unbalanced transportation Problem, Hungarian method for assignment problem.

Sequencing and Scheduling: Introduction-Flow Shop Scheduling, Johnson's algorithm, Problems with n jobs and two machines, n jobs and m machines.

UNIT III:

Theory of Games: Introduction, to solve the rectangular two person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, solution of a two person zero sum 2Xn game, Graphical method for 2Xn and nX2 games.

Queing Theory: Queuing systems and their characteristics. M/M/1 : FCFS/ ∞ / ∞ and M/M/1 : FCFS/ ∞ / N models

UNIT – IV

Project Management by PERT/CPM: Introduction, Basic steps in PERT/CPM techniques, Network diagram presentation, Rules of drawing network diagram, Fulkerson's rule, Time estimates and Critical path in network analysis, Project Evaluation and Review Technique, Application areas of PERT/CPM. Crashing Cost consideration in CPM/PERT.

Learning Resources:

Text Book:

1. S. D. Sharma and Kedarnath, *Operations Research.* (Units: I, IV) Meerut: Ramnath & Co.,
2. S Kalavathy, *Operations Research.* New Delhi: Vikas Publishing House Pvt Ltd.
3. R Pannerselvam, *Operations Research*. New Delhi: Pentice Hall of India Pvt Ltd.

Reference Books:

1. L S Srinath, *PERT and CPM Principles and Applications*. New Delhi: Affiliated East West Press Pvt Ltd.
2. Hamdy A Taha, *Operations Research*'. Singapore: Pearson Education.

CS 5004
DATABASE MANAGEMENT SYSTEMS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand DBMS concepts, data models and Architecture.
2. Use SQL for database management.
3. Understand ER concepts and ER mapping to relational model
4. Apply the concepts of relational algebra and calculus.
5. Apply normalization process to construct the data base.
6. Understand Concurrency and recovery strategies of DBMS

UNIT I:

INTRODUCTION: Purpose of Database system-Characteristics of database approach-Advantages of using DBMS-Database concept and architecture-Database System concepts and Architecture -Data Models, Schemas, and Instances -DBMS Architecture and Data Independence - Database Languages and Interfaces-Database Users

SQL: Simple Queries in SQL-Sub queries-Full-Relation Operations-Database Modifications-Defining a Relation Schema-View Definitions- Constraints and Triggers: Keys and Foreign Keys-Constraints on Attributes and Tuples-Modification of Constraints-Schema-Level Constraints and Triggers -Java Database Connectivity- Security and User Authorization in SQL.

UNIT II:

Data Modeling Using the Entity-Relationship Approach High-Level Conceptual Data Models and Database Design - ER Model Concepts -Entity-Relationship (ER) Diagrams - Proper Naming of Schema Constructs -Relationship Types of Degree Higher than Two-Relational Database Design Using ER-to-Relational Mapping

The Relational Data Model and Relational Algebra Relational Model Concepts - Relational Integrity Constraints -Update Operations on Relations - Defining Relations - Relational Algebra - Relational Calculus- Tuple Relational Calculus -Domain Relational Calculus -Overview of the QBE Language

UNIT III:

Functional Dependencies and Normalization for Relational Databases Informal Design Guidelines for Relation Schemas -Functional Dependencies Normal Forms Based on Primary Keys -General Definitions of Second and Third Normal Forms - Boyce-Codd Normal Form (BCNF) - Multivalued Dependencies and Fourth Normal Form -Join Dependencies and Fifth Normal Form.

Transactions Processing Concepts Introduction to Transaction Processing - Transaction and System Concepts -Desirable Properties of Transactions -Schedules and Recoverability - Serializability of Schedules

UNIT – IV

Concurrency Control Techniques Locking Techniques for Concurrency Control -

Concurrency Control Techniques Based on Timestamp Ordering, Multi version based. Validation protocols and multi granularity.

Recovery Techniques: Recovery Concepts –Basic Recovery Techniques: log based

Learning Resources:

Text Book:

1. Elmasri and Navathe, *Fundamentals of Database Systems*. 5 ed, Addison Wesley, Pearson Education Inc., 2000.

Reference Books:

1. C. J Date, *An Introduction to Database Systems.* Pearson Education.
2. Raghu Ramakrishnan, *Database Management Systems.* Tata McGraw Hill.
3. Avi Silberschatz Henry F. Korth and S. Sudarshan, *Database System Concepts*. Tata McGraw-Hill Publications, 5th Edition

CS 5005
OPERATING SYSTEMS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understand the structure and functionalities of an Operating System and the concept of process.
2. Apply CPU Scheduling algorithms
3. Explain different problems related to process synchronization.
4. Apply deadlock prevention and deadlock detection algorithms
5. Describe the concepts of paging and segmentation for memory management.
6. Apply different page replacement algorithms
7. Describe different disk space allocation methods and free space management techniques.
8. Analyze different aspects of Linux.

UNIT I:

Introduction: What is an Operating System, Mainframe Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Clustered Systems, Real time Systems, Computer System.

Process: Concept, Process Scheduling, Operation on Processes, Co-operating Processes, Inter-process Communication.

CPU Scheduling: Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Process scheduling, Real time Scheduling

UNIT II:

Process Synchronization: Background, Critical-Section Problem, Synchronization Hardware, Semaphores, Classical problem of synchronization, Critical Region, Monitors,

Deadlocks: Model, Characterization, Methods for Handling Deadlocks, Prevention, Avoidance, Detection, Recovery, Combined Approach to Deadlock Handling.

UNIT III:

Memory Management: Background, Logical Vs. Physical Address space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with paging.

Virtual Memory: Background, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithm, Allocation of frames, Thrashing, Other Consideration, Demand Segmentation

UNIT – IV

File-System Implementation: File system structure, File system Implementation, Directory Implementation, Allocation methods, Free space Management, Efficiency and Performance, Recovery.

Linux System: History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Interprocess Communication, Network Structure, Security.

Learning Resources:

Text Book:

1. Silberschatz and Galvin, *Operating System Concepts*. 6 ed, John Wiley & Sons(Asia) Pvt.Ltd., 2001.

Reference Books:

1. Charles Crowley, *Operating Systems : A Design-Oriented Approach*. Tata McGraw Hill Co.,1998.
2. Andrew S.Tanenbaum, *Modern Operating Systems*. 2 ed, PHI, 1995.

CS 5006
COMPUTER GRAPHICS

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Explain the Computer Graphics display technologies
2. Analyze the basic output primitive drawing algorithms along with 2D transformation concepts to display the objects
3. Apply the polygon filling algorithms to fill polygons with required color
4. Apply the Line clipping and Polygon Clipping techniques
5. Demonstrate the 3D transformation concepts to model an object.
6. Derive the parallel projection perspective projection transformations.

UNIT I:

Graphics Primitives: Introduction – Raster & Random display concepts and devices - CRT – Primitive operations – The display file interpreter – Normalized device co-ordinates – Display file structure – Display file algorithms – Display control.

Output Primitives: Line-Drawing Algorithms: Simple DDA, Symmetrical DDA and, Bresenham's Algorithm, Circle generating Algorithms: Properties of circle, Parametric, Trigonometric, Bresenham's and, Midpoint Circle algorithms, Ellipse Generation Algorithms: Properties of ellipse, Midpoint Ellipse algorithm.

UNIT II:

Two-Dimensional Geometric Transformations: Basic Transformations: Translation, Rotation and, Scaling; Matrix representation and Homogeneous coordinates, Composite Transformations: Translations, Rotations, Scalings, General Pivot-Point Rotation, General Fixed-Point Scaling, Concatenation Properties; Other Transformations: Reflections and shear

Polygons: Introduction-Polygons-An Inside-Outside Tests-Scan-Line Polygon Fill Algorithm- Boundary Fill Algorithm- Flood Fill algorithm- Fill Area Functions-Character Generation- Antialiasing

UNIT III:

Two Dimensional Viewing: The viewing Pipeline-Viewing Coordinate Reference Frame- Window to View port transformation – Two Dimensional Viewing Functions-Line Clipping: The Cohen-Sutherland Outcode algorithm-Liang Barsky Line clipping-Nicholl-Lee-Nicholl; Polygon Clipping: The Sutherland Hodgman Algorithm –Weiler Atherton Polygon Clipping - Character and Text Clipping .

Three Dimensional Geometric and Modeling Transformations: Translation-Rotation-Coordinate-Axes Rotations- General Three Dimensional Rotations-scaling-Other Transformations: Reflections and Shears-Composite Transformations -3D Transformation Functions.

UNIT – IV

Three Dimensional Viewing: Viewing Pipeline- Viewing Coordinates- Projections: Parallel Projection and Perspective projection – General Parallel Projection

Transformations - General Perspective Projection Transformations – Clipping.

Three Dimensional Object representations: Polygon Surfaces- Curved Lines and Surfaces- Quadratic Surfaces- Spline Representations - Cubic Spline methods- Bézier Curves and Surfaces- B Spline Curves and Surfaces.

Learning Resources:

Text Book:

1. Donald Hearn and M.Pauline Baker, *Computer Graphics*. 2 ed, PHI.

Reference Books:

1. Steven Harrington, *Computer Graphics – A Programming Approach.* 2 ed, Tata McGraw Hill Co.
2. Zhigang Xiang and Roy A Plastock, *Computer Graphics.* TMH
3. W.M.Newman & RF Sproull, *Principles of Interactive Computer Graphics*. 2 ed, Tata McGraw Hill Co.
4. Foley, Vandam, Feiner and Hughes, *Computer Graphics.* 2 ed, Pearson Education.

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CS 5051
DATABASE MANAGEMENT SYSTEMS LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Understand DBMS concepts, data models and Architecture.
2. Use SQL for database management.
3. Understand ER concepts and ER mapping to relational model
4. Apply the concepts of relational algebra and calculus.
5. Apply normalization process to construct the data base.
6. Understand Concurrency and recovery strategies of DBMS

LIST OF PROGRAMS

Week 1:

Data Definition Language (DDL) commands in RDBMS
Data Manipulation Language (DML) and Data Control Language (DCL)

Week 2:

Simple queries: selection, projection, sorting on a simple table
Small-large number of attributes
Distinct output values
Renaming attributes
Computed attributes
Simple-complex conditions (AND, OR, NOT)

Week 3:

Partial Matching operators (LIKE, %, _, *, ?)
ASC-DESC ordering combinations
Checking for Nulls

Week 4:

Multi-table queries (JOIN OPERATIONS)
Simple joins (no INNER JOIN)
Aliasing tables – Full/Partial name qualification
Inner-joins (two and more (different) tables)
Inner-recursive-joins (joining to itself)
Outer-joins (restrictions as part of the WHERE and ON clauses)
Using where & having clauses

Week 5:

Nested queries
In, Not In
Exists, Not Exists
Dynamic relations (as part of SELECT, FROM, and WHERE clauses)

Week 6:

Set Oriented Operations
Union
Difference
Intersection
Division

Week 7:

PL/SQL Programming I
Programs using named and unnamed blocks
Programs using Cursors, Cursor loops and records

Week 8:

PL/SQL Programming II
Creating stored procedures, functions and
Week 9:
Packages
Exception handling

Week 10:
Triggers and auditing triggers

Additional
Forms design

Learning Resources:

Text Books :

1. Kevin Loney, *Oracle Database 10g The Complete Reference*. Tata McGraw-Hill Publishing Company Limited.
2. Scott Urman, *Oracle 9i PL/SQL Programming.* Tata McGraw-Hill Publishing Company Limited.
3. Parteek Bhatia, Sanjiv Datta and Ranjit Singh, *Simplified Approach to Oracle*. Kalyani Publishers.

CS 5052
OPERATING SYSTEMS LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Understand the structure and functionalities of an Operating System and the concept of process.
2. Apply CPU Scheduling algorithms
3. Explain different problems related to process synchronization.
4. Apply deadlock prevention and deadlock detection algorithms
5. Describe the concepts of paging and segmentation for memory management.
6. Apply different page replacement algorithms
7. Describe different disk space allocation methods and free space management techniques.
8. Analyze different aspects of Linux.

LIST OF PROGRAMS

Programs in B-Shell

Week 1:

1. Program to find whether a number is Prime, Perfect, Strong, Armstrong number.

Week 2:

2. Program to implement searching and sorting operations on a list.

Week 3:

3. Program to count no of ordinary and Directory files in a given Directory and append operation between two files.

Week 4:

4. Program to perform various operations on File.

Week 5:

5. Program to wish the user based on System Time

Programs in C-shell

Week 6:

6. Program to print Multiplication table of a number.
7. Program to Print * in Equilateral Triangle format.

Programs in System calls

Week 7:

8. Program to implement FORK system call in C.
9. Program to implement EXECL system call in C.

Programs in Operating System.

Week 8:

10. Program to implement FCFS scheduling algorithm.

Week 9:

11. Program to implement SJF scheduling algorithm.

Week 10:

12. Program to implement Round Robin scheduling algorithm.

Extra programs

13. Program to implement Dining Philosophers Problem using Semaphores.
14. Program to implement Producer Consumer Problem using Semaphores.
15. Program to implement for shared variables using Monitors.
16. Program to implement Page Replacement algorithms.
    a) FIFO b)LRU c)Optimal

Learning Resources:

Text Books :

1. N.B.Venkateswarulu, *Advanced Unix Programming.* BS Publications
2. N.B.Venkateswarulu, *Linux Programming tools Unveiled.* BS Publications

CS 6001
OBJECT ORIENTED ANALYSIS AND DESIGN

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand various object oriented concepts and methodologies.
2. Build object oriented analysis model using UML
3. Identify design requirements by creating a design model.
4. Apply the concepts of refinement, iteration, reusability in Object Oriented Software Development.

UNIT I:

Object Oriented Design Fundamentals: The Object Model – Overview of Object Oriented system Development – Object Basic – Object – Oriented Systems Development Life Cycle;

Object oriented Methodologies: Methodologies - Shaler / Meller, Coad / Yourdon, RumBaugh et al.'s Object Modeling Technique; The Booch Methodology; The Jacobson et al. Methodologies; Patterns; Frameworks; The Unified Approach;

Object Oriented Analysis Process*:* Identifying use cases: Introduction; Why Analysis is a Difficult Activity; Business Object Analysis: Understanding the Business Layer; Use-Case Driven Object-Oriented Analysis: The Unified Approach; Business Process Modeling; Use-Case Model; Developing Effective Documentation

UNIT II:

Unified Modeling Language (UML)*:* Introduction; Static and Dynamic Models; Why Modeling? ; Introduction to the Unified Modeling Language; UML Diagrams;

Static Modeling*:* UML Use Case Diagram- Use case descriptions- Actors and actor descriptions - Use case relationships: communication association, include, extend and Generalization, System Boundary; case study ViaNet Bank ATM.

Object Analysis (Classification): Introduction; classifications Theory; Approaches for Identifying Classes; Naming Classes; **Identifying Object Relationships, Attributes and Methods:** Introduction; Associations; Super-Sub Class Relationships; A-Part-of Relationships-Aggregation; Class Responsibility: Identifying Attributes and Methods; Class Responsibility: Defining Attributes by Analyzing Use Cases and Other UML Diagrams; Object Responsibility: Methods and Messages;

Static Modeling*:* UML Class Diagram: Class, interface, package, Relationships between classes and other Notations of Class Diagram; case study ViaNet Bank ATM.

UNIT III:

Dynamic Modeling (Behavioral Diagram*):-* UML Interaction Diagrams –

UML Sequence Diagram*:* object, life line, Activation Bar, Types of Messages;

UML Collaboration Diagram*:* object, object Connection, Message with sequence numbers, case study ViaNet Bank ATM;

UML State-Chart Diagram: object State, Initial/Final State, Simple/Complex Transitions;

UML Activity Diagram: Activity State, Transition, Swim Lane, Initial state, Final State, Synchronization Bar, Branching, case study ViaNet Bank ATM

UNIT – IV

Implementation Diagrams – Component Diagram: Component, Dependency and Interface; Deployment Diagram: Node, Communication Association, case study ViaNet Bank ATM; Model Management: Packages and Model Organization; UML Extensibility; UML Meta-Model.

Object Oriented Design Process and Design Axioms: Introduction; The Object-Oriented Design Process; Object-Oriented Design Axioms; Corollaries.

Designing Classes: Introduction; The Object-Oriented Design Philosophy; UML Object Constraint Language; Designing Classes: The Process; Class Visibility: Designing Well-Defined Public, Private, and Protected Protocols; Designing Classes: Refining Attributes; Designing Methods and Protocols; Packages and Managing Classes, case study ViaNet Bank ATM;

View Layer: Designing Interface Objects*:* Introduction; User Interface Design as a Creative Process; Designing View Layer Classes; Macro-Level Process: Identifying View Classes by Analyzing Use Cases; Micro-Level Process

Learning Resources:

Text Book:

1. Ali Bahrami, *Object Oriented Systems Development – Using the Unified Modeling Language*. Tata McGraw Hill International Editions, Computer Science Series.

Reference Books:

1. Grady Booch, *Object Oriented Analysis & Design with Applications*. 2 ed, Pearson Education 1999.
2. James Rumbaugh, Jacobson and Booch, *Unified Modeling Language Reference Manual.* PHI.
3. Jacobson et al., *The Unified Software Development Process*. AW, 1999.
4. Tom Pender, *UML Bible.* John Wiley & Sons.

CS 6002
DATA MINING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand the concepts of data warehouse and data mining
2. Use data preprocessing techniques to build data warehouse
3. Analyze transaction databases for association rules.
4. Use classification methods and prediction techniques on transaction databases.
5. Understand various clustering techniques for categorizing data.
6. Understand methods for outlier analysis.

UNIT I:

Data Warehouse – Introduction, A Multi-dimensional data model, Data Warehouse Architecture, Data Warehouse Implementation.

Data Mining – Introduction, Data Mining, on what kind of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining.

UNIT II:

Data Preprocessing – Data cleaning, Data Integration & Transformation, Data Reduction, Discretization & Concept Hierarchy Generation, Data Mining Primitives.

Mining Association rules in large databases – Association rule mining, mining single-dimensional Boolean Association rules from Transactional Databases, Mining Multi-dimensional Association rules from relational databases & Data Warehouses.

UNIT III:

Classification & Prediction – Introduction, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Other Classification Methods, Prediction, Classifier accuracy

UNIT – IV

Cluster Analysis – Introduction, Types of data in Cluster analysis, A categorization of major clustering methods, partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN, Grid-based Method: STING; Model-based Clustering Method: Statistical approach, Outlier analysis.

Learning Resources:

Text Book:

1. Jiawei Han and Micheline Kamber, *Data Mining Concepts and Techniques*, 2 ed, Elseiver publishers.

Reference Books:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining.* PEA.
2. Margaret H Dunham, *Data Mining Introductory and Advanced Topics*. Pearson Education
3. Paulraj Ponnaiah, *Data Warehousing Fundamentals.* Wiley Student Edition.

CS 6003
ENGINEERING ECONOMICS AND MANAGEMENT

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Understand a working knowledge of money management and how to make economic comparisons of alternative engineering designs or projects.
2. Understand the impact of inflation, taxation, depreciation. Financial planning, economic basis for replacement, project scheduling, and legal and regulatory issues are introduced and applied to economic investment and project-management problems.
3. Understand ethical and other non-economic issues related to professional and personal financial and economic decisions.

UNIT I:

General Management: Principles of scientific management, Henri Fayol's principles of management. Brief treatment of managerial functions: planning, organizing, staffing, directing, coordinating and controlling etc.

Forms of Business Organization: Salient features of sole proprietorship, partnership, Joint Stock Company: private limited and public limited companies.

Personnel Management: The personnel function, functions of a personnel management, Job Evaluation – Methods

UNIT II:

Managerial Economics: Introduction, Basic Economic concepts, Supply and Demand Law of diminishing utility, Marginal utility and Total utility, Demand Analysis , Elasticity of Demand, Elastic and Inelastic Demand, Isoquants (Equal product curves, Cost output relationship (Theory of Cost) .Relationship between ATC and MC , Relationship between AC and MC. Theory of Firm Profit maximization under perfect maximization, Returns to scale.

UNIT III:

Work Study: Introduction, Management techniques to reduce work content and ineffective time.

Method Study: Procedure, Tools for recording information: charts and diagrams, use of fundamental hand motions (Therbligs), principles of motion economy, SIMO chart, cycle graph and chrono cycle graph.

Work Measurement: Objectives and techniques, time study methods and rating systems. Allowances: Standard time.

UNIT – IV

Marketing Management: Concept of selling and marketing – differences, functions of marketing, market research, advertising and sales promotion, break-even analysis, distribution channels – types, product life cycle.

Financial Management: Functions of financial management, simple and compound interest, Methods of evaluating alternatives- Present Worth method. Future worth Method, Annual equivalent method. Depreciation, common methods of depreciation: straight line method, declining balance method, sum of year's digits method

Learning Resources:

Text Book:

1. ILO, *Introduction to work study.*
2. Marthand T and Telsang, *Industrial and Business Management.*

Reference Books:

1. Tripathi and Reddy, *Personnel Management.*
2. Theusen and Theusen, *Engineering Economy*.

CS 6004
COMPUTER NETWORKS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Describe the need for computer networks and the role of network reference models.
2. Understand various guided transmission media.
3. Analyze error detection and error correction codes.
4. Understand the concepts behind medium access control sub layer.
5. Implement and analyse routing and congestion issues in network design.
6. Analyze the underlying protocols in transport layer.
7. Identify different applications in Application layer.

UNIT I:

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

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

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

UNIT II:

The Data Link Layer: Data link layer design issues**,** Error detection and correction, Elementary data link protocols, and Sliding window protocols.

The Medium Access Control Sub layer: The channel allocation problem, Multiple access protocols, ETHERNET, and Wireless LANs.

UNIT III:

The Network Layer: Network Layer Design Issues, Routing Algorithms: Shortest Path, Flooding, DVR, and Link State routing algorithm, Congestion Control Algorithms, and Quality of Service.

UNIT – IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, and the Internet Transport Protocols TCP and UDP.

Application Layer: The Domain Name System (DNS), and E-Mail.

Learning Resources:

Text Book:

1. Andrew S Tanenbaum, *Computer Networks.* 4 ed, Pearson Education / PHI.

Reference Books

1. Kurose and Ross, *Computer Networks – A Top-down Approach Featuring the Internet.* 'Pearson Education.
2. Behrouz A.Forouzan, *Data Communications and Networking.* 4 ed, TATA McGraw Hill
3. Nader F.Mir, *Computer and Communication Networks.* PHI.

CS 6005
WEB TECHNOLOGIES

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Explain the fundamental concepts and features of Java Programming language.
2. Implement the basic principles of Object Oriented Programming which includes inheritance, polymorphism, encapsulation and abstraction and also Arrays, data and Text File Operations.
3. Develop Graphical User Interface applications and Web based applications in Java by importing applet, AWT and SWING packages.
4. Implement the role of XML for the management and delivery of electronic information for given application.
5. Develop Web based applications by Servlets and JSP to have an interactive application such as Client Server Architecture.

UNIT I:

OOPS Concepts in JAVA: Introduction to java, Features of java, Comparison with C++, Classes and Objects, Inheritance, Interfaces and Packages, Strings, String tokenizer, Exception Handling, Multithreading.

I/O Streams: Streams, byte streams, character streams, file class, file streams

UNIT II:

Applets: Concepts of applets, life cycle of an applet, creating applets, passing parameters to applets, color class and graphics class, handling image, animation.

Swing: Swing introduction, J Applet, J Frame and J Component, Icons and Labels, text fields, buttons – the J Button Class, check boxes, Radio buttons, combo boxes, tabbed panes, scroll panes, trees, and tables.

JDBC Connectivity: JDBC Connectivity, types of JDBC drivers, connecting to the database, JDBC statements, JDBC exceptions, Manipulations on the database, metadata.

UNIT III:

HTML Common Tags - List, Tables, images, forms, Frames, Cascading Style sheets, Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX Web Servers: Tomcat Server installation & Testing

UNIT – IV

Servlets and Application Development: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, accessing a database from a Servlet application.

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture, Using Scripting Elements, Implicit JSP Objects, Conditional Processing, Declaring Variables and Methods, Sharing Data between JSP pages, Sharing Session and Application data, accessing a Database from a JSP Page Application.

Learning Resources:

Text Book:

1. Patrick Naughton and Herbert Schildt., *The Complete Reference Java 2*. 5 ed , TMH (UNITS 1,2)
2. Dietel & Dietel, *Internet & World Wide Web*. PHI Publications (UNIT-3)
3. Hans Bergsten, *Java Server Pages*. SPD O'Reilly – (UNIT 4).

Reference Books:

1. Sebesta, *Programming World Wide Web*. Pearson.

2. Marty Hall and Larry Brown, *Core Servlets and Javaserver Pages Volume 1: Core Technologies.* Pearson.

CS 6051
SOFTWARE ENGINEERING LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:
1. Understand various object oriented concepts and methodologies.
2. Build object oriented analysis model using UML
3. Identify design requirements by creating a design model.
4. Apply the concepts of refinement, iteration, reusability in Object Oriented Software Development

LIST OF PROGRAMS:

Week 1: Study of UNIFIED MODELING LANUAGE Diagrams.

Week 2: Use MS Project to create a series of tasks leading to completion of a project of your choice. For your project, you need to:

- Set start or ending dates.
- Develop a list of tasks that need to be completed.
- Establish any sub tasks and create links.
- Create any links between major tasks.
- Assign a specific amount time for each task.
- Assign resources for each task.
- Create task information for each item you put into the list.

Week 3: Create a DFD for :

a)SAFE HOME SYSTEM

b) (a + b) * (c + a * d)

Week 4: Identify Use Cases and develop the Use Case model for Health Clinic Management System.

Week 5: Take two of the use cases from Health Clinic Management System and write flow of events for those. You should work in groups of four to solve this problem

Week6: Identify analysis classes and develop the UML Class diagram for Library Information System.

Week 7: Using the identified scenarios from above systems in week4 and week5 find the interaction between objects and represent them using UML interaction diagrams

Week 8: Develop a UML activity diagram and state chart diagram for inventory control System

Week 9: Develop all UML Diagrams for ATM Application System**.**

Week 10: Develop all UML Diagrams for School Management System.

Week 11: Write a JUnit test class for testing

```
public class Exercise {
/** Return the minimum of x and y. */
public static int min(int x, int y) {  ... }
  }
```

Learning Resources:

1. Ali Bahrami, *Object Oriented Systems Development – Using the Unified Modeling Language*. Tata McGraw Hill International Editions, 1999.

CS 6052
COMPUTER NETWORKS LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Describe various standard network models.
2. Understand various guided transmission media.
3. Analyze error detection and error correction codes.
4. Understand the concepts behind medium access control sub layer.
5. Implement and analyze routing and congestion issues in network design.
6. Analyze the underlying protocols in transport layer. Identify different applications in Application layer..

LIST OF PROGRAMS

Week 1: Implement the data link layer framing methods: character stuffing and bit stuffing.

Week 2: Write a program to implement stop and wait protocol.

Write a program to implement go-back-n sliding window protocol.

Week 3: Implement on a data set of characters the three CRC polynomials- CRC12, CRC16.

Week 4: Implement error detection method using **checksum** algorithm

Week 5: Implement error correction method using **Hamming distance** method

Week 6: Compute shortest route using **Dijkstra's algorithm**.

Week 7: Implement **distance vector** routing algorithm.

Week 8: Construct a routing table at each node using link state routing algorithm.

Week 9: Construct broad cast tree for a subnet of hosts.

Week 10: Implement Client Server application using UDP

Implement socket programming for chat application using TCP

Learning Resources:

Text Books :

1. Andrew S. Tanenbaum, *Computer Networks*. 4 ed, PHI/ Pearson Education

Reference Books:

1. Behrouz A.Forouzan, *Data Communications and Networking* 4 ed, TATA McGraw Hill

CS 6053
WEB TECHNOLOGIES LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Explain the fundamental concepts and features of Java Programming language.
2. Implement the basic principles of Object Oriented Programming which includes inheritance, polymorphism, encapsulation and abstraction and also Arrays, data and Text File Operations.
3. Develop Graphical User Interface applications and Web based applications in Java by importing applet, AWT and SWING packages.
4. Implement the role of XML for the management and delivery of electronic information for given application.
5. Develop Web based applications by Servlets and JSP to have an interactive application such as Client Server Architecture.

LIST OF PROGRAMS

1	Design a Java application that reflects the inheritance concepts of Java.
2	Design a Java application to copy the contents of one file to other using sequential files and random access files.
3	Design a user registration form using Java Applets.
4	Develop a menu based swing application for designing a note pad.
5	Design an applet application that implements JDBC to interact with Database.
6	Design a web application using different types of CSS.
7	Design a student database using XML and display the content using XSL by validating through XML schema.
8	Design a simple java servlet application to retrieve the data from a client form and display the data.
9	Design a web application for user management using Java servlets.
10	Design a simple JSP application to perform simple operations.
11	Design a web application for user management using JSP.
12	Design a web application to share the data between multiple pages using sessions and cookies.

Learning Resources:

Text Books :

1. Dietel and Dietel, *Internet & World Wide Web.* PHI Publications.
2. Patrick Naughton and Herbert Schildt, *The complete Reference Java 2*. 5 ed, TMH.

CS 6054
TERM PAPER

Lecture :	--	**Internal Assessment:**	75 (I:25, E:50)
Tutorial :	1 hrs/ Week	**Final Examination:**	
Practical :	-	**Credits:**	1

Course Outcomes:

1. Formulate a real world problem and develop its requirements (a,b,c,g,l)
2. Design a prototype for a set of requirements (a,b,e,g,l)
3. Express technical and behavioral ideas and thoughts in oral form (f,h)
4. Practice in, and possibly moderate discussions that lead to making decisions (h,i,j)
5. Express technical ideas strategies and methodologies in written form (f,i)
6. Prepare and conduct oral presentations (f,i)
7. Understand new tools, algorithms and/or techniques contribute to the software solution of the term paper (j,k)

Guide Lines
Title Page
Abstract
Introduction
Materials and Methods
Results
Literature Cited

CS 7001
CRYPTOGRAPHY AND NETWORK SECURITY

Lecture :	4 hrs/ Week	**Internal Assessment:**	40
Tutorial :	-	**Final Examination:**	60
Practical :	-	**Credits:**	4

Course Outcomes:

1. Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks.
2. Understand the concept of encryption and analyze the various symmetric encryption algorithms and asymmetric algorithms.
3. Apply modern algebra and number theory to understanding of cryptographic algorithms and vulnerabilities.
4. Examine and understand the techniques and algorithms used for message authentication: MAC, Digital Signatures and Hash functions.
5. Understand the need for Kerberos authentication and the techniques involved.
6. Familiarize with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc).
7. Understand the principles behind design of firewalls

UNIT I:
Security attacks, Services, Mechanisms; A model for network security;
Classical encryption techniques;
Modern techniques: DES, Differential and linear cryptanalysis; Triple DES, Advanced Encryption Standard; Block cipher modes of operation.

UNIT II:
Placement of Encryption function, Traffic confidentiality, key distribution.
Number Theory: Prime and relative prime numbers, modular arithmetic: theorems, testing for primality, Euclid's algorithm, Chinese remainder theorem, discrete logarithms.
Public key cryptography: principles, RSA algorithm, key management, Diffie-Hellman key exchange

UNIT III:
Message Authentication and Hash functions: Authentication requirements and functions, security of hash functions and MACs. Message digest algorithm, secure hash algorithm, Digital signatures and standards. Kerberos authentication
Email security: PGP;

UNIT – IV
IP Security: overview, architecture, authentication header, encapsulating security payload, key management;
Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.
Viruses and Related threats. Fire Walls: Fire wall Design Principles.

Learning Resources:

Text Book:

1. William Stalligs, *Cryptography and Network Security: Principles and Practice.* 4 ed, Pearson Education.

Reference Books:

1. Charlie Caufman, Radia Perlman and Mike Speciner, *Network Security- Private Communication in a Public World.* 2 ed, PHI.
2. Mark Burgess, *Principles of Network and Systems Administration.* John Wiley.

CS 7002
EMBEDDED SYSTEMS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand the architecture of 8051 microcontroller.
2. Write and implement Assembly language programs for 8051 microcontroller.
3. Understand the basics of embedded systems and their applications.
4. Understand the Basic design using real time operating systems.
5. Understand Embedded Software Development process and Tools.

UNIT I:

Introduction: Introduction to microcontrollers, comparing microprocessors and microcontrollers,

The 8051 Architecture: Over view of the 8051 family, 8051 microcontroller hardware, inputs/ outputs pins, ports and circuits, external memory, counters and timers, serial data input/output and interrupts

UNIT II:

Programming The 8051 Microcontroller: Introduction , addressing modes of 8051, external data moves, code memory read only data moves, PUSH and POP op codes, data exchanges, byte level and bit level logical operations, rotate and swap operations Arithmetic operations, Incrementing , Decrementing, addition, subtraction, multiplication and division, jump and call program range, jumps, calls & subroutines Interrupts & returns .Simple programs using 8051

UNIT III:

Introduction To Embedded Systems: Embedded systems, Embedded processors, hard ware units, software. Examples of embedded systems, Systems on chip, complex systems design and processors, design process in embedded systems, formalization of system design, design process and design examples, classification of embedded systems, skills required for an embedded system designer, processor selection, memory selection

UNIT – IV

Real Time Operating Systems: Introduction to real time operating systems, Basic design using real time operating systems.

Embedded Software Development Process: Introduction to Embedded Software Development process and Tools, Host and Target Machines, Linker/Locators for Embedded Software, Getting Embedded Software into the target System, issues in hardware-software design and co design. Testing on Host Machine.

Learning Resources:

Text Book:

1. Kenneth. J.Ayala and Penram, *The 8051 Microcontroller Architecture, Programming and Applications*. 2 ed, Penram International 1996. (Unit 1,2)
2. Raj Kamal, *Embedded Systems Architecture, Programming and Design.* 2 ed,TMH.(Unit 3,4)

Reference Books:

1. David E.Simon, *An Embedded Software Primer.* Pearson Education Asia
2. Frank Vahid and Tony Givargis, *Embedded Systems Design – A Unified Hardware /Software Introduction.* John Wiley, 2002.

CS 7003
COMPILER DESIGN

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:
1. Describe the functionality of each phase involved in Compilation process**.**
2. Implement the parsing techniques including Bottom-up and Top-down parsing for the given programming construct described in Context Free Grammar.
3. Understand the different representations of intermediate code**.**
4. Describe the concepts of storage administration for different programming environments**.**
5. Apply different error recovery routines to recover the errors seen at different phases of compilation**.**
6. Generate the machine code by considering all the functionalities involved in different phases of the compilation process.

UNIT I:

Introduction to compilers: Compilers and translators, why do we need translators?, the structure of a compiler, Lexical Analysis, Syntax analysis, Intermediate Code generation, Optimization, Code generation, Bookkeeping, Error handling, Compiler-writing tools.

Lexical Analysis: The role of lexical analyzer, A simple approach to the design of lexical analyzer, Lex tool

UNIT II:

Basic Parsing Techniques: Top – down parsing, Predictive parsers, Automatic Construction of efficient parsers: LR parsers, The canonical collection of LR(0) items, Constructing SLR parsing tables, Constructing canonical LR parsing tables, Constructing LALR parsing tables, Using ambiguous grammars, An automatic parser generator, Implementation of LR parsing tables, Constructing LALR sets of items.

UNIT III:

Syntax – Directed Translation: Syntax – directed translation schemes, Implementation of Syntax-directed translators, Intermediate code, Postfix notation, Parse trees and syntax trees, Three-address code, quadruples, and triples, Translation of assignment statements, Boolean expressions, Statements that alter the flow of control, Postfix translations, Translation with a top-down parser. More about Translation: Procedure calls & Record Structures.

Symbol Tables: The contents of a symbol table, Data structures for symbol tables, Representing scope information.

UNIT – IV

Run – time Storage Administration: – Implementation of simple stack allocation scheme, Implementation of block – structured languages; Error Detection and Recovery: Errors, Lexical-phase errors, Syntactic-phase errors, Semantic errors.

Code Generation: A simple code generator, code Generation using DAG's.

Learning Resources:

Text Book:

1. Alfred V.Aho, Jeffrey D. Ullman, *Principles of Compiler Design*. Narosa Publishing.

Reference Books:

1. Aho, Ravi Sethi and JD Ullman, *Compilers Principles, Techniques and Tools*. Pearson Education/Prentice Hall of India.

CS 7004
MOBILE COMPUTING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understand the concept of radio propagation and interference in multipath propagation and channel model description
2. Compare different modulation and multiplexing techniques
3. Explain the Bluetooth, WLAN, WiMAX emerging wireless transmission technologies
4. Differentiate GSM and GPRS mobile technologies
5. Analyse Wireless Application Protocol (WAP) for internet access and advanced telephony services from the mobile phones.
6. Evaluate the performance of the security techniques which include symmetric key cryptography and public key cryptography algorithms.

UNIT I:

Introduction: A short history of wireless communication-A market for mobile communications-A simplified reference model

Wireless Transmission: Frequencies for radio transmission-Signals-Signal propagation-Multiplexing-Modulation-Spread spectrum-Cellular system

Multiple access Procedures: TDMA-FDMA-CDMA-SDMA-Comparison of TDMA, FDMA, CDMA and SDMA.

UNIT II:

Bluetooth : Bluetooth protocol-Bluetooth protocol stack-Bluetooth security-Application models

Wireless LAN: Introduction-Wireless LAN advantages-IEEE 802.11 standards-Wireless LAN architecture-Mobility in wireless LAN-Deploying Wireless LAN-Mobility Ad hoc networks and sensor networks-Wireless LAN security- WiFi versus 3G

WiMAX: Introduction- Physical layer- 802.16 medium access control-broadband applications-broadband cellular system

UNIT III:

Mobile Computing Architecture: Mobile Computing-Architecture for mobile computing-Three tier architecture-Design considerations for mobile computing-Mobile computing through internet-Making the existing applications Mobile-Enabled

GSM : Global System for Mobile Communications- GSM system architecture-GSM entities-Call routing in GSM,PLMN interface-GSM addresses and Identifiers-Network Aspects in GSM- GSM frequency allocation-Authentication and security

SMS: Mobile Computing over SMS-Short Message Services-Value added services through SMS-Accessing the SMS Bearer

GPRS: Introduction- GPRS and Packet Data Network-GPRS network architecture-Network operations-Data services in GPRS-Applications for GPRS-Limitations of GPRS-Billing and Charging in GPRS.

UNIT – IV

Wireless Application Protocol (WAP): Introduction-WAP application environment-Wireless session protocol-Wireless transaction protocol –Wireless transport layer security-Wireless datagram protocol-Wireless Markup language (WML)-Wireless telephony application-MMS-GPRS applications

Mobile IP and IPV6: Introduction- How does Mobile IP works?-Discovery-Registration-Tunneling

IPV6 address space-IPV6 security-Packet payload-mobile IP with IPV6

Security Issues in Mobile Computing: Introduction-Information Security-Security techniques and algorithms-security protocols-Public Key Infrastructure-Security models-Security framework for mobile environment

Learning Resources:

Text Books:

1. J. Schiller, *Mobile Communications.* Pearson Education. (Unit 1)
2. Asoke K Talukder and Roopa R.Yavagal, *Mobile Computing – Technology Applications and Service Creation*. TMH, 2006. (Unit 2,3,4)

Reference Books:

1. Deitel, et al., *Wireless Internet and Mobile Business-How to Program*. Prentice Hall India.
2. Frank Adelstein, Sandeep K.S. Gupta, Golden G. Richard III and Loren Schwiebert, *A Fundamentals of Mobile and Pervasive Computing.* McGraw-Hill, 2005.

CS 7005 A
HUMAN COMPUTER INTERACTION

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:
1. Understand the concepts of screen design and graphical user interface.
2. Understand human interaction characteristics in the design process.
3. Use screen elements for presenting information simply and meaningfully.
4. Analyze device based , screen based controls and components of a window.
5. Understand various software tools and interaction devices.

UNIT I:

Introduction: Importance of user interface, definition, importance of good design, A brief history of Screen Design

Graphical User Interface: Popularity of graphics, the concept of direct manipulation, graphical system, characteristics, Web user – interface popularity, characteristics- principles of user interface.

UNIT II:

Design Process: Human interaction with computers, importance of human characteristics, human considerations, human interaction speeds

Screen designing: Interface design goals, screen meaning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, visually pleasing composition, amount of information, focus and emphasis, presenting information simply and meaningfully, technological considerations in interface design.

UNIT III:

Windows: Characteristics, components, operations. Selection of device based and screen based controls.

Components: Icons and images, Multimedia, choosing proper colors

UNIT – IV

Windows: Characteristics, components, operations. Selection of device based and screen based controls.

Components: Icons and images, Multimedia, choosing proper colors

Learning Resources:

Text Books:

1. Wilbert O Galitz, *The Essential Guide to User Interface Design*. 2 ed, Wiley DreamaTech
2. Ben Shneidermann, *Designing the User Interface.* 3 ed, Pearson Education Asia

Reference Books:

1. Alan Dix, Janet Fincay, Gre Goryd, Abowd and Russell Bealg, *Human Computer Interaction*. Pearson.
2. Prece, Rogers, Sharps *Interaction Design.* Wiley Dreamatech,
3. Soren Lauesen, *User Interface Design*. Pearson Education.

CS 7005 B
DIGITAL SIGNAL PROCESSING

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. This course introduces students to the fundamental techniques and applications of digital signal processing. Through lectures and homework students should be able to do the following upon completion of this course:
2. Analyze signals using the discrete Fourier transform (DFT).
3. Understand the Decimation in time and frequency FFT algorithms for efficient computation of the DFT.
4. Design digital IIR filters by designing prototypical analog filters and then applying analog to digital conversion techniques such as the bilinear transformation.
5. Design digital FIR filters using the window method.
6. Implement digital filters in a variety of forms: direct form I and II, parallel, and cascade

UNIT I:

Discrete Signals and Systems: Introduction to digital signal processing, advantages and applications, classification of Discrete time signals and systems, LTI system : stability and causality. Convolution sum.

Z-Transforms: Z-Transforms, Region of Convergence, Z-Transform Theorems and properties, Parsevals relation, relation between Z-transform and Fourier Transform of a sequence. Inverse – Z-Transform using Cauchy's Integration Theorem. Partial fraction method, long division method. Solution of differential equations using one sided – Z-Transform.

UNIT II:

DFT and FFT: Discrete Fourieer Transform. Properties of DFT, linear convolution using DFT. Computations for evaluating DFT, Decimation in time FFT algorithms, Dissemination in frequency FFT algorithm. Computation of inverse DFT.

UNIT III:

IIR Filter Design Techniques: Introduction, properties of IIR filters, design of Digital Butterworth and Chebyshev filters using bilinear transformation. Impulse invariance transformation methods.

Realization of Digital Filters: Direct, canonic, cascade, parallel and ladder realizations.

UNIT – IV

FIR Filter Design Techniques: Introduction, characteristics of linear phase FIR filters, frequency response, designing FIR filters using windowing methods – Rectangular window, Hanning window, Hamming window, Generalized Hamming window, Bartlett triangular window, Comparison of IIR and FIR digital filters.

Learning Resources:

Text Book:

1. John. G. Proakis, *Digital Signal Processing : Principles, Algorithms and Applications* 4 ed, Pearson

Reference Books:

1. Salivahanan and Vallavaraj, *Digital Signal Processing*. TMH

CS 7005 C
SOFTWARE PROJECT MANAGEMENT

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:
1. Understand how to manage projects.
2. Compare conventional and modern software engineering principles.
3. Explain various phases in modern software management.
4. Understand project planning and organization.
5. Apply software metrics and economics in a project.

UNIT I:

Conventional Software Management : The waterfall model, conventional software **Management Performance Evolution of Software Economics:** Software Economics, pragmatic software cost estimation.

Improving Software Economics : Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections

UNIT II:

The old way and the New: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

UNIT III:

Flows of the Process: Software process workflows, Inter trans workflows.

Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Interactive

Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations,
Project Organizations, evolution of Organizations. Process Automation : Automation Building Blocks, The Project Environment

UNIT – IV

Project Control and Process Instrumentation: The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. **Tailoring the Process**: Process dicriminants, Example.

Future Software Project Management : Modern Project Profiles Next generation
Software economics, modern Process transitions. Case Study : The Command Center Processing and Display System-Replacement(CCPDS-R)

Learning Resources:

Text Book:

1. Walker Rayce, *Software Project Management*. Pearson Education, 2005.

Reference Books :

1. Richard H.Thayer, *Software Engineering Project Management*. IEEE Computer Society, 1997.
2. Shere K.D., *Software Engineering and Management*, Prentice Hall, 1988.

CS 7005 D
ADVANCED COMPUTER ARCHITECTURE

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Understand Principles of parallel processing and advanced computer architectures.
2. Analyse and understand different types of parallel computer architecture.
3. Describe the memory organization for parallel computers.
4. Explain different interconnection networks among different sub systems of parallel computers.
5. Discuss application of parallel algorithms for solving complex computations.

UNIT I:

Introduction to Parallel Processing: Trends towards parallel processing, Parallelism in uniprocesser systems, Parallel computer structures, Architectural classification schemes, Parallel processing applications, memory hierarchy in parallel processing systems, addressing schemes.

Principles of Pipelining And Vector Processing: Pipelining, principles of linear pipelining, classification of pipeline processors, general principles and Reservation tables, interleaved memory organization, Instruction & arithmetic pipelines, Principles of designing pipeline processors, Vector processing Requirements.

UNIT II:

SIMD array processors, organization, masking and routing mechanisms, inter PE communications, SIMD interconnection networks, single stage and multi stage networks, mesh connected Iliac networks, parallel shifter, shuffle exchange and omega networks, parallel algorithms for array processors, matrix multiplication, parallel sorting, fast Fourier transform computation, associative array processor.

UNIT III:

Multiprocessor Architecture: Loosely coupled and tightly coupled multiprocessor systems, processor characteristics, interconnection networks, crossbar switch and multi port memories, multi stage networks, banyan and delta networks parallel memory organization, multiprocessing operating systems, classification and requirements, software requirements for MPS, language features to exploit parallelism, multi processor scheduling strategies, parallel algorithms.

UNIT – IV

Data Flow Computers: Control flow versus data flow, data flow computer architectures, data flow graphs, data flow languages, Dennis and Irvine machines, dataflow design alternatives, dependence driven and multi level event driven approaches, VLSI computing structures, systolic array architecture, VLSI matrix arithmetic processor.

Learning Resources:

Text Book:

1. Hwang K, Briggs F. A, *Computer Architecture and Parallel Processing.* Tata McGraw-Hill.

Reference Books:

1. Sima, *Advanced Computer Architecture: A Design Space Approach.* Pearson Education.
2. Parthasarthy, *Advanced Computer Architecture.* Cengage Publications.

CS 7005 E
MIDDLEWARE TECHNOLOGIES

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:
1. Describe the benefits and architecture of Client Server Technology.
2. Understand the concepts of CORBA, RMI and .Net technologies.
3. Apply the components of C# .Net technology to given applications
4. Classify the architecture of CORBA and mapping the CORBA with existing Programming languages like Java.
5. Implement integration of component based architectures with Enterprise applications.
6. Demonstrate understanding the concepts of Java Bean Component model.

UNIT I:

Introduction to Client Server Computing: Evolution of corporate computing models from centralized to distributed computing, client server models. Benefits of client server computing, pitfalls of client server programming.

CORBA with Java: Review of Java concept like RMI, RMI API, JDBC. Client/Server CORBA-style, The object web: CORBA with Java.

UNIT II:

Introducing C# and the .NET Platform; Understanding .NET Assemblies; Object – Oriented Programming with C#; Callback Interfaces, Delegates, and Events.

Building c# applications: Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services.

UNIT III:

Core CORBA / Java: Two types of Client/ Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multicount.

Existential CORBA: CORBA initialization protocol, CORBA activation services, CORBAIDL mapping CORBA java- to- IDL mapping, The introspective CORBA/Java object.

UNIT – IV

Java Bean Component Model: Events, properties, persistency, Introspection of beans, CORBA Beans.

EJBs and CORBA: Object transaction monitors CORBA OTM's, EJB and CORBA OTM's, EJB container frame work, Session and Entity Beans, The EJB client/server development Process The EJB container protocol, support for transaction EJB packaging EJB design Guidelines.

Learning Resources:

Text Books:

1. Robert Orfali and Dan Harkey, *Client/Server programming with Java and CORBA*. 2 ed, John Wiley & Sons.
2. G.Brose, A Vogel and K.Duddy, *Java Programming with CORBA*. 3 ed, Wiley-Dreamtech, India John Wiley and Sons

References:

1. M.L.Liu, *Distributed Computing, Principles and Applications.* Pearson Education.
2. Robert Orfali Dan Harkey and Jeri Edwards, *Client/Server Survival Guide.* 3 ed, John Wiley & Sons
3. D T Dewire, *Client/Server Computing.* TMH.
4. *Introduction to C# Using .NET*. Pearson Education

CS 7005 F
INDUSTRY NEED BASED ELECTIVE*

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Understand the current needs of the industry
2. Engage in life-long learning
3. Use techniques, skills, and modern engineering tools
4. Analyze and solve the problems of the society

UNIT I:

UNIT II:

UNIT III:

UNIT – IV

Learning Resources:

Text Book:

Reference Books:

*** Introduced as per the needs of Industry from time to time.**

CS 7006 A
DIGITAL IMAGE PROCESSING

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:
1. Explain fundamental steps of Digital Image Processing
2. Apply frequency domain filters and spatial filters for image enhancement
3. Identify the image degradation models which includes linear, position-invariant models
4. Analyze various filtering techniques used to restore the image
5. Explain multi resolution view of wavelet transformation functions in 1D and 2D
6. Mention image compression and segmentation techniques.

UNIT I:

Introduction: Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

Digital Image Fundamentals: Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels.

UNIT II:

Image Enhancement in the Spatial Domain: Some Basic Gray Level Transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing spatial Filters, Sharpening spatial Filters.

Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain, Smoothing frequency-domain Filters, Sharpening Frequency-domain Filters, Homomorphic Filtering, Implementation.

UNIT III:

Image Restoration: A Model of the Image Degradation/Restoration Process, Linear, Position-Invariant Degradations, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.

Wavelets and Multi resolution Processing: Multi resolution Expansions, Wavelet Transforms in one Dimension, The Fast Wavelet Transform, Wavelet Transforms in Two Dimensions.

UNIT – IV

Image Compression: Image Compression Models, Error-free Compression, Lossy Compression, Image Compression Standards.

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

Learning Resources:

Text Book:

1. Rafael C. Gonzalez and Richard E. Woods, *Digital Image Processing*. Prentice Hall India/Pearson Education.

Reference Books:

1. A.K.Jain, *Fundamentals of Digital Image Processing*. Prentice Hall India.
2. Madhuri.A.Joshi, *Digital Image Processing,* PHI.
3. Sonka, *Image Processing, Analysis and Machine Vision.* Cengage Publications.

CS 7006 B
REAL TIME SYSTEMS

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Concepts of real-time systems and recognize the characteristics of a real-time system.
2. Basics of designing and/or choosing hardware and software for simple and advanced real-time systems.
3. Current practical issues in real-time systems.
4. Techniques and results for theoretical analysis of real-time scheduling algorithms.
5. Architectural design of a real-time system.
6. Software engineering principles for real-time system development.

UNIT I:

Typical Real-Time systems: Digital control, High-Level controls, Signal Processing, Other real time applications.

Hard versus soft Real-Time systems: Jobs and Processors, Hard Real-Time systems, Soft Real-Time systems.

A reference model of Real-Time Systems: Processors and Resources, Temporal parameters of real-time workload, Periodic task model, Functional parameters, Scheduling Hierarchy.

UNIT II:

Commonly used approaches to Real-Time scheduling: Clock-Driven approach, Weighted Round-robin approach, Priority Driven approach, Dynamic vs Static systems , Off-line vs. On-line scheduling.

Clock-Driven scheduling: General structure of cyclic schedules, Scheduling sporadic jobs, Algorithm for constructing static schedules**,** Pros and Cons of Clock-driven scheduling.

UNIT III:

Priority-Driven scheduling of Periodic tasks: Static Assumption, Fixed-Priority versus Dynamic-Priority algorithms, Optimality of the RM and DM algorithms, A schedulability test for Fixed-Priority tasks with short response times and arbitrary response times, sufficient schedulability conditions for the RM and DM algorithms.

Scheduling Periodic and sporadic jobs in Priority-Driven systems: Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth and weighted Fair-Queuing Servers, Scheduling of sporadic Jobs.

UNIT – IV

Resources and Resources Access Control: Assumptions on Resources and their usage, Nonpreemptive critical sections, Basic priority-Inheritance protocol, Basic Priority-Ceiling Protocol, Preemption-Ceiling Protocol.

Scheduling Flexible computations and tasks with temporal distance Constraints: Flexible Applications, Tasks with Temporal Distance Constraints

Learning Resources:

Text Book:

1. Jane W.S.Liu, *Real-Time Systems*. 3 ed, Pearson Education.

Reference Book:

1. C.M.Krishna and G.Shin, *Real-Time Systems.* Tata Mc Graw Hill.

CS 7006 C
ADVANCED DATABASE MANAGEMENT SYSTEMS

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

- Understand ISAM, B^+tree indices, the impact of index implementation
- Generate a good evaluation plan for a given query among many alternative plans
- Transaction management in Parallel, Distributed and Object Oriented databases
- Benchmarks to measure commercial database system performance
- Transaction processing monitors, transactional workflows

UNIT I:

Indexing: Basic Concepts- Ordered Indices- B+-Tree Index Files- B-Tree Index Files- Index Definition in SQL

Query Processing: Overview- Measures of Query Cost- Selection Operation- Sorting- Join Operation- Other Operations- Evaluation of Expressions

Query Optimization: Overview- Estimating Statistics of Expression Results- Transformation of Relational Expressions- Choice of Evaluation Plans- Materialized Views.

UNIT II:

Object –Relational Databases: Nested Relations- Complex Types- Inheritance- Reference Types- Querying with Complex Types- Functions and Procedures- Object-Oriented versus Object-Relational

Distributed Databases: Homogeneous and Heterogeneous Databases- Distributed Data Storage- Distributed Transactions- Commit Protocols- Concurrency Control in Distributed Databases- Availability- Distributed Query Processing- Heterogeneous Distributed Databases- Directory Systems

UNIT III:

Parallel Databases: Introduction- I/O Parallelism- Interquery Parallelism- Intraquery Parallelism- Intraoperation Parallelism- Interoperation Parallelism- Design of Parallel Systems

Application Development and Administration: Web Interfaces to Databases- Performance Tuning- Performance Benchmarks- Standardization- Legacy Systems

UNIT – IV

Advanced Data Types and New Applications: Motivation- Time in Databases- Spatial and Geographic Data- Multimedia Databases- Mobility and Personal Databases

Advanced Transaction Processing: Transaction-Processing Monitors- Transactional Workflows- Main-Memory Databases- Real-Time Transaction Systems- Long-Duration Transactions- Transaction Management in Multidatabases

Learning Resources:

Text Book:

1. Avi Silberschatz Henry F. Korth and S. Sudarshan, *Database System Concepts*. 5 ed Tata McGraw-Hill Publications.

Reference Books:

1. Thomas M. Connolly and Carolyn E. Begg *Database Systems: A Practical Approach to Design, Implementation and Management,* 5 ed, Addison-Wesley.

2. OZSU and Valduriez, *Principles of Distributed Database Systems.* 2 ed, Pearson, 2001.

CS 7006 D
BIO-INFORMATICS

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:

1. Explain fundamental concepts of biology and bioinformatics
2. Understand the sequence/structure analysis of genomics and proteomics.
3. Analyze protein and gene sequence/structures of databases.
4. Use sequence alignment techniques to analyze similarity between sequences.
5. Apply database search for primary/secondary sequences and search protocol
6. Understand various Analysis packages of bioinformatics.

UNIT I:

Introduction and DNA Sequence analysis: Introduction: Introduction to Bioinformatics: History of bioinformatics. Role of bioinformatics in biological sciences, Scope of bioinformatics, The Central dogma, DNA and Protein, Genetic code, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy.

UNIT II:

Data Bases in Bioinformatics

Protein Information Resources: Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.

Genome Information Resources: DNA sequence databases, specialized genomic resources

UNIT III:

Alignment Techniques

Pair wise alignment techniques: Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

Multiple sequence alignment: Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching

UNIT – IV

Database Searching and Analysis Packages

Secondary database searching: Importance and need of secondary database searches, secondary database structure and building a sequence search protocol

Analysis Packages: Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

Learning Resources:

Text Book:

1. K Attwood & D J Parry-Smith, *Introduction to Bioinformatics.* Addison Wesley Longman
2. DanE Krane, Michael L Raymer, *Fundamental Concepts of Bioinformatics*. Wright State University: Benjamin Cummings.

Reference Books:

1. Jean-Michel Claveriw, Cerdric Notredame, *Bioinformatics- A Beginner's Guide.* WILEY DreamTech India Pvt. Ltd.
2. Scott Markel &Darryl Leon, *Sequence Analysis in A Nutshell*. O'REILLY.

CS 7006 E
ARTIFICIAL INTELLIGENCE

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

Course Outcomes:
1. Understand the basic principles and applications of Artificial Intelligence
2. Solve various problems by applying a suitable search method
3. Represent knowledge using various different techniques
4. Apply knowledge representation and list the key aspects of planning
5. Design various logic programs with Prolog

UNIT I:

Problems, Problem Spaces And Search: Defining the Problem as a State space Search, Production Systems, Problem Characteristics, Production system characteristics, Issues in the Design of Search Programs.

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

UNIT II:

Knowledge Representation Using Predicate Logic: Representing Simple Facts in logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Question answering.

Representing Knowledge Using Rules : Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.

Weak Slot-And-Fillers Structures: Semantic Nets, Frames.

UNIT III:

Strong Slot-and- Filter Structures: Conceptual dependency, Scripts.

Hopfield Networks, Perceptrons, Back propagation networks, generalization, Applications of Neural networks, Expert systems.

PROLOG Language:

Facts, Objects and predicates, Variables, Rules, Input and Output, Arithmetic Operations, Cut, Fail, Recursion, string operations, Dynamic databases, Lists.

Learning Resources:

Text Book:

1. Elaine Rich and Kevin Knight, *Artificial Intelligence.* 2 ed, Tata McGraw Hill Edition
2. Carl Townsend, *Introduction to TURBO PROLOG*. BPB Publications.

Reference Books:

1. Patrick Henry Winston, *Artificial Intelligence*. Pearson Education/Prentice Hall of India.
2. Russel and Norvig, *Artificial Intelligence*. Prentice Hall of India/Pearson Education
3. Giarratano, *Expert Systems :Principles and Programming*. Cengage Publications.

CS 7006 F
INDUSTRY NEED BASED ELECTIVE*

Lecture :	3 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	3

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

- Understand the current needs of the industry
- Engage in life-long learning
- Use techniques, skills, and modern engineering tools
- Analyze and solve the problems of the society

UNIT I:

UNIT II:

UNIT III:

UNIT – IV

Learning Resources:

Text Book:

Reference Books:

*** Introduced as per the needs of Industry from time to time.**

CS 7051
. NET TECHNOLOGIES LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Describe the benefits and architecture of Client Server Technology.
2. Understand the concepts of CORBA, RMI and .Net technologies.
3. Apply the components of C# .Net technology to given applications
4. Classify the architecture of CORBA and mapping the CORBA with existing Programming languages like Java.
5. Implement integration of component based architectures with Enterprise applications.
6. Demonstrate understanding the concepts of Java Bean Component model.

LIST OF PROGRAMS

Design Windows Applications Using C#.NET

Week 1:

A form validates user Input.
Calendar.

Week 2:

Calculator
Alarm Clock.

Week 3:

Demonstrate basic String manipulation functions using both string builder and string classes

Week 4:

Notepad.

Week 5:

Design an application to demonstrate DML & DDL Command using ADO.NET

Week 6:

Web browser
Media player

Week 7:

Create and access Assemblies

Design Web Applications Using ASP.NET

Week 8:

Web Design a Web Form to demonstrate all ASP.Net controls.

Week 9:

Database application using ADO.NET.

Week 10:

Design a Web page that counts no of users visited and Number of users Online.
Sending an E-Mail.

Week 11:

Online Birthday reminder.

Week 12:

Using and Creating an XML document

Learning Resources:

Text Books :

1. Kevin Hoffman, *Microsoft Visual C# 2005 Unleashed.* Sams Pearson India, 2006
2. Andrew Troelson, *Pro C# 2005 and the .NET Platform.* 3 ed, Apless 2005.

CS 7052
EMBEDDED SYSTEMS LAB

Lecture :	--	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Understand the architecture of 8051 microcontroller.
2. Write and implement Assembly language programs for 8051 microcontroller.
3. Understand the basics of embedded systems and their applications.
4. Understand the Basic design using real time operating systems.
5. Understand Embedded Software Development process and Tools.

LIST OF PROGRAMS
On 8051 and PIC microcontrollers

Week1:

Basic programs on Data transfer instructions using 8051

Week 2:

Programs on Arithmetic instructions using 8051

Week 3:

Programs on Logical instructions using 8051

Week 4:

Programs to Branching Instructions using 8051

Week 5:

Programs to Subroutine instructions using 8051

Week 6:

Programs on Timer & counters concepts

Week7:

Programs on Interfacing of ADC/DAC

Week8:

Programs on Interfacing of stepper Motor

Week9:

Programs on Interfacing of LCD

Week 10:

Programs For Traffic lights control

Additional Exercises

Programs on Interrupt
Mechanism Programs on
Memory Interfacing EPROM
Flash Programming
Programs on networking using PIC microcontroller
Writing serial device driver code with an UART 8250 device.
Programs on Interfacing of seven segment Display

LearningResources:

Text Books :

1. Kenneth. J.Ayala, Penram, *The 8051 Microcontroller Architecture, Programming and Applications.* 2 ed. Penram International, 1996.
2. Raj Kamal, *Embedded Systems Architecture, Programming and Design*., 2 ed, Tata Mc GrawHill

Reference Books:

1. David E.Simon, *An Embedded Software Primer.* Pearson Education Asia
2. Frank Vahid and Tony Givargis, *Embedded Systems Design – A Unified Hardware /Software Introduction,* John Wiley, 2002.

CS 7053
MINI PROJECT

Lecture :	--	**Internal Assessment:**	75 (I:25, E:50)
Tutorial :	1	**Final Examination:**	-
Practical :	-	**Credits:**	1

Course Outcomes:

1. Formulate a real world problem and develop its requirements
2. develop a design solution for a set of requirements
3. Test and validate the conformance of the developed prototype against the original requirements of the problem
4. Work as a responsible member and possibly a leader of a team in developing software solutions
5. Express technical and behavioural ideas and thought in oral settings
6. Participate in and possibly moderate, discussions that lead to making decisions
7. Express technical ideas, strategies and methodologies in written form
8. Prepare and conduct oral presentations
9. Self learn new tools, algorithms, and/or techniques that contribute to the software solution of the project
10. Generate alternative solutions, compare them and select the optimum one.

CS 8001

SOFTWARE TESTING METHODOLOGIES

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	1 hr/ Week	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand types of testing and bugs.
2. Understand flow graphs and apply path testing.
3. Apply transaction and data flow techniques.
4. Distinguish various domains.
5. Apply different testing techniques.

UNIT I:

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT II:

Transaction Flow Testing: transaction flows, transaction flow testing techniques. **Dataflow testing**: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT III:

Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability. **Paths, Path products and Regular expressions**: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

UNIT – IV

Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications. **State, State Graphs and Transition testing**: state graphs, good and bad state graphs, state testing, Testability tips.

Learning Resources:

Text Book:

1. Baris Beizer, *Software Testing Techniques,* 2 ed, Dreamtech.

Reference Books:

1. *Software Testing Techniques* – SPD (Oreille)
2. Edward Kit, *Software Testing in the Real World.* Pearson.
3. Perry, *Effective Methods of Software Testing,* John Wiley.

CS 8002 A
INFORMATION RETRIEVAL SYSTEMS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Record structures and text processing required producing basic document retrieval systems.
2. Content-based retrieval approaches—Boolean, vector space, and probabilistic approaches.
3. User Search techniques for commercial and digital information access and retrieval systems.

UNIT I:
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.
Information Retrieval System Capabilities: Search, Browse, Miscellaneous

UNIT II:
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.
Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT III:
Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT – IV
User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.
Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.
Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

Learning Resources:

Text Book:

1. Gerald J Kowalski, Mark T Maybury, *Information Storage and Retrieval Systems*. Springer International Edition.

Reference Books:

1. Frakes, W.B and Ricardo Baeza Yates, *Information Retrieval Data Structures and Algorithms.* Prentice Hall, 1992.
2. Yates, *Modern Information Retrival* Pearson Education.
3. Robert Korfhage, *Information Storage and Retieval.* John Wiley and Sons.

CS 8002 C
VIRTUAL REALITY

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understands various input and output devices (Trackers, Navigation, and Gesture Interfaces) (Graphics displays, sound displays & haptic feedback)
2. Familiar with the three I's of virtual reality, commercial VR technology and the five classic components of a VR system.
3. Design virtual reality systems.
4. Able to distinguish between various kinds of modeling
5. Understand the basic components of a VR system.
6. Implement programming in Virtual Reality.

UNIT I:

Introduction: The three I's of Virtual Reality, early commercial VR technology and the five classic components of a VR system.

Input Devices: Trackers, Navigation, and Gesture Interfaces: Three-dimensional position trackers, Navigation and Manipulation interfaces, Gesture interfaces.

UNIT II:

Output Devices: Graphics Displays, Sound Displays & Hap tic feedback.

Modeling: Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management.

UNIT III:

Human Factors: Methodology and terminology, user performance studies, VR health and safety issues.

Computing Architectures for VR: The Rendering Pipeline, PC Graphics Architecture, Workstation-Based Architectures, Distributed VR Architectures.

UNIT – IV

Traditional & Emerging VR Applications: Medical applications of VR, Military VR applications, VR Applications in manufacturing, Applications of VR in Robotics.

VR Programming: Toolkits and Scene Graphs, WorldToolKit, Java3D, General Haptics Open Software Toolkit, People Shop.

Learning Resources:

Text Book:

1. Grigore C. Burdea and Philippe Coiffet, *Virtual Reality Technology*. 2 ed, A John Wiley & Sons, Inc., Publication.

References Books:

1. William R.Sherman, Alan Craig, *Understanding Virtual Reality, Interface, Application and Design*, Elsevier (Morgan Kaufmann).
2. Bill Fleming, *3D Modeling and Surfacing*, Elsevier (Morgan Kauffman).
3. David H.Eberly, *3D Game Engine Design*. Elsevier.
4. John Vince, *Virtual Reality Systems*, Pearson Education.

CS 8002 D
E-COMMERCE

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Define e-commerce and identify some business applications of e-commerce.
2. Identify the strategic goals of e-commerce.
3. Know the approaches to safe Electronic Commerce.
4. Describe different Electronic payment Schemes.
5. Know the various types of security issues and solutions for e-commerce.
6. Describe the approaches for electronic publishing.

UNIT I:

Electronic Commerce Environment and Opportunities: Background, The Electronic Commerce Environment, Electronic Marketplace Technologies.

Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward. Approaches to Safe Electronic Commerce: Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

UNIT II:

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash.

Internet/Intranet Security Issues and Solutions : The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

UNIT III:

Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: Introduction, The Means of Distribution, A model for Message Handling, E-mail working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

UNIT – IV

Internet Resources for Commerce: Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet. Advertising on Internet: Issues and Technologies. Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.\

Learning Resources:

Text Book:

1. Daniel Minoli, Emma Minoli, *Web Commerce Technology Handbook*. TATA McGraw-Hill Edition.

Reference Books:

1. Ravi Kalakotar and Andrew B.Whinston, *Frontiers of Electronic Commerce.* Pearson Education - 1999.
2. Achuyut S.Godbole and Atul Kahate, *Web Technologies TCP/IP to Internet Application Architectures.* Tata McGraw-Hill Publishing Company Limited.
3. Schneider, *Electronic Commerce*, Cengage Publications

CS 8002 E
GRID COMPUTING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand the basic concepts of Cluster Computing, Grid Computing and Mobile Grid Models.
2. Integrating Task parallelism with Data Parallelism.
3. Know about a parallel Computing Model over Grids.
4. Can develop some simulation algorithms for job shop scheduling etc

UNIT I:

Introduction: Cluster to Grid Computing: Cluster computing models, Grid models, Mobile grid models, Applications.

Parset: System Independent Parallel Programming on distributed systems:-Motivation and introduction, Semantics of the parset construct, Expressing parallelism through parsets, Implementing parsets on a loosely coupled distributed system.

Anonymous Remote Computing Model:-Introduction, Issues in parallel computing on interconnected workstations, Existing distributed programming approaches, The arc model of computation, The two-tired arc language constructs, Implementation

UNIT II:

Integrating Task Parallelism with Data Parallelism: Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work

Anonymous Remote Computing and Communication Model: Introduction, Location-independent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes, Case study, and Performance analysis.

Parallel Programming Model on CORBA:-Introduction, Existing works, notion of concurrency, system support implementation performance, stability of CORBA: introspection.

UNIT III:

Sneha-Samuham: Grid Computing Model: Introduction, Sneha-Samuham: a parallel computing model over grids, Design and implementation of the model, Performance studies, Related work.

Introducing Mobility into Anonymous Remote Computing and Communication Model: Introduction, issues in mobile clusters and parallel computing on mobile clusters, moset overview, moset computation model, implementation, performance.

UNIT – IV

Distributed Simulating Annealing Algorithms for Job Shop Scheduling: Introduction, overview, distributed algorithms for job shop scheduling, implementation, results and observation.

Parallel Simulated Annealing Algorithms: Introduction, Simulated Annealing (SA) Technique, Clustering algorithm for Simulated Annealing (SA), Combination of genetic algorithm and simulated annealing (SA) algorithm

Learning Resources:

Text Book:

1. D.Janakiram, *GRID COMPUTING-A Research Monograph*. TMH publications, 2005.

Reference Books:

1. Ahmar Abbas and Charles, *Grid Computing: A Practical Guide to technology and Applications*. River Media, 2003.
2. Joshy Joseph and Craig Fellenstein, *Grid Computing*, Pearson Education

CS 8003 A
SOFT COMPUTING

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand the need and usage of Soft Computing in various areas
2. Know the steps involved in the development of Soft Computing;
3. Use popular tools for Soft Computing;
4. Design and implement computing systems by using appropriate Soft Computing techniques and tools.

UNIT I:
Artificial Neural Networks: Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning – Back propagation networks - Kohnen's self organizing networks - Hopfield network.

UNIT II:
Fuzzy Systems: Fuzzy sets and Fuzzy reasoning - Fuzzy matrices - Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.
Neuro - Fuzzy Modeling: Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing – Evolutionary computation.

UNIT III:
Genetic Algorithms: Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction - Rank method - Rank space method.

UNIT – IV
Soft computing and Conventional AI : AI search algorithm - Predicate calculus - Rules of interference – Semantic networks - Frames - Objects - Hybrid models - Applications.

Learning Resources:

Text Books:

1. Jang J.S.R., Sun C.T. and Mizutani E, *Neuro-Fuzzy and Soft Computing.* Prentice Hall of India /Pearson Education, 1998.

Reference Books:

1. Timothy J.Ross, *Fuzzy Logic with Engineering Applications*. McGraw Hill, 1997.
2. Laurene Fausett, *Fundamentals of Neural Networks*. Pearson Education/Prentice Hall of India, 1994.
3. George J. Klir and Bo Yuan, *Fuzzy sets and Fuzzy Logic*. Prentice Hall of India/Pearson Education.
4. Nih J.Nelsson, *Artificial Intelligence - A New Synthesis.*, Harcourt Asia Ltd., 1998.
5. D.E.Goldberg, *Genetic Algorithms: Search, Optimization and Machine Learning*. Pearson Education, NY, 1989.

CS 8003 B
ADVANCED EMBEDDED SYSTEMS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand devices that are required to transfer software from host machine to Target machine.
2. Understand the functions of RTOs
3. Design Embedded Systems
4. Test and debug Embedded Software

UNIT I:

Introduction: Embedded Design life cycle – Product specification – Hardware / Software partitioning, Detailed hardware and software design, Integration, Product testing, Selection Processes – Microprocessor Vs Micro Controller – Performance tools, Bench marking, RTOS Micro Controller – Performance tools, Bench marking, RTOS availability, Tool chain availability, Other issues in selection processes.

UNIT II:

Partitioning: Partitioning decision – Hardware / Software duality, coding Hardware – ASIC revolution – Managing the Risk, Co-verification, execution environment, memory organization, System startup – Hardware manipulation – memory, mapped access, speed and code density.

UNIT III:

Interrupt Service Routines : Interrupt Service routines – Watch dog timers – Flash memory Basic toolset – Host and debugging – Remote debugging – ROM emulators, logic Analyzer, Caches – Computer optimization – Statistical profiling - Serial/parallel port interfacing and drivers, DMA & high speed I/O interfacing, Memory selection for embedded systems.

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UNIT – IV

Emulators and Testing: Bullet proof run control – Real time trace, Hardware break points – Timing constraints – Triggers, Testing, Bug tracking, reduction of risks & costs – Performance – Unit testing, Regression testing, Choosing test cases – Functional tests, Coverage tests, Testing embedded software .

Learning Resources:

Text Books:

1. Arnold S. Berger, *Embedded System Design.* CMP books, USA 2002.

Reference Books:

1. Wayne Wolf, *Computers as Components: Principles of Embedded Computer Systems Design*, Morgan Kaufman Publishers, 2004.
2. Frank Vahid and Tony Gwargie *Embedded System Design*, John Wiley & sons, 2002.
3. Steve Heath, *Embedded System Design*.2 ed, Elserien, 2004

CS 8003 C
PRINCIPLES OF TCP/IP

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand the architecture and underlying technologies of TCP/IP.
2. Understand Socket Programming.
3. Identify the need of multiple protocols.
4. Explain routing mechanism within an autonomous system.
5. Differentiate Multicast Routing Protocols.
6. Understand IP Switching and MPLS.
7. Understand Mobile IP, Internet Security And Firewall Design.

UNIT I:

Introduction and Overview : The Motivation for Internetworking, The TCP/IP Internet, Internet Services, History And Scope Of The Internet
The Socket Interface Introduction Adding Network I/O to UNIX, Socket Programming
Review Of Underlying Network Technologies: Introduction, Two approaches to network communication, Ethernet Technology, Switched Ethernet Asynchronous Transfer Mode

UNIT II:

Protocol Layering: The Need for Multiple Protocols, TCP/IP 5-Layer Reference Model Layering in a TCP/IP Internet Environment, Two Important Boundaries In The TCP/IP Model The Basic Idea Behind Multiplexing and demultiplexing

UNIT III:

Routing Between Peers (BGP): Autonomous System Concept, Exterior Gateway Protocols and Reachability. BGP Routing algorithm, Routing within an Autonomous System (RIP, OSPF)
Internet Multicasting IGMP, Multicast Routing Protocols IP Switching and MPLS

UNIT – IV

Mobile IP Mobility, Routing, and Addressing Overview Of Mobile IP Operation Foreign Agent Discovery, Agent Registration Communication With A Foreign Agent Datagram Transmission And Reception Bootstrap and Auto configuration (**DHCP**) Network Management (**SNMP**) Internet Security And Firewall Design (**IPsec, SSL**) A Next Generation IP (**IPv6**)

Learning Resources:

Text Book:

1. Douglas E. Comer *Internetworking with TCP/IP Vol. I: Principles, Protocols, and Architecture.* Prentice Hall of India.

Reference Books:

1. Behrouz A. Forouzan, *TCP/IP Protocol Suite.* 2 ed, Tata McGraw Hill publications
2. Gary R. Wright, W. Richard Steven, *TCP/IP Illustrated Vol. II.* Pearson Education.
3. Douglas E. Comer and David L. Stevens, *Internetworking with TCP/IP Vol. II: ANSI C Version: Design, Implementation, and Internals.* 3 ed, Prentice Hall of India.

CS 8003 D
NEURAL NETWORKS

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:

1. Understand the fundamentals of neural networks and identify which types of neural networks are used for discriminators, classifiers, computation
2. List the techniques for computer-based representation and manipulation of complex information
3. Analyze training algorithms such as feed forward, back- propagation
4. Understand how Neuro dynamics and Hopfield models are used in neural networks

UNIT I:

Introduction - what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process – Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process,

UNIT II:

Single layer perceptrons – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron –convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment

Multilayer Perceptron – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection,

UNIT III:

Back Propagation - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning.

Self Organization Maps – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification

UNIT – IV

Neuro Dynamics – Dynamical systems, stability of equilibrium states, attractors, neurodynamical models , manipulation of attractors as a recurrent network paradigm

Hopfield Models – Hopfield models, computer experiment

Learning Resources:

Text Book:

1. Simon Hhaykin, *Neural Networks A comprehensive foundations.* 2 ed Pearson Education 2004

Reference Books

1. B.Vegnanarayana, *Artifical Neural Networks*. Prentice Halll of India P Ltd, 2005.
2. Li Min Fu, *Neural Networks in Computer Intelligence*. TMH, 2003.
3. James A Freeman David M S Kapura, *Neural Networks*, Pearson Education, 2004

CS 8003 E
PATTERN RECOGNITION

Lecture :	4 hrs/ Week	**Internal Assessment:**	30
Tutorial :	-	**Final Examination:**	70
Practical :	-	**Credits:**	4

Course Outcomes:
1. Understand the basic concepts of pattern recognition system
2. Describe the Maximum Likelihood and Bayesian parameter estimations
3. Compare the supervised, unsupervised dimensionality reduction techniques
4. Explain the Hidden Markov Model
5. Apply clustering techniques to multivariate data

UNIT I:

Introduction: Machine perception, pattern recognition systems, the design cycle, learning and adaptation.

Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces.

UNIT II:

Normal density: Univariate and multivariate density, discriminant functions for the normal density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context.

Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case.

UNIT III:

Problems of dimensionality: Accuracy, Dimension and Training Sample size, Computational Complexity, Over fitting

Component analyses and discriminants: Principal component analysis, Fisher Linear Discriminant, Multiple Discriminant Analysis, Nonlinear component analysis; Low dimensional representations and multi dimensional scaling..

UNIT – IV

Hidden Markov Models: First- Order Markov Models, First- Order Hidden Markov Models, Hidden Markov Model computation, Evaluation, Decoding, Learning

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering.

Learning Resources:

Text Book:

1. Richard O. Duda, Peter E. Hart, David G. Stroke *Pattern Classifications,*. 2 ed, Wiley Student Edition.

References :

1. Earl Gose, Richard John baugh, Steve Jost , *Pattern Recognition and Image Analysis.* PHI 2004
2. Lawerence Rabiner, Biing – Hwang, *Juang Fundamentals of speech Recognition.* Pearson Education.

CS 8051
SOFTWARE TESTING TOOLS LAB

Lecture :	-	**Internal Assessment:**	25
Tutorial :	-	**Final Examination:**	50
Practical :	3 hrs/ Week	**Credits:**	2

Course Outcomes:

1. Understand types of testing and bugs.
2. Understand flow graphs and apply path testing.
3. Apply transaction and data flow techniques.
4. Distinguish various domains.
5. Apply different testing techniques.

LIST OF PROGRAMS:

Week 1: Introduction to Rational Functional tester.

- View Functional Test perspective.
- Record and play back a simple script

Week 2: Recording a Script

- Record a Data verification point.
- Record a Properties verification point.
- Include script support functions in a script.
- Include a timer in a script.
- Insert recording into a script.

Week 3: Playing Back a Script and Viewing Results

- View a specific log.
- View results from a script containing a verification point.
- Use the Verification Point Comparator.
- Insert a breakpoint into a script.
- Set Functional Tester options and preferences

Week 4: Extending Scripts

- Record a script, add code for a message box, and play back the script.
- Record a script, add code to override some preference settings, and play back the script.
- Run a sample script that has an unexpected active window.
- Edit the script to handle an unexpected active window and play back the script.

Week5: Extending Scripts

- Create a helper class and move the code to handle an unexpected activewindow into the helper class.

Week 6: Using Test Object Maps

- Display a test object map.
- Create and use a shared test object map.
- Modify a test object map

Week 7: Managing Object Recognition

- Set recognition score thresholds.
- Set up pattern-based recognition.
- Update the baseline for a verification point

Week 8: Creating Data-Driven Tests in Functional Tester:

- Record a data-driven test script
- Change a verification point reference from a literal to a datapool variable
- Edit data in a datapool
- Run a data-driven test script and view the results

Week 9: Importing a Datapool:

- Import and edit an external datapool
- Associate the datapool with a test script
- Change script literal values to variable references
- Play back script
- Troubleshoot an imported datapool

Week 10: Exporting a Datapool

- Create a datapool while recording a test script
- Edit a recorded verification point
- Edit a datapool
- Import a CSV file into a new datapool

Learning Resources:

1. K V V K Prasad **,** *Software Testing Tools***.**

2. Elfriede Dustin, Jeff Rashka, John Paul, ***Automated Software Testing.***

3. Kanglin Li, Mengqi Wu, ***Effective Software Ttest Automation*****.**

CS 8052
MAJOR PROJECT

Lecture :	2 hrs / week	**Internal Assessment:**	50
Tutorial :	6 hrs / week	**Final Examination:**	100
Practical :	-	**Credits:**	12

Course Outcomes:

1. Formulate a real world problem and develop its requirements.
2. Develop a design solution for a set of requirements.
3. Test and validate the conformance of the developed prototype against the original requirements of the problem.
4. Work as a responsible member and possibly a leader of a team in developing software solutions .
5. Express technical and behavioural ideas and thought in oral settings.
6. Participate in and possibly moderate, discussions that lead to making decisions.
7. Express technical ideas, strategies and methodologies in written form.
8. Prepare and conduct oral presentations.
9. Self learn new tools, algorithms, and/or techniques that contribute to the software solution of the project.
10. Generate alternative solutions, compare them and select the optimum one.