SCHEME FOR SYLLABUS
OF
B.TECH. (COMPUTER SCIENCE ENGINEERING)

University Institute of Information Technology

HIMACHAL PRADESH UNIVERSITY

SUMMER HILL

SHIMLA-5

Scheme of Examination (Common to all branches)											Credits
First Semester						Exam Schedule		Practical Schedule			
Course No.	Subjects	L	T	P	Total	Theory	Sess.	Pract.	Sess.	Total	
AS – 1001	Applied Mathematics – I	3	1	-	4	100	50	-	-	150	4
AS – 1002	Applied Physics – I	3	1	-	4	100	50	-	-	150	4
ME – 1001	Engineering Graphics	3	1	-	4	100	50	-	-	150	4
HU – 1003	Communication & Professional Skills in English	3	1	-	4	100	50	-	-	150	4
EC – 1001	Basic Electronics	3	1	-	4	100	50	-	-	150	4
CS – 1001	Introduction to Computers & Programming in C	3	1	-	4	100	50	-	-	150	4
(Practicals/ Drawing/Design)											
AS – 1003	Applied Physics Lab	-	-	2	2	-	-	50	50	100	2
EC – 1002	Basic Electronics Lab	-	-	2	2	-	-	50	50	100	2
ME – 1002	Engineering Graphics Lab	-	-	3	3	-	-	50	50	100	3
CS – 1002	Computer Programming Lab	-	-	2	2	-	-	50	50	100	2
TOTAL		**18**	**6**	**9**	**33**	**600**	**300**	**200**	**200**	**1300**	**33**

35

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

Scheme of Examination (Common to all branches)											
Second Semester						Exam Schedule		Practical Schedule			Credits
Course No.	**Subjects**	**L**	**T**	**P**	**Total**	**Theory**	**Sess.**	**Pract.**	**Sess.**	**Total**	
AS – 2001	Applied Mathematics – II	3	1	-	4	100	50	-	-	150	4
AS – 2002	Applied Physics – II	3	1	-	4	100	50	-	-	150	4
CS - 2002	Fundamentals of Computer Science and Technology	3	1	-	4	100	50	-	-	150	4
HU – 2002	Science, Technology & Society	3	1	-	4	100	50	-	-	150	4
EE – 2001	Basic Electrical Engineering	3	1	-	4	100	50	-	-	150	4
ME – 2001	Basic Mechanical Engineering	3	1	-	4	100	50	-	-	150	4
(Practicals/Drawing/Design)											
EE – 2002	Basic Electrical Engineering Lab	-	-	2	2	-	-	50	50	100	2
CS – 2003	Computer Science Trainer Workshop	-	-	4	4	-	-	50	50	100	4
ME – 2002	Basic Mechanical Engineering Lab	-	-	2	2	-	-	50	50	100	2
IT-1003	Matlab	-	-	2	2	-	-	50	50	100	2
TOTAL		**18**	**6**	**10**	**34**	**600**	**300**	**200**	**200**	**1300**	**34**

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

Scheme of Examination (Computer Science Engineering)											Credits
Third Semester						Exam Schedule		Practical Schedule			
Course No.	Subjects	L	T	P	Total	Theory	Sess.	Pract.	Sess.	Total	
CS – 3001	Numerical Analysis and Computer Programming	3	1	-	4	100	50	-	-	150	4
EC – 3001	Digital Electronics	3	1	-	4	100	50	-	-	150	4
CS – 3003	Data Structures	3	1	-	4	100	50	-	-	150	4
CS – 3004	Computer Organization	3	1	-	4	100	50	-	-	150	4
CS – 3002	Object Oriented Paradigm	3	1	-	4	100	50	-	-	150	4
CS -3005	Principles of Programming Languages	3	1	-	4	100	50	-	-	150	4
(Practicals / Drawing / Design)											
EC – 3004	Digital Electronics Laboratory	-	-	2	2	-		50	50	100	2
CS – 3006	Data Structure & algorithms Laboratory	-	-	2	2	-		50	50	100	2
CS – 3007	Object Oriented Programming Laboratory with C++	-	-	2	2	-		50	50	100	2
CS - 3008	Numerical Analysis and Computer Programming Laboratory	-	-	2	2	-		50	50	100	2
	TOTAL	**18**	**6**	**8**	**32**	**600**	**300**	**200**	**200**	**1300**	**32**

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

Scheme of Examination (Computer Science Engineering)											Credits
Fourth Semester						Exam Schedule		Practical Schedule			
Course No.	**Subjects**	**L**	**T**	**P**	**Total**	**Theory**	**Sess.**	**Pract.**	**Sess.**	**Total**	
CS – 4001	Discrete Mathematics & Logic Design	3	1	-	4	100	50	-	-	150	4
CS – 4002	Operating Systems	3	1	-	4	100	50	-	-	150	4
CS – 4003	Systems Analysis & Design	3	1	-	4	100	50	-	-	150	4
CS – 4004	Advance Computer Architecture	3	1	-	4	100	50	-	-	150	4
CS – 4005	Analysis & Design of Algorithms	3	1	-	4	100	50	-	-	150	4
CS - 4006	Theory of Automata & Computation	3	1	-	4	100	50	-	-	150	4
(Practicals / Drawing / Design)											
CS - 4007	Operating System Laboratory	-	-	2	2	-		50	50	100	2
CS - 4008	Analysis & Design of Algorithms Lab	-	-	2	2	-		50	50	100	2
CS – 4009	SAD Project	-	-	2	2	-		50	50	100	2
	TOTAL	**18**	**6**	**6**	**30**	**600**	**300**	**150**	**150**	**1200**	**30**

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

Scheme of Examination (Computer Science Engineering)											Credits
Fifth Semester						Exam Schedule		Practical Schedule			
Course No.	**Subjects**	**L**	**T**	**P**	**Total**	**Theory**	**Sess.**	**Pract.**	**Sess.**	**Total**	
CS – 5001	Software Engineering	3	1	-	4	100	50	-	-	150	4
CS – 5002	Database Management System	3	1	-	4	100	50	-	-	150	4
CS – 5003	Principles of Engineering Economics & Management	3	1	-	4	100	50	-	-	150	4
EC - 5001	Microprocessor Theory & Applications	3	1	-	4	100	50	-	-	150	4
CS - 5004	Web Technology	3	1	-	4	100	50	-	-	150	4
CS - 5005	Compiler Design	3	1	-	4	100	50	-	-	150	4
(Practicals / Drawing / Design)											
CS - 5006	RDBMS Laboratory	-	-	2	2	-		50	50	100	2
CS - 5007	Web Technology Laboratory	-	-	2	2	-		50	50	100	2
EC - 5002	Microprocessor Laboratory	-	-	2	2	-		50	50	100	2
CS - 5008	Vocational Training*	-	-	2	2	-		50	50	100	2
	TOTAL	**18**	**6**	**8**	**32**	**600**	**300**	**200**	**200**	**1300**	**32**

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

***Note: -**

1. 6 Weeks Vocational Training

Scheme of Examination (Computer Science Engineering)											Credits
Sixth Semester						Exam Schedule		Practical Schedule			
Course No.	Subjects	L	T	P	Total	Theory	Sess.	Pract.	Sess.	Total	
CS – 6001	Modeling and Simulation	3	1	-	4	100	50	-	-	150	4
CS – 6002	Computer Graphics & Multimedia	3	1	-	4	100	50	-	-	150	4
CS – 6003	Computer Networks	3	1	-	4	100	50	-	-	150	4
CS - 6004	Statistical Methods	3	1	-	4	100	50	-	-	150	4
CS - 6005	Core Java Programming	3	1	-	4	100	50	-	-	150	4
EC – 6001	Digital Communications	3	1	-	4	100	50	-	-	150	4
(Practicals / Drawing / Design)											
CS - 6006	Java Programming Laboratory	-	-	2	2	-		50	50	100	2
CS - 6007	Modeling & Simulation Laboratory	-	-	2	2	-		50	50	100	2
EC – 6002	Computer Networks Laboratory			2	2	-		50	50	100	2
CS - 6008	Computer Graphics Laboratory			2	2	-		50	50	100	2
	TOTAL	**18**	**6**	**8**	**32**	**600**	**300**	**200**	**200**	**1300**	**32**

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

Scheme of Examination (Computer Science Engineering)											Credits
Seventh Semester						Exam Schedule		Practical Schedule			
Course No.	**Subjects**	**L**	**T**	**P**	**Total**	**Theory**	**Sess.**	**Pract.**	**Sess.**	**Total**	
CS – 7001	Information Security	3	1	-	4	100	50	-	-	150	4
CS – 7002	Artificial Intelligence	3	1	-	4	100	50	-	-	150	4
CS – 7003	Mobile Computing	3	1	-	4	100	50	-	-	150	4
CS - 7004	E-Commerce & ERP	3	1	-	4	100	50	-	-	150	4
CS - 7005	Advanced Java Programming	3	1	-	4	100	50	-	-	150	4
XX-XXX	Professional Elective-I	3	1	-	4	100	50	-	-	150	4
(Practicals / Drawing / Design)											
CS - 7006	Advanced Java Programming Laboratory	-	-	2	2	-		50	50	100	2
CS - 7007	E-Commerce & ERP Laboratory Laboratory	-	-	2	2	-		50	50	100	2
CS – 7008	Project-I			2	2	-		50	50	100	2
CS - 7010	Artificial Intelligence Laboratory			2	2	-		50	50	100	2
CS - 7009	Vocational Training *	-	-	2	2	-		50	50	100	2
	TOTAL	**18**	**6**	**10**	**34**	**600**	**300**	**250**	**250**	**1400**	**34**

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

***Note: -**

1. 6 Weeks Vocational Training

Scheme of Examination (Computer Science Engineering)											Credits
Eighth Semester						Exam Schedule		Practical Schedule			
Course No.	**Subjects**	**L**	**T**	**P**	**Total**	**Theory**	**Sess.**	**Pract.**	**Sess.**	**Total**	
CS – 8001	Data Warehouse and Data Mining	3	1	-	4	100	50	-	-	150	4
CS – 8002	Soft Computing	3	1	-	4	100	50	-	-	150	4
CS – 8003	Distributed Systems	3	1	-	4	100	50	-	-	150	4
XX-XXX	Open Elective	3	1	-	4	100	50	-	-	150	4
XX-XXX	Professional Elective-II	3	1	-	4	100	50	-	-	150	4
(Practicals / Drawing / Design)											
IT-8004*	Project-II	-	-	10	10	-		150	100	250	10
IT-8005	Project Seminar	-	-	2	2	-		50	50	100	2
IT-8016	General Proficiency	-	-	1	1	-		50	50	100	1
	TOTAL	**15**	**5**	**13**	**33**	**500**	**250**	**250**	**200**	**1200**	**33**

L: Lecture (Theory)/per week **T: Tutorial/per week** **P: Practical/per week**

Sess.: Sessionals **Pract.: Practicals**

Professional Elective -I				Open Elective	
1.	Software Quality Engineering	CS - 7010	1.	Object Oriented Software Engineering	CS-8020
2.	Communication Protocol Engineering	CS - 7011	2.	Computational Complexity	EC-8021
3.	Design of Embedded Systems	CS - 7013	3	Software Project Management	CS-8018
4.	Global Positioning Systems	CS - 7015	4.	Computational Geometry	EE-8009
Professional Elective -II			5.	Bioinformatics	CS-8020
			6.	Communication Network Security	CS-8021
			7	Storage Technologies	CS-8023
			8	Mathematics And Quantitative Techniques For Financial Decisions	HU-8021
1	Mobile Computing*	CS - 8007	9	Adhoc Networks	CS-8022
2	Neural Networks	ES - 8001	10	Parallel Algorithms	CS-8019
3	Real Time Systems	CS - 8008	11	Fuzzy Systems	CS-8024
4	Software Verification, Validation & Testing	CS - 8009	12	Digital Speech Signal Processing	ME-8021
5	Computer Network Management	CS - 8010	13	Disaster Management	CS-8022
6	Digital Image Processing	CS - 8011	14	Mobile Application Development	CS-8025
			15	Cloud Computing	CS-8026
			16	Intrusion Detection System	CS-8027
			17	Wireless Communication	CS-8028

Note :

For 7th & 8th semesters any of the core courses offered in B. Tech. (IT) which are not being taught in B. Tech. (CSE) can also be offered as elective course.

Syllabus

of

B. TECH.
(Computer Science Engineering)

FIRST SEMESTER

Semester - I

Applied Mathematics - I (AS-1001)

Course Code	**AS-1001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Applied Mathematics - I**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials / Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Function of several variables, limits and continuity, partial derivatives, higher order partial derivatives, Euler's theorem, Jacobians, maxima of functions of two variables. Lagrange's method of multipliers, double and triple integrals, change of variables, applications of double and triple integrals, beta and gamma functions.

Section B

Reduction formulae, definite integral as limit of a sum, area under a curve, length of an arc of a curve. Linear differential equations of second order with constant coefficients: complementary functions, particular integrals, Euler homogeneous form, and variation of parameters. Convergence of series, Taylor's theorem with remainder, power series expansion of functions, Taylor's and Maclaurin's series.

Section C

Matrices: review of properties of determinants. Elementary operations on matrices. Homogeneous and nonhomogeneous system of linear equations and their properties, bilinear, quadratic, hermitian and skew-hermeitian forms. Eigenvalues of hermitian, skew-hermitian and unitary matrices.

Section D

Complex analytic functions: brief review of complex numbers, complex variable, concept of limit, continuity and derivatives of analytical function, cauchy-Riemann equations, harmonic function, complex series, some elementary functions, logarithm.

Books:

1. Kryszig, Thomas-Finny, Advanced Engineering Mathematics.
2. S.S. Shastri, "Engineering Mathematics (2^{nd} edition) Vol-I and Vol-II.
3. B.S. Grewal, Higher Engineering Mathematics.
4. Piskunov, Differential and Integral Calculus.
5. R.K.Jain and S.R. K. Iyengar, Advanced Engineering, Mathematics.
6. Michael D. Greenberg, Advanced Engg. Mathematics.

Semester - I

Applied Physics - I (AS-1002)

Course Code	**AS-1002**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Applied Physics - I**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/ Assignments, 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Physical Optics: Interference-division of wavefront-fresnel's biprism, division of multitude, interference by Newton's rings, Michelson's interferometer and its applications.

Diffraction- Difference between fraunhofer and fresnel diffraction through slit, plane transmission grating, its dispersal and resolving powers Polarization- polarized and unpolarised light, double refraction, nicol prism, quarter and half wave plates, polarimetry, biquartz and laurents half shade polarimeters, simple concepts of photoelasticity.

Special theory of Relativity: Michelson-Moreley experiments, Relativistic transformations, Variation of mass with velocity, mass energy equivalence.

Section B

Wave and oscillations: Simple harmonic oscillations, simple concept of harmonic oscillator, resonance, quality factor, E.M wave theory, Review of basic ideas, Maxwell's equations and their experimental basis. Simple plane wave equations, simple concepts of wave-guides and co- axial cables, Poynting vector.

Dielelectrics: Molecular Theory, polarization, displacement susceptibility, dielectric coefficient, permitivity and various relations between these Gauss's law in the presence of dielectric, energy stored in an electric field. Behavior of dielectric in field –simple concepts, dielectric losses.

Section C

Quantum Physics: Difficulities with classical physics, Introduction to quantum mechanics- simple concepts, discovery of Planck's constant. De Broglie Waves, Phase and Group Velocities, Particle diffraction, Uncertainty Principle, the wave equation, Postulates of quantum mechanics, Time dependent and independent Schrodinger equation, Expectation Values, Eigen Values and Eigen functions, Particle in a box, Finite Potential Well, Tunnel Effect, Harmonic oscillator. Statistical distributions, Maxwell Boltzmann Statistics, Quantum statistics.

Section D

Nuclear Physics: Neutron cross-section, nuclear fission, moderators, nuclear reactors, reactor criticality, interaction of radiation with matter-basic concepts, Radiation Detectors-ionization chamber, G.M counter, scintillations & solid state detectors, cloud Chamber & bubble chamber.

Books:

1. Arthur Beiser, Concepts of Modern Physics, 5th International edition Tata McGraw Hill
2. Wehr, Richards & Adair, Physics of the Atom.
3. A.S.Vasudeva, Modern Engg. Physics.

Semester - I

Engineering Graphics (ME-1001)

Course Code	**ME-1001**	**Credits-6**	**L-3, T-1, P-0**
Name of the Course	**Engineering Graphics**		
Lectures to be Delivered	**78 Hrs. of Lab. Work (6 hrs. per week)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2), 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50** **Min. Pass Marks: 25**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION – A

Plane Curves And Free Hand Sketching:

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves, Scales: Construction of Diagonal and Vernier scales. Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

SECTION – B

Projection Of Points, Lines And Plane Surfaces:

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

SECTION – C

Projection of Spolids

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

SECTION – D

Projection of Sectioned Solids and Development of Surfaces

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and

holes

Principles of isometric projection

isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones-combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

Introduction: Starting, User Interface, Working with Commands, Cartesian Workspace, Opening an Existing Drawing File ,Viewing Your Drawing ,Saving Your Work,

Basic Drawing & Editing Commands : Drawing Lines , Erasing Objects , Drawing Lines with Polar Tracking , Drawing Rectangles, Drawing Circles , Undo and Redo Actions.

Drawing Precision: Using Running Object Snaps , Using Object Snap Overrides , Polar Tracking at Angles, Object Snap Tracking , Drawing with Snap and Grid (Optional).

Books:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2. AUTOCAD for Engineers and Designers BY Prof.Sham Tickoo, Published by Dreamtech Press
3. Autocad 2014 for Engineers and Designers by Prof. Sham Tickoo , Amit Bhatt (Author), T. Kishore , Gaurav Verma, Published by Dreamtech Press
4. AutoCAD 2013 and AutoCAD LT 2013 Bible: The Comprehensive Tutorial Resource by Ellen Finkelstein, Published by Wiley India Private Limited

Semester - I

Communication & Professional Skills in English (HU-1003)

Course Code	**HU-1003**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Communication & Professional Skills in English**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E.

Section A

Reading Skills: The skill of effective reading – eye movements, fixations, regression and visual wandering, the right approach to reading; Factors affecting the style of reading – reader related material related and environmental; Memory, retention, association of read material.

Kinds of Reading: Introduction to phonetics – familiarization with speech sound and their symbols – articulation of speech sounds – stress and intonation.

Grammar: Word building use of punctuation marks, articles, tenses, abbreviations, prepositions, idioms & phrases transformation of sentences, incorrect to correct English, single word for a group of words.

Section B

Writing Skills: Business letters: principles, structure and style of writing business i.e., sales letters, claim and adjustment letters, inviting quotations/tenders, writing a memo, job application letters, preparing a personal resume; Effective Meetings: Qualities i.e. planning, processing the discussion, conducting a meeting use of different type of questions, summaries, handling problem situations and problem people, writing notices, agenda and minutes of meetings; Report writing: Characteristics, types of reports, structure of technical/research reports, preparatory steps to report writing; Elements of style: Definition of style, characteristics of a good technical style – practical hints to improve the style of writing ; précis writing; Comprehension of passages (May be picked up from the books recommended for reading).

Section C

Listening Skills: Barriers to listening, effective listening and feedback skills, Telephone techniques. Considerations of listening and voice, developing telephone skills – preparing for the call, controlling the call follow up action. Handling difficult calls and difficult callers.

Section D

Speaking And Discussion Skills: Effective speaking: Preparation i.e., deciding the objective, preparing the environments, organizing the material selection of words, voice modulation, speed, expression, body language, dealing with questions, dealing with nervousness, presentation of audio-visual aids; Group Discussions: The art of participating in group discussion i.e., initiative, cooperation with group members, analysis of the issue, putting one's views effectively, establishing leadership.

Assignments / Seminars / discussions may be given for following skill development. a) Word processing a document

b) Report writing
c) Preparing agenda for meeting
d) Preparing minutes of the meeting / seminars. e) Press

Releases

f) Preparing a Brochure g) Advertisements

h) Preparing a power point slide show on a PC / OHP

i) Any other exercise decided by the course Professor.

Books:

1. Sheila HA Smith, M and Thomas, L., Methuen, Reading to Learn; London, 1982.
2. McGraw, SJ;Basic Managerial Skills for all, Prentice Hall of India, New Delhi 1991
3. Technical Reporting Writing British Association for commercial and Industrial Education, BACIE, 1992
4. Chrissie Wright (Ed.); Handbook of Practical Communication Skills; JAICO Books
5. K.K.Sinha, Business Communication, Galgotia Publishing Company, New Delhi, 1999.
6. English Grammar
7. David Cameron, Mastering Modern English.
8. Robert L. Shuster, Written Communication in Business.
9. Ron Ludlow & Ferous panton. The Essence of Effective Communication.
10. Ragmond & Petit, business Communication.
11. Common Errors in English, by Sudha Publication (P) Ltd., B-5, Prabhat Kiran Building, Rajendra Place, New Delhi – 110008.
12. Abul Hashem, Common Errors in English, Ramesh Publishing House, Daryagang New Delhi.
13. Objective English by Tata McGraw Hill Publishing Co. Ltd., New Delhi.
14. R.K.Bansal & J.B. Harrison, spoken English for India, Orient Longman.
15. Veena Kumar, The Sounds of English, Makaav Educational Software, New Delhi.
16. R.C.Sharma & Krishna Mohan, Business Correspondence and Report writing, Tat McGraw Hill Publishing Co. Ltd., New Delhi
17. Group Discussion by Sudha Publications and Ramesh Publishing House, New Delhi.

Recommended Readings

1. Business @ The Speed of thought, Bill Gates.
2. My Experiments with Truth, M.K.Ghandhi
3. Wings of Fire, A.P.J. Kalam
4. An Autobiography, Jwahar Lal Nehru.

Semester - I

Basic Electronics (EC – 1001)

Course Code	**EC -1001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Basic Electronics**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section -A

Brief review of Band Theory, transport phenomenon in semiconductors, Electrons and holes in Intrinsic semiconductor, Donor and acceptor Impurities, charge densities in semiconductor.
PN Junction, Reverse and Forward bias conditions, Diode Characteristic and parameter, Ideal vs. Practical diode.equivalent circuits and frequency response. rectification-half and full wave, Zener and Avalanche diode, its role as regulator, photodiode.

Section B

Bipolar junction transistor (BJT) and their characteristics as circuit and gain elements.
Two port network analysis, h-parameters and trans-conductance. Equivalent circuits for JFET and MOSFET, enhancement mode and depletion mode MOSFETS.
Unijunction transistor (UJT), UJT characteristics, parameters and circuit operation.

Section C

Bias for transistor amplifier: fixed bias, emitter feed back bias. Feedback principles. Types of feedback, Stabilization of gain, reduction of non-linear distortion, change of inputs and output resistance by negative feedback in amplifier. Amplifiers coupling, types of coupling, Amplifier pass band, Eq circuits for BJT at high frequency response of CE, RC-Coupled amplifiers at mid, low and high frequencies.

Section D

Semi conductor processing, active and passive elements, Integrated circuits, bias for integrated circuits. Basic operational amplifier, applications of operational amplifier – adder, subtractor, Integrator, differentiator and comparator, Photo transistor: its characteristics and applications.

Reference Books:-

1. A.P.Malvino.Electronic Principles.
2. J.D. Ryder Electronic Fundamentals and Applications.
3. J.Millman and C.C.Halkias Electronic Circuits & Devices.
4. J.Millman & C.C.Halkias Integrated Circuits & Devices.
5. N.N.Bhargava & Kulshrestha, Electronic Devices.

Semester - I

Introduction to Computer & Programming in C (CS-1001)

Course Code	**CS-1001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Introduction to Computer & Programming in C**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50** **Min. Pass Marks: 25**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section A

Fundamental Computer Concept: Operating system fundamentals, disk basics, VDU Basics, Keyboard basics, introduction to compiler, interpreter, assembler, linker and loader and their inter relationship, Introduction to basics of Information Technology.

Section B

Problem solving with Computers: Algorithms, pseudo codes and Flowcharts, Debugging, testing and documentation, structure-programming concepts, top down and bottom-up design approaches. Data types, Constants, variables, arithmetic and logical expressions, data inputs and output, assignments statements, conditional statements.

Section C

Iteration, arrays processing, use-defined data types, functions, recursion, parameter passing by reference and by value.

Section D

Structure, Multiple structures, Arrays of structure, Unions,
Files: reading, writing text and binary files, pointers, character pointers, pointers to arrays, arrays of pointer to structures.
(The programming language C is to be taught along with the course in detail.)

Books:

1. Kanitkar, "Let us C", BPB Publications
2. Richie and Kerningham, "C Programming"
3. V Rajaraman "Fundamentals of computers"
4. D.Dromey, "How to solve it by computers" (Prentice Hall)
5. E. Balaguruswamy, "Programming in C", Tata McGraw Hill.

Semester - I

Applied Physics Lab (AS-1003)

Course Code	**AS-1003**	**Credits-2**	**L-0, T-0, P-2**
Name of the Course	**Applied Physics Lab**		
Lectures to be Delivered	**26 hours of Lab. work (2 hrs. per week)**		
Semester End Examination	**Max Marks: 50**	**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Continuous Assessment	**Lab work 30%** **Lab Record 25%** **Viva/ Hands on 25%** **Attendance 20%**		**Max Marks: 50** **Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments

Note: (Two experiments to be done from each section, total number of experiments required to be performed 10 to be decided by the teacher concerned and availability of equipment.)

Section A

1. To find the wavelength of sodium light by Newton's rings experiment.
2. To find the wavelength of sodium light by Fresnel's Biprism experiment.
3. To find the wavelength of sodium light by using the phenomenon of diffraction of light at a straight edge.
4. To find the wavelength of various colors of white light with the help of a plane transmission diffraction grating.
5. To find the wavelength of sodium light by Michelson interferometer.

Section B

1. To find the refractive index and Cauchy's constant of a prism by using spectrometer.
2. To find the resolving power of a telescope.
3. To study the beam parameters of a helium-neon laser.
4. To find the specific rotation of sugar solution by using a polarimeter.
5. To find the velocity of Ultrasonic Waves in a given liquid.
6. To find the specific rotation of sugar using polarimeter

Electricity and Magnetism

Section C

1. To compare the capacitances of two capacitors by De'sauty Bridge.
2. To find the flashing & quenching potentials of argon & also to find the capacitance of unknown capacitor.
3. To find the temperature coefficient of resistance by using platinum resistance thermometer and Callender & Griffith bridge.

Section D

1. To find the frequency of AC mains by using sonometer.
2. To find the low resistance by carrey – Foster's bridge.
3. To find the resistance of a galvanometer by Thomson's constant deflection method using a post office box.

4. To find the value of high resistance by Substitution method.
5. To find the value of high resistance by Leakage method.
6. To convert a galvanometer into an ammeter of a given range.
7. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
8. To find the reduction factor of two turn coil of tangent galvanometer by using a copper voltammeter.

Modern Physics: Section E

1. To find the value of e/m for electrons by Helical method.
2. To determine the charge of an electron by Millikan's oil drop method.
3. To find the ionization potential of Argon. Mercury using a thyratron tube.
4. To find the value of Planck's constant by using a photoelectric cell.

Section F

1. To study the various crystal structures using Beed Model.
2. To calculate the hysteresis loss by tracing a B-H curve for a given sample.
3. To determine the band gap of an intrinsic semiconductor by four probe method.
4. To determine the resisitivity of a semi-conductor by four probe method at different temperatures.
5. To determine the Hall co-efficient.
6. To study the photovoltaic cell & hence to verify the inverse square law.

Books:

1. Practical Physics-S.L.Gupta & V.Kumar.
2. Advanced Practical Physics Vol. I & II – S.P. Singh
3. Practical Physics for B.Sc I, II and III - C.L.Arora.

Semester - I

Basic Electronics Lab (EC-1002)

Course Code	**EC-1002**	**Credits-2**	**L-0, T-0, P-2**
Name of the Course	**Basic Electronics Lab**		
Lectures to be Delivered	**26 hours of Lab. work (2 hrs. per week)**		
Semester End Examination	**Max Marks: 50**	**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Laboratory Continuous Assessment	**Lab work 30%** **Viva/ Hands on 25%**	**Lab Record 25%** **Attendance 20%**	**Max Marks: 50** **Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments:

1. (a) To study the use and scope of using an oscilloscope as a measuring device in an electronic laboratory.
   (b) To study the use and scope of using a millimeter (digital and analog) as a measuring device in an electronics laboratory.
   (c) To study the use and scope of function generator as a signal source in an electronics laboratory.

Set up an experiment to:

2. Draw forward bias and reverse bias characteristics of a p-n junction diode and use it as a half wave and full wave rectifier.
3. Draw the characteristics of a zener diode and use it as a voltage regulator.
4. Draw characteristics of common base configuration of p-n-p transistor.
5. Draw characteristics of common emitter configuration of an npn transistor.
6. Draw characteristics of common drain configuration of a MOSFET.
7. Find the voltage and current gain of single stage common emitter amplifier.
8. Draw the characteristics curve of UJT.
9. Find the voltage gain of single stage voltage series feedback amplifier.
10. Use operational amplifier as
    I) Inverting amplifier
    II) Non-inverting amplifier
    III) Comparator
11. Use operational amplifier as
    I) Integrator
    II) Differentiator
12. Use operational amplifier as
    I) Adder
    II) Precision amplifier
13. Find the overall voltage gain and current gain of a two stage RC coupled amplifier.

Basic electronics should stress on interfacing with real life devices and general-purpose linear units. Emphasis is on system design and not on discrete components, some of the components around which exercises can be built are

1. SCR as triacs and power control.
2. Power supplies starting with zener.
3. Op to compliers and isolations where photo diode, transistors, leds are used.
4. Laser diode (laser pointer)
5. Op amps
6. Op amps for instrument amplifiers.

Note: - Record to be maintained in the laboratory record book for evaluation. Usage of breadboard approach to be encouraged

Semester - I

Engineering Graphics Lab (ME-1002)

Course Code	**ME-1002**	**Credits-3**	**L-0, T-0, P-3**
Name of the Course	**Engineering Graphics Lab**		
Lectures to be Delivered	**39hrs. (Lab Session=13(3 hrs. each))**		
Semester End Examination	**Max Marks: 50**	**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Laboratory Continuous Assessment	**Lab work 30%** **Viva/ Hands on 25%**	**Lab Record 25%** **Attendance 20%**	**Max Marks: 50** **Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

Introduction:

Starting AutoCAD, User Interface, Working with Commands, AutoCAD's Cartesian Workspace, Opening an Existing Drawing File ,Viewing Your Drawing ,Saving Your Work,

Basic Drawing & Editing Commands : Drawing Lines , Erasing Objects , Drawing Lines with Polar Tracking , Drawing Rectangles, Drawing Circles , Undo and Redo Actions.

Drawing Precision in AutoCAD : Using Running Object Snaps , Using Object Snap Overrides , Polar Tracking at Angles, Object Snap Tracking , Drawing with Snap and Grid (Optional).

Making Changes in Your Drawing : Selecting Objects for Editing , Moving Objects , Copying Objects , Rotating Objects , Scaling Objects , Mirroring Objects , Editing with Grips.

Advanced Object Types: Drawing Arcs ,Drawing Polylines, Editing Polylines, Drawing Polygons , Drawing Ellipses.

Getting Information from Your Drawing:

Working with Object Properties , Measuring Objects , Advanced Editing Commands, Trimming and Extending Objects , Stretching Objects , Creating Fillets and Chamfers , Offsetting Objects , Creating Arrays of Objects.

Inserting Blocks: What are Blocks? Inserting Blocks ,Working with Dynamic Blocks , Inserting Blocks with DesignCenter

Setting Up a Layout : Printing Concepts , Working in Layouts , Copying Layouts , Creating Viewports , Guidelines for Layouts.

Text : Working with Annotations , Adding Text in a Drawing , Modifying Multiline Text , Formatting Multiline Text , Adding Notes with Leaders to Your, Drawing , Creating Tables , Modifying Tables, Hatching, Editing Hatches , Adding Dimensions, Dimensioning Concepts , Adding Linear Dimensions , Adding Radial & Angular Dimensions , Editing Dimensions, Model Space and Paper Space, Creating Tiled View ports, Making a View port Current, Joining Two Adjacent View, Paper Space Viewports(Floating Viewports), Editing Viewports, Manipulating the visibility of Viewport Layers

Printing Your Drawing :Printing Layouts , Printing from the Model Tab

Understanding External References:

External References, Dependent Symbols, Managing External Refernces in a drawing, The Overlay option, , Working with the ATTACH Command, The User Coordinate System: The World Coordinate System, Controlling the Visibility of UCS Icon, Defining the New UCS, Managing the UCS

Books:

1. AUTOCAD for Engineers and Designers BY Prof.Sham Tickoo, Published by Dreamtech Press
   Autocad 2014 for Engineers and Designers by Prof. Sham Tickoo , Amit Bhatt (Author), T. Kishore , Gaurav Verma, Published by Dreamtech Press
2. AutoCAD 2013 and AutoCAD LT 2013 Bible: The Comprehensive Tutorial Resource by Ellen Finkelstein, Published by Wiley India Private Limited

Semester - I

Computer Programming Lab. (CS -1002)

Course Code	**CS -1002**	**Credits-2**		**L-0, T-0, P-2**
Name of the Course	**Computer Programming Lab.**			
Lectures to be Delivered	**26 Hrs. of Lab. Work (2 hrs. per week)**			
Semester End Examination	**Max Marks: 50**	**Min Pass Marks: 20**		**Maximum Time: 3 hrs**
Laboratory Continuous Assessment	**Lab work 30% Lab Record 25% Viva/ Hands on 25% Attendance 20%**		**Max Marks: 50**	**Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

A. Dos 6.2 (through MS-DOS prompt, usage of basic commands, idea of .bat, .sys, .com, .exe etc.and usage of an editor to be done in consultation with the faculty incharge for the course).

B. Windows (usage of GUI for working effectively in laboratory to be done in consultation with the faculty incharge for the course).

C. Microsoft office (projects based on word, excel, power point, access, to prepare reports, presentations and databases to be done in consultation with the faculty incharge for the course).

D. Programming of fundamental algorithms in C in the form of projects in groups of two (based on how to solve it, Dromey and let us C by Kanitkar and in consultation with the faculty incharge for the course).List of Lab. exercises to be displayed in advance covering whole of the course. Tentative list is given below to be developed in the form of projects. 10 more exercises to be added by the faculty incharge.

1. Write a program to find the largest of three numbers (if-then-else).
2. Write a program to find the largest number out of ten numbers (for statement).
3. Write a program to find the average male height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statement.
5. Write a program using arrays to find the largest and second largest no.
6. Write a program to multiply two matrices.
7. Write a program to read a string and write it in reverse order.
8. Write a program to concatenate two strings.
9. Write a program to sort numbers using the Quick sort Algorithm.
10. Represent a deck of playing cards using arrays.

Note: -Record to be maintained both electronically and hard copy for evaluation.

SECOND SEMESTER

Semester - II

APPLIED MATHEMATICS – II(AS – 2001)

Course Code	**AS – 2001**	**Credits : 4**	**L-3, T-1, P-0**
Name of the Course	**APPLIED MATHEMATICS-II**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

Vector Calculus: Curves, arc length, tangent, curvature and torsion, Directional derivative, Gradient of a scalar field, divergence and curl of a vector field. Line, surface and volume integrals, theorem of gauss, Stoke's and Green's (proofs not needed), consequences and applications.

SECTION – B

Integral Transforms: Fourier series, Euler's formula, even and odd functions, half range expansions. Fourier integral. Fourier and Laplace transform, Inverse transform of derivatives and integrals, shifting theorem, application to periodic functions, unit step function, impulse function.

SECTION – C

Second order Differential Equations: Solution by: Power series method and its basis, Solution of Bessel and Legendre differential equations, properties of Bessel and Legendre functions.

SECTION – D

Partial Differential Equations (PDE): Formulation and classification. Solution of wave equation heat equation in one dimension and Laplace equation in two dimesion by the method of separation of variables.

Books:

1. E.Kreyszig, Advanced Engineering Mathematics (Wiley Eastern Pvt. Ltd.).
2. S.S.Sastri, Engineering Mathematics (2^{nd}edition) Vol-I and Vol-II.
3. B.S.Grewal, Higher Engineering Mathematics.
4. Piskunov, Differential and Integral Calculus.
5. R.K.Jain and S.R.K.Iyengar, Advanced Engineering, Mathematics.
6. Michael d.Greenberg, Advanced Engg. Mathematics.

Semester - II

APPLIED PHYSICS– II(AS –2002)

Course Code	**AS –2002**	**Credits : 4**	**L-3, T-1, P-0**
Name of the Course	**APPLIED PHYSICS – II**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50% , Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

Crystal Structure: Space lattice, unit cell and translation vector, miller indices, Simple crystal structure, bonding in solids, Experimental x-ray diffraction method, laue method, powder method.

Free electron theory: Elements of classical free electron theory and its limitations. Quantum theory of free electrons, Fermi level, density of states, fermi dirac distribution function, Thermionic emission, Richardson's equation.

SECTION – B

Band Theory of Solids: Origin of energy bands, kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Concept of effective mass and holes, Classification into metals, semiconductors and insulators, fermi energy and its variation with temperature.

SECTION – C

Photoconductivity & Photovoltaic: Photoconductivity in insulating crystals, variation with illumination, Effect of traps, application of photoconductivity, Photovoltaic cell and their characteristics.

Properties of Solids: Atomic Magnetic Moments, Orbital Diamagnetism, Classical Theory of Para magnetism, Ferromagnetism Molecular Field theory and domains, Magnetic circuit. Its comparison with Electric circuit and its applications, Super Conductor (Introduction, Types and Applications) Hall Effect.

SECTION – D

Laser: Spontaneous and stimulated emission, Laser action, Characteristics of Laser Beam – Concept of coherence, Types of lasers based on pumping techniques, He-Ne Laser, Semiconductor Laser (simple Ideas) with applications.

Fiber Optics: Optical communication: Communication through open space, optical wave guides with special reference to Propagation of light in Fibres, Numerical Aperture, single mode and multi mode Fibers, applications.

Books:

1. Charles Kittel: Introduction to Solid State Physics.
2. B.S.Saxena, R.C.Gupta & P.N.Saena: Solid state Physics.
3. M.B.Avadhanulu & P.G.Kshirsagar, A text book of Engineering Physics.
4. Arthur Beiser, concepts of Modern Physics, 5th International edition Tata McGraw Hill.
5. A.J.Dekkar, Introduction to solid state Physics.

Semester - II

FUNDAMENTALS OF COMPUTER SCIENCE AND TECHNOLOGY(CS – 2002)

Course Code	**CS – 2002**	**Credits : 4**	**L-3, T-1, P-0**
Name of the Course	**FUNDAMENTALS OF COMPUTER SCIENCE AND TECHNOLOGY**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

Computer Appreciation: Definition of an Electronic Digital Computer, history, Generations, Characteristics and applications of Computers, classification of Computers.

Fundamentals of Computer & Internet:

Introduction to Computer and Problem Solving: Information and Data Hardware: CPU, Primary and Secondary storage, I/O devices, Bus structure, Computer Peripherals - VDU, Keyboard, Mouse, Printer. Software: System and Application. Different System Software.

Programming Languages: Machine Language, Assembly Language, High Level Language, Object Oriented Language.

SECTION – B

Programming Language Classification: Computer Languages, Generation of Languages, Translators – Interpreters, Compilers, Assembles, Introduction to 4GLS.

Problem solving: Algorithm, Flow charts, Decision tables & Pseudo codes.

Number systems and Codes: Number representation: Weighted codes, Non-weighted codes, Positional, Binary, Octal, Hexadecimal, Binary Coded Decimal (BCD), Conversion of bases. Complement notations, Binary Arithmetic, Binary Codes: Gray, Alphanumeric, ASCII, EBCDIC, Single Error-Detecting and Correcting Codes, Hamming Codes.

Basic Computer Organization: IAS Computer, Von Neumann Computer, System Bus. Instruction Cycle, Data Representation, Machine instruction and Assembly Language, CPU Organization, Arithmetic and Logic Unit, Control Unit, CPU Registers, Instruction Registers, Program Counter, Stack Pointer.

SECTION – C

Introduction to Networking & Advantages of Networking: Basic Features, LAN, MAN and WAN; simple PC Based Network: Example, block diagram. Mode of operation and characteristic features. Types of LAN, Basic ISO-OSI model of LAN, client – Sever Architecture's.

Intranet and Internet: Servers and Clients; Ports; Domain Name Server (DNS); WWW, Browsers Connections: Guided and Unguided media - Dial up, ISDN, ADSN; Cable, Modem; E-mail, Voice and Video Conferencing.

SECTION – D

Information Technology Applications: Multimedia introduction, tools graphics, sound, video and animations. Artificial intelligence (AI) – Basic concepts of AI and Expert systems.

Latest Computer enabled business applications: Basic concepts with definitions and short introduction of Enterprise Resource Planning (ERP), Customer relationship Management (CRM) Supply Chain Management (SCM), E-Commerce. Awareness of Ongoing IT Projects in India such as NICNET, ERNET, INFLIBNET etc.

Books:

1. Rajaram,V.: Introduction to Computer.
2. Morris: Computer Organisation.
3. Hamacher: Computer Organisation.
4. Kanter: Managing Information System.
5. Vital N: Information Technology India Tomorrow.
6. Murthy C.S.V: Fundamentals & Information Technology.

Semester - II

SCIENCE, TECHNOLOGY AND SOCIETY (HU – 2002)

Course Code	**HU – 2002**	**Credits : 4**	**L-3, T-1, P-0**
Name of the Course	**SCIENCE, TECHNOLOGY AND SOCIETY**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

1. Science, Technology and Engineering, as knowledge and as social and professional activities.
2. Inter-relationship of technology growth and social, economic and cultural growth: historical perspective.
3. Ancient, medieval and modern technology/Industrial revolution and its impact. The Indian Science and Technology.

SECTION – B

1. Social and Human critiques of technology: Mumford and Ellul.
2. Rapid technological growth and depletion of resources. Reports of the club of Rome.
3. Energy crisis; renewable energy resources.

Environmental degradation and pollution. Eco-friendly technologies. Environmental regulations. Environmental ethics.

SECTION – C

1. Technology and the arms race. The nuclear threat.
2. Appropriate technology movement Schumacher; later developments.
3. Technology and the developing nations. Problems of technology transfer. Technology assessment/impact analysis.
4. Human operator in Engineering projects and industries Problems of man machine interaction. Impact of assembly line and automation. Human centered technology.

SECTION – D

1. Industrial hazards and safety. Safety regulations. Safety Engineering.
2. Politics and technology. Authoritarian versus democratic control of technology. Social and ethical audit of industrial organizations.
3. Engineering profession. Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and Ethical responsibilities of the engineer. Codes of professional ethics. Whistle blowing and beyond. Case studies.

BOOKS:

1. Appleyard, R.ed. 1989. the impact of international migration on developing countries paris: OECD.
2. Barger, Bernard 1952 science and the social order New York: Free Press.
3. Gaillard, J 1991. Scientists in the third world Lexington: Kentucky University Press.
4. Gaillard, J., V.V.Krishna and R.Waast, eds. 1997. Scientific communities in the developing world New Delhi: Sage.
5. Kamala Cahubey ed. 1974. Science policy and national development New Delhi: Macmillan.
6. Krishna, V.V.1993. S.S.Bhatnagar on science, technology and development 1938-54 New Delhi: Wiley Eastern.
7. Kornhauser, William, 1962 Scientists in industry, Berkley; University of California Press, price, Derek J.dSolla,
1963 little science, big science New York Columbia University Press.
8. Rahman, A.1972 Trimurti: Science, Technology and society – A collection of essays New Delhi: Peoples Publishing
House.
9. Storer, Norman W.1966. The social system of science New York: Holt Rinehart and Winston.
10. UNCTAD/CSIR Case study in reverse transfer of technology: A survey of problems and policy in India Doc.
TD/B/C.6AC.4/6 and Corr.1, Geneva.
11. Crane, Diana. 1965. "scientists at major and minor universities: A study of productivity and recognition'" American sociological review, 30 (5) , Pp. 699-714.
12. Coler, Myron A.ed 1963 Essays on the creativity in the sciences New York: New York University Press.
13. Debroy, Bibek. 1996. Beyond the Uruguay round: The Indian perspective on GATT New Delhi: Sage.
14. Gilpin, Robert, and Christopher Wright eds. 1964. Scientists and national policy making New York: Columbia
University Press.
15. Kumar, Nagesh and N.S.Siddharthan. 1997. Technology, market structures and internationalization: Issues and policies for developing countries London: Routlege and the united National University.
16. MacLeod, Roy and Deepak Kumar, 1995. Technology and the raj: Western technology and technical transfers to India,
1700-1947 New Delhi: Saga.
17. Merton, Robert K.1938. "Science, technology and society in seventeenth – century England" Osiris (Bruges, Belgium),
14 Pp.360-632.

Semester - II

BASIC ELECTRICAL ENGINEERING (EE – 2001)

Course Code	**EE –2001**	**Credits: 4**	**L-3, T-1, P-0**
Name of the Course	**BASIC ELECTRICAL ENGINEERING**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section A:

D.C. circuits: Ohm's law, Kirchoff's Laws, Thevenin's, Norton's, superposition theorem, Maximum power transfer theorem, Reciprocity, Compensation, Millman and Tellegan's Theorem . D.C. circuits, Nodal and Mesh analysis.

A.C. circuits: Sinusoidal signal, instantaneous and peak values, RMS and average values, phase angle, polar and rectangular, exponential and trigonometric representations RL and C components, behavior of these components in A.C. circuits, concept of complex power, power factor.

Transient Response: transient response RL, RC and RLC circuits with step input.

Section B:

Series and Parallel A.C. circuits: Series and Parallel A.C. circuit, Series and Parallel resonance. Q factor, cut off frequency and bandwidth.

Three phase circuits: Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by 2-wattmeter method, importance of earthling.

Section C:

Transformers: Principle, construction and working of transformer, Efficiency and regulation.

Electrical Machines: Introduction to D.C. Machines, induction motor, Synchronous machines.

Section D:

Measuring Instruments: Voltmeter, Ammeter, Wattmeter, Energy meter.

Batteries: Storage batteries:- Types, construction, charging and discharging, capacity and efficiency.

Books:

1. Kothari & Nagarath: Basic Electrical Engg. (2^{nd} Edition), TMH.
2. B.L. Theraja & A.K. Theraja, S.Chand: Electrical Technology(Vol-1).
3. Deltoro: Electrical Engg Fundamentals, PHI.

Semester - II

BASIC MECHANICAL ENGINEERING(ME – 2001)

Course Code	**ME - 2001**	**Credits: 4**	**L-3, T-1, P-0**
Name of the Course	**Basic Mechanical Engineering**		
Lectures to be delivered	**65 (1 Hr Each) (L =52, T = 13 for each semester)**		
Semester End Examination	**Maximum Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

First Law of Thermodynamics

Essence and corollaries of the first law, analytical expressions applicable to a process and cycle, internal energy, enthalpy and specific heats, first law analysis of steady flow, applications of steady flow energy equation to engineering devices.

Applications of first law of Thermodynamics

Closed and open systems, analysis of non-flow and flow processes for an ideal gas under constant volume (Isochoric), constant pressure (Isobaric), constant temperature (Isothermal), adiabatic and polytropic conditions. Analysis of free expansion and throttling processes. Representation of these processes on P-V charts and analysis of property changes and energy exchange (work and heat) during these processes.

SECTION – B

Second Law of Thermodynamics

Limitations of first law, various statements of second law and their equivalence, application of statements of second law to heat engine, heat pump and refrigerator. Philosophy of Carnot cycle and its consequences. Carnot theorem for heat engines and heat pump. Classius inequality, concept and philosophy of entropy and entropy changes during various processes. Temperature – entropy chart and representation of various processes on it. Third law of thermodynamics.

SECTION – C

Simple Stresses & Strains

Concept & types of Stresses and strains, Poisson's ratio, stresses and strain in simple and compound bars under axial loading, stress strain diagrams, Hooks law, Elastic constants and their relationships. Temperature stress and strain in simple and compound bars under axial loading, Numerical problems.

Shear Force and Bending Moments

Definitions, SF & BM diagrams for cantilevers, simply supported beams with or without over-hang and calculation of maximum BM and SF and the point of contraflexture under (i) concentrated loads, (ii) uniformly distributed loads over whole span or a part of it, (iii) combination of concentrated loads and uniformly distributed loads. Relation between the rate of loading, the shear force and the bending moments, Numerical Problems.

SECTION – D

Bending Stresses in Beams

Bending Stresses in Beams with derivation of Bending equation and its application to beams of

circular, rectangular I & T Section, Composite beams, stress in beam with derivation, Combined Bending , Torsion & Arial loading of beams , Numerically .

Torsion of Circular Members

Design of thin Circular Tubes, Torsion of Solid and hollow circular shafts, Combined bending and torsion, Equivalent torque, Numerical Problems.

Text Books

1. Nag, P.K., "Engineering Thermodynamics", Tata McGraw – Hill, New Delhi.
2. Yadav, R., Thermal Science and Engineering, Central Publishing House, Allahabad.
3. Strength of Materials – G.H.Ryder – Third Edition in S I units 1969 Macmillan India.
4. Mechanics of Materials – Dr. Kirpal Singh, Standard Publishers Distributors, New Delhi.

Reference Books

1. Strength of Materials – Popoy, PHI, New Delhi.
2. Strength of Materials – Sadhu Singh, Khanna Publications.
3. Strength of Materials – A Rudimentary Approach – M.A.Jayaram, Revised Ed. 2001, Sapna Book House, Bangalore.
4. Strength of Materials – U.C.Jindal
5. Moran, M.J. and Shapiro, H.N., Fundamentals of Engineering Thermodynamics, John Wiley, New York.
6. Van Wylen, G.J., Fundamental of Classic Thermodynamics, John Wiley, New York.
7. Spalding, D.B. and Cole, E.H., Engineering Thermodynamics, ELBS, New Delhi.
8. Hibbeler, R.C. Engineering Mechanics – Statics, Addison Wesley Longman, New Delhi.

Semester - II

BASIC ELECTRICAL ENGINEERING LAB (EE–2002)

Course Code	**EE – 2002**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**BASIC ELECTRICAL ENGINEERING LAB**		
Lectures to be Delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments

1. To verify KCL and KVL.
2. TO study frequency response of series RLC circuit and determine resonance frequency and Q factor for various values of R,L,C
3. TO study frequency response of parallel RLC circuit and determine resonance frequency and Q factor for various values of R,L,C
4. To perform direct load test of transformer and plot efficiency v/s load characteristics.
5. To perform direct load test of the DC shunt generator and plot load v/s current curve.
6. To study and verify Thevenins, Norton's, superposition, Milliman's, maximum power, reciprocity theorems
7. To perform O.C and S.C test of transformer.
8. T o study various types of meters
9. Measurement of power by 3 voltmeter/ 3 ammeter method.
10. Measurement of power in 3-phase system by 2-wattmeter method.

Semester - II

Computer Science Trainer Workshop (CS –2003)

Course Code	**CS –2003**	**Credits : 4**	**L-1, T-0, P-3**
Name of the Course	**Computer Science Trainer Workshop**		
Lectures to be delivered	**52 hours**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments

This workshop will provide training of different types of operating systems (Windows98,LINUX) with hands on experiments on the following:

1. Installation of operating system.
2. Configuration of Hard Disk.
3. Configuration of Display Cards.
4. Configuration of sound cards.
5. Configuration of CDROM.
6. Configuration of Mouse.
7. Configuration of Printer.
8. Configuration of Display Cards.
9. Configuration of Network Cards.
10. Configuration of Modems.
11. Understanding Boot up process.
12. Creating and using emergency Disk.
13. Troubleshooting exercises related to various components of computer like Monitor drives, memory, printers etc.
14. Assembling a PC.

Semester - II

BASIC MECHANICAL ENGENEERING LAB (ME – 2002)

Course Code	**ME – 2002**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**BASIC MECHANICAL ENGENEERING LAB**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS

1. To study low-pressure boilers.
2. To study High-pressure boilers.
3. Calibration of thermometers.
4. Calibration of pressure gauges.
5. Study of discharge measuring devices.
6. To determine co-efficient of discharge of orifice meter.
7. To verify the Bernoulli's Theorem.
8. To find Young's Modulus of Elasticity using Searl's apparatus.
9. To find Young's Modulus of Elasticity of a beam with deflection beam apparatus.
10. To find Modulus of rigidity with the help of torsion apparatus.

MAT LAB **(IT– 1003)**

Course Code	**IT– 1003**	Credits : 2	L-0, T-0, P-2
Name of the Course	**MAT LAB**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter/Candidates

Laboratory examination will consist of two parts:

i) Performing a practical examination assigned by the examiner (25 marks).

ii) Viva-voce examination (25 marks).

Viva-voce examination will be related to the practical performed/projects executed by the candidate related to the paper during the course of the semester.

The aim of this laboratory is to help students get an idea about a programming environment very widely used by engineer to solve the problem in their respective disciplines.

Exercises on computer

i. Roots of a quadratic equation.
ii. Guessing a number
iii. Units conversion
iv. Factorial program
v. Simulation of RC circuit
vi. V-I characteristics of a MOSFET.
vii. Finding average with dynamic array.
viii. Writing a binary file
ix. Reading a binary file
x. Plotting one dimensional and two dimensional graph using MAT LAB 2-D plot types.
xi. Using functions in MAT LAB Environment

To teacher concerned will give at least 10 exercises to solve non trivial problems using MAT LAB environment.

Reference books

1 Programming in MAT LAB by Marc E.Herniter Thomson ASIA Ptd. Ltd Singapore(2001)

2 MAT LAB the languages of computing. The maths work inc.

THIRD SEMESTER

Semester - III
Numerical Analysis & Computer Programming (CS – 3001)

Course Code	**CS – 3001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Numerical Analysis & Computer Programming**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Infinite Series:

Convergence, divergence and oscillation of an infinite series,comparison test, p-series ,D'Alembert's ratio test,logarithmic, integral test(all test without proof) for series of positive terms, Numerical analysis.

Section-B

Solution of algebraic and transcendental equations:

Bisection method, method of false position, secant method, Iteration method Newton-Raphson method, Generalized Newton-Raphson method.

Solution Of Simultaneous Algebraic Equations :

Jacobi's method, Gauss-Seidal method, relaxation method,fixed point iteration & its convergence, Eigen values by iteration – Power and Jacobi's Method

Section-C

Finite Differences & Interpolation:

Forward and Backward difference operators, Newton's Forward and Backward interpolation formulae, Central Difference Interpolation formulae, Gauss's forward and Backward Interpolation formulae, Lagrange's interpolation formulae and Newton's Divided Difference formulae.

Numerical differentiation and integration:

Formulae for derivatives, Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules

Section- D

Numerical Methods To Solve Differential Equations

Solution of first order differential equations using Taylor's Series , Euler's, Picard's and Runge Kutta method upto 4^{th} order ,Predictor- Corrector methods (Adam's and Milne's method), Simultaneous differential equations of first order, differential equations of second order.

Text and Reference Books

- Numerical Methods in Engg. & Sciences by B.S.Grewal.
- Numerical methods for Scientific & Engg. Computations by M.K.Jain, S.R.K.Iyengar & R.K.Jain

Semester - III
Digital Electronics (EC – 3001)

Course Code	**EC - 3001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Digital Electronics**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A:

Binary, octal & Hexadecimal number systems and their inter conversion, Binary arithmetic (Addition & Subtraction, Multiplication & Division), 1's & 2's complements, 9's & 10's complement, BCD code, BCD Addition, Gray Code, Error Detection and Correction , Hamming code.

Section-B:

Logic functions (OR, AND, NOT, NAND, NOR, XOR), Elements of Boolean Algebra (Theorems truth tables and relations), Negative & Positive logic, Saturated & non saturated logic, fan in, fan-out, Logic IC's, de Morgan's Theorem, minterms and maxterms, Karnaugh mapping, K-map representation of logical function for 2,4,5 & 6 variable, simplification of Boolean equations with the help of K-map, Various inimization techniques, Quine's method and Quines Mc-Cluskey method, Half adder, full adder, half subtractor, full subtractor, serial and parallel binary adder.

Section-C:

Introduction and performance criteria for logic families, various logic families - DCTL, RTL, DTL, TTL & EC working and their characteristics in brief, MOS Gates and CMOS Gates, comparison of various logic families

Section-D:

Various kinds of Flip-Flop: RS Flip-Flop, Clocked RS Flip-Flop,Edge triggered D Flip- Flop, Flip-Flop Switching time, J/K Flip-Flop, JK Master Slave Flip flop, Shift registers: serial in serial out, serial in parallel out ,parallel in serial out, parallel in parallel out, Ringcounters, asynchronous counters, synchronous counters, D/A Converter, A/D Converter, Multiplexers and Demultiplexer, Encoder and Decoder & their applications

Text and Reference Books

- Digital Principles & Applications by Malvino and Leach
- Digital Integrated Electronics by Taub and Schilling
- Modern Digital Electronics by R.P. Jain.

Semester - III
Data Structures (CS - 3003)

Course Code	**CS - 3003**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Data Structures**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Data types, data structures, abstract data types, the running time of a program, the running time and storage cost of algorithms, complexity, asymptotic complexity, big O notation, obtaining the complexity of an algorithm.

Development of Algorithms

Notations and Analysis, Storage structures for arrays - sparse matrices - structures and arrays of structures, Stacks and Queues: Representations, implementations and applications.

Section B

Linked Lists

Singly linked lists, Linked stacks and queues, operations on Polynomials, Doubly Linked Lists, Circularly Linked Lists, Operations on linked lists- Insertion, deletion and traversal, dynamic storage management – Garbage collection and compaction.

Trees

Basic terminology, General Trees, Binary Trees, Tree Traversing: inorder, preorder and postorder traversal, building a binary search tree, Operations on Binary Trees - Expression Manipulations - Symbol Table construction, Height Balanced Trees(AVL), B-trees, B+ -trees.

Section C

Graphs

Basic definitions, representations of directed and undirected graphs, the single-source shortests path problem, the all-pair shortest path problem, traversals of directed and undirected graphs, directed acyclic graphs, strong components, minimum cost spanning tress, articulation points and biconnected components, graph matching.

Section D

Sorting and Searching Techniques

Bubble sorting, Insertion sort, Selection sort, Shell sort, Merge sort, Heap and Heap sort, Quick sort, Radix sort and Bucket sort, Address calculation, Sequential searching, Binary Searching, Index searching, Hash table methods.

Text and Reference Books

1. J.P. Tremblay and P.G. Sorenson, "An Introduction to Data Structures with applications", Tata McGraw Hill.
2. S.Sahni, "Data structures, Algorithms ad Applications in C++", WCB/McGraw Hill.
3. Aho ,Ullman and Hopcroft, " Data Structures and Algorithms".
4. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education
5. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE

Semester - III
Computer Organization (CS - 3004)

Course Code	**CS - 3004**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Computer Organization**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

BASICS: An introduction to computers with block diagram, Computers generation, Impact of technology.

LOGIC DESIGN TECHNIQUES: Designing combinations logic using Karnaugh-Maps with building blocks of basic gates , Multiplexers, de-multiplexer, decoders and encoders, arithmetic, logics units, Instruction codes, Computers registers and instructions, timing and control, instruction cycle, memory reference instruction, I –O interruption, Basic sequential logic blocks flip-flops, registers, shift registers and counters, Finite state Machine using state tables

Sections-B

COMPUTER ARITHMETIC: Adder and Subtractor circuits, Booth Multiplication algorithm, Performance bench marks.
CONTROL PATH DESIGN: Sequence counter method, Micro programmed controllers, address sequencing, symbolic micro –instructions

Section-C:

CENTRAL PROCESSING UNIT: Registers general register origination, stack origination, Instruction formats, address instructions, addressing modes, data transfer and manipulations, programmed control RISC instruction set design, three address instructions and arithmetic pipelines with example of floating point adder, instruction pipe lines, advanced pipe lining using instruction level parallelism

Section –D

MEMORY ORGANISATION: Memory device characteristics, random access memory, serial access Memory, virtual memory, associative memory, cache memory, memory management hardware

I/O ORGANISATION: I/O interface asynchronous data transfer, DMA interrupt, I/O processor

Text and Reference Books

1. M. Moris Mano , Computer System &Architecture PHI
2. Hayes J. P Computer Architecture & Organization .
3. M. Morris & Charles R . Kire , Logic and Computer Design Fundamental –PHI 1995

Semester - III
Object Oriented Paradigm (CS - 3002)

Course Code	**CS - 3002**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Object Oriented Paradigm**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Concepts of Object-Oriented Programming

Oriented Programming Paradigm, Basic concepts of OOP's, Benefits of OOPS, Introduction to object oriented design and development, Design steps, Design example, Object oriented languages, Comparison of structured and object-oriented programming languages.

Arrays, Pointers and Functions

Arrays, Storage of arrays in memory, Initializing Arrays, Multi-Dimensional Arrays, Pointers, accessing array elements through pointers, Passing pointers as function arguments, Arrays of pointers, Pointers to pointers, Functions, Arguments, Inline functions, Function Overloading Polymorphism.

Section - B

Classes and Objects

Data types, operators, expressions, control structures, arrays, strings, Classes and objects, access specifiers, constructors, destructors, operator overloading, type conversion.

Storage classes

Fixed vs Automatic declaration, Scope, Global variables, register specifier, Dynamic memory allocation.

Inheritance

Inheritance, single Inheritance, Multiple Inheritance, Multi level inheritance, hierarchical inheritance, hybrid inheritance, Virtual functions, Friend functions, Generic programming with templates.

Section – C

Streams and Files

Opening and closing a file, File pointers and their manipulations, Sequential Input and output operations, multi-file programs, Random Access, command line argument, string class, Date class, Array class, List class, Queue class, User defined class, Generic Class.

Exception Handling

List of exceptions, catching exception, handling exception,

Section – D

Graphics

Text Mode, Graphics mode functions, Rectangles, and Lines, Polygons & Inheritance, Sound & Motion, Text in Graphics Mode.

Standard Template Library

Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, Container Classes, General Theory of Operation, Vectors.

Text and Reference Books

1. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications,
2. Balagurusamy, 'Object Oriented programming with C++", Tata McGraw Hill.
3. Bjarne Strustrup, "The C++ programming Language", Addison Wesley,
4. Booch, "Object Oriented Analysis and Design with Applications, Addison Wesley.5. Chair H. Pappas & William H. Murray, "The Complete Reference Visual C++", TMH.

Semester - III
Principles of Programming Languages (CS - 3005)

Course Code	**CS - 3005**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Principles of Programming Languages**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Introduction: A brief history, Characteristics of a good programming language, Programming language translators compiler & interpreters, Elementary data types – data objects, variable & constants, data types, Specification & implementation of elementary data types, Declarations, type checking & type conversions, Assignment & initialization, Numeric data types, enumerations, Booleans & characters, Syntax & Semantics.

Section-B

Structured data objects: Structured data objects & data types, Specification & implementation of structured data types, vector & arrays, records Character strings, variable size data structures , Union, pointer.

Subprograms and Programmer Defined Data Types: Evolution of data type concept abstraction, encapsulation & information hiding, Subprograms, type definitions, abstract data types, over loaded subprograms, generic subprograms

Section-C

Sequence Control: Implicit & explicit sequence control, sequence control within expressions, sequence control within statement, Subprogram sequence control, simple call return, recursive subprograms, Exception & exception handlers, co routines.

Data Control: Names & referencing environment, static & dynamic scope, Local data, Shared data, dynamic & static scope, Parameter & parameter transmission schemes.

Section-D

Introduction to storage management: Major run time elements requiring storage, Static storage management, Stack based storage management, Heap storage management.

Programming Languages: Introduction to procedural, non-procedural, structured, logical, functional and object oriented programming language, Comparison of C & C++ programming languages

Text and Reference Books

- Programming languages Design & implementation by T.W. .Pratt
- Programming Languages – Principles and Paradigms by Allen Tucker & Robert Noonan
- Fundamentals of Programming languages by Ellis Horowitz

Semester - III

Digital Electronics Laboratory (EC – 3004)

Course Code	**EC - 3004**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Digital Electronics Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

Course Description:

LIST OF EXPERIMENTS

- Verify truth tables of AND, OR, NOT, NAND, NOR and XOR gates.
- Implement (i) half adder (ii) full adder using AND – OR gates.
- Implement full adder using NAND gates as two level realization.
- Implement full subtractor using 8 to 1 multiplexer.
- Verify truth tables of RS & JK flip flops and convert JK flip fops int type & T type flip fops.
- Realization of Gates(AND, OR, NOT) with discrete components.
- Use of 4-bit shift register for shift left and shift right operations.
- Use 4-bit shift register as a ring counter.
- Implement mod – 10 counter and draw its output wave forms.
- Implement 4-bit DAC using binary weighted resistance technique/R- ladder network technique.
- Implement 8 – bit ADC using IC (ADC 0800/0801).

ADDITIONAL EXERCISES:

- Construct bounce less switch.
- Construct a pulser of 1 Hz and 10 Hz, 1k Hz and manual.
- Construct logic state detector.
- Construct opto – sensor based.
- Measurement rotational speed of motor.
- Measurement time elapse between two events.
- Measurement of linear velocity.
- Measurement of acceleration.
- Construct a memory using TTL Circuits. Read and write data onto a memory from bus.

Text and Reference Books

- Digital Principles & Applications by Malvino and Leach
- Digital Integrated Electronics by Taub and Schilling
- Modern Digital Electronics by R.P. Jain.

Semester - III

Data Structures & Algorithm Laboratory (CS – 3006)

Course Code	**CS - 3006**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Data Structures & Algorithm Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

Course Description:

LIST OF EXPERIMENTS

1. Write a program to insert and delete an element at a specified location in an array.
2. Write a program to print array elements in row and column major order.
3. Write a program to search an element in an array using Linear Search.
4. Write programs to search an element in the array using Binary Search.
5. Write a menu driven program to perform various operations on strings (string length, reverse, concatenate, comparison) using user defined programs.
6. Write a program to implement stack using arrays.
7. Write a program to implement queue using arrays.
8. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
    - Addition of two matrices
    - Subtraction of two matrices
    - Finding upper and lower triangular matrices
    - Trace of a matrix
    - Transpose of a matrix
    - Check of matrix symmetry
9. Write a program to implement Binary search tree.
10. Write a program to perform insertion & deletion operation on Binary Search trees.
11. Write a program for implementation of a file and performing operations such as insert, delete and update a record in a file.
12. Write a program to create a linked list & display elements of a linked list.
13. Create a linked list and perform the following operation on it

    a) Add a node b) Delete a node c) Count no. of nodes
14. Write a program to implement breadth first search on a graph.
15. Write a program to implement depth first search on a graph.
16. Sorting

    a) Bubble sort

    b) Merge sort

    c) Insertion sort

d) Selection sort
e) Radix Sort
f) Quick Sort

Text and Reference Books

- Data structures by Seymour Lipschutz
- Data structures and algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman
- Data Structures using C by A. M. Tenenbaum

Semester - III

Object Oriented Programming Laboratory C++ (CS – 3007)

Course Code	**CS - 3007**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Object Oriented Programming Laboratory C++**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Labrecord 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

Course Description:

LIST OF EXPERIMENTS

1. Raising a number n to a power of p is the same as multiplying n by itself p times. Write a function called power( ) that takes a double value for an int value for p and returns the result as double value . Use a default argument of 2 of p, so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function .
2. A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example (4,5) represents point 4 unit to the right of origin along the X axis and 5 units up the y-axis . The sum of the two points can be defined as new point whose X and Y coordinates.
   Write a program that uses a structure called point to model a point . Define three points and have the user input values to two of them. Than set the third point equal to the sum of the other two. And display the value of new points. Interaction with the program might look like this.

   Enter Coordinate of P1: 3 4
   Enter Coordinate of P2: 5 7
   Coordinates of P1+P2 are : 8 11

3. Create the equivalent of four function calculator . The program should request the to user to enter a number , an operator and another number . It should carry out the specified arithmetical operation: adding, subtracting, multiplying ,or dividing the two numbers. (it should use a switch statement to select the operation) finally it should be display the result. When it finishes the calculation, the program should ask if the user want to do another calculation. The response can be 'Y' or 'N', Some sample interaction with the program might look like this.

   Enter first number ,operators and second number 12+100
   Answer =112
   Do another (Y/N)?N

4. A phone no. such as (212)767-8900 , can be thought of as having three parts area code(212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of phone both no. separately . Call the structure phone . create two structure Enter your area code Exchange and number : 415 555 1212
   My number is (415)555-1212

5. Create two classes DM and DB which stores the value of distances DM stores distance in meters and centimeters and DB in feet and inches . Write a program that can read value for the classes objects and add one object of DM with another object DB.
   Use a friend function to carry out the addition operation .The object that stores the result may be a Dm object or DB

object depending on the units in which result are required .
The display should be in the format of feet and inches or meters and centimeters depending on the object on display.

6. Create a class rational which represents numerical value by two double value NUMERATOR & DENOMENATOR . Include the following public member functions:
   - Constructor with no arguments.(defaults)
   - Constructor with two arguments.
   - Void reduce( ) that reduce the rational number by eliminating the highest common factor between the numerator and denominator .
   - Overload +operator to add two rational number
   - Overload operator >> operator to be enabled input through cin
   - Overload <<operator to be enabled input through count. Write a main ( ) to test all the functions in the class
7. Consider the following class definition class father { Protected :
   int age;
   Public:

```
Father (int x){age = x;}
Virtual void iam ()
{

{cout <<"I AM THE FATHER , my age is ",<<age<<endl;}

};
```

Derive the two classes son and daughter from the above classes and for each define iam() to write our similar but appropriate message .You should also define suitable constructors for these classes Now write a main ( ) that creates objects of three classes and then call iam( ) them .Declare pointer to father , successively assign addresses of object of the two derived classes to this pointer and in each case , call iam( ) through the pointer to demonstrate polymorphism in action.

8. Write a program that create a binary files by reading the data from the students from the terminal.
   The data of each student consist of roll no, name(a string of 30 or lesser no. of character) and marks.
9. A hospital wants to create a database regarding its indoor patients. The information to store include.
   a) Name of the patient
   b) Date of admission
   c) Disease
   d) Date of discharge

   Create a structure to store the data (year, month, date as its members). Create a base class to store the above information. The member function should include function to enter information and display a list of all the patients in database Create a drive class to store the age of patients. List the information about all to store the age of the patients. List the information about all the pediatric (less then twelve years in age)
10. Makes a class Employee with the name and salary . Makes a class manager inherit from the Employee Add an instance variable named :department, type : string. Supply a method to String that print the manager's name, department and salary. Make a class Executive inherit from information store in the manager super class object . Supply a test program that test these classes and methods.
11. Imagine a tollbooth with a class called Toll booth . The two data item are a type unsigned into to hold the total number of cars and type double to hold the total amount of money collected . A constructor initializes both these to 0. A member function called nopaycar( ). Increments the car total and adds 0.50 to the cash total. Another function, called nopaycar( ), increment the car total but adds nothing to the cash total. Finally , a member function called display the two totals . Include a program to test this class . This program should allow the user to push one key to count paying a car ,and another to count a non paying car . Pushing the ESC key should cause the program to print out the total cars and total cash and then exit.
12. Write a function called reverse it ( ) that reverses a string(an array of char) use a for loop that swap the first and last characters, then the second and next to last character and so on .

the string should be passed to reversesit ( ), and print out the result. Use an input method that allows embedded blanks. Test the program with Napoleon's famous phrase , "Able was ere I saw Elba".

13. Create some objects of the string class, and put them in a Deque – some at the head of the Deque and some at the tail. Display the contents of the Deque using the for Each( ) function and a user written display function . Then search the Deque for a particular strings, using the first That ( ) Function and display any string that match, finally remove all the item from the date using the get left( ) Function and display each item. Not ice is the order in which the item are displayed: Using Get Left ( ), Those inserted on the left (head),of the Deque are removed in "last and first out" order while those put on the right side are removed in "first in first out" order. The opposite would be true if Get right ( ) were used

14. Assume that a blank maintain two kinds of accounts for customer. One called as saving accounts and another is current account . The saving account provides compound interest and withdrawal facility but no cheque book facility, The current account provides cheque book facility but no interest Current account holders should also maintain a minimum balance and if the balance false below this level , a service charge is imposed.

    Create a class account that store customer name, account number and type of account. From this drive the classes cur_acct and sav_account to make them more specific to their requirement. Include necessary member function in order to achieve the following task

    a) Accept deposit from a customer and update the balance
    b) Display the balance
    c) Compute and deposit interest
    d) Permit withdrawal and update the balance
    e) Check for the minimum balance, impose penalty ,necessary and update the balance. f) Do not use any constructor , use member function to initialize the class members

15. Create a base class called shape .Use this class to store two double type values that could be used to compute the area of figure, Derive to specific classes called triangle and rectangle from the base shape . Add to the base class, a member function get data ( ) to initialize base class data member and another member function display area ( ), To compute and display the area of figures make display area ( ) as virtual function and redefine this function in the derived classes to suit the requirements.

    Using this three classes design a program that will accept dimension of triangle or rectangle interactively and display the area

    Remember the two value given as input will be treated as length of two sides in the case of rectangle and as base and height in the case of triangle and used as follows

    Area of rectangle= x * y

    Area of triangle =1/2 * x * y

Programming of exercise in C++ in the form of project (based on "object oriented programming in TURBO C++") , Robert lafore , Galgotia Publication Pvt. Ltd.1994 to be done in consultation with the faculty incharge for the course

Note: Record to be maintained both electronically and hard copy of evaluation

Semester - III

Numerical Analysis & Computer Programming Laboratory (CS – 3008)

Course Code	**CS - 3008**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Numerical Analysis & Computer Programming Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Labrecord 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

Course Description:

LIST OF EXPERIMENTS

Programs to be executed using MATLAB

- Study different tool box available in MATLAB.
- Roots of a quadratic equation.
- Factorial Program
- Write a code snippet using a for loop that creates a sine wave whose frequency increments from 0 to 1 Hz over 5 seconds. Turn in the code and a plot.
- Simulation of an RC circuit.
- Study different mathematical functions available in MATLAB.
- I-V characteristic of a MOSFET.
- Finding average with a dynamic array.
- Writing and Reading a binary file.
- Calculator design using MATLAB GUI.
- To find the roots of non-linear equation using Bisection method/Muller's method.
- To find the roots of non-linear equation using Newton's method/Muller's method.
- To solve the system of linear equations using Gauss- Elimination method.
- To solve the system of linear equations using Gauss-Seidal iteration method.
- To solve the system of linear equations using Gauss-Jordan method.
- To solve integral equation numerically using Trapezoidal rule.
- To solve integral equation numerically using Simpson's rule.
- To find numerical solution of ordinary differential equations by
- Euler's method.
- To find numerical solution of ordinary differential equations by
- Runga-Kutta method.

- To solve a given problem using Newton's forward interpolation formula.

Text and Reference Books

- Experiments with MATLAB by Cleve Moler.
- Introduction to mat lab by Ross L. Spencer

FOURTH SEMESTER

Semester - IV
Discrete Mathematics & Logic Design (CS - 4001)

Course Code	**CS - 4001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Discrete Mathematics & Logic Design**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Mathematic Logic: Statements and Notation, Connectives; Negation; Conjunction; Disjunction;Statement Formulas and Truth Tables; Logical Capabilities of programming Languages; Conditional and Biconditional; Well formed Formulas; Tautologies; Equivalence of Formulas; Duality Law; Tautological Implications; Formulas with distinct Truth Tables; Functionally Complete sets of connectives; other connectives; Two state devices and Statement logic; Normal forms; principal disjunctive normal forms; principal conjunctive normal form; ordering and Uniqueness of Normal Forms; Completely parenthesized Infix Notation and Polish Notation; The Theory of Interference for the statement calculus; Validity using Truth Table; Rules of Inference; Consistency of Premises and Indirect Method Of Proof; Automatic Theory Proving; The Predicate Calculus; predicates; The Statement Function, variables and Quantifiers; Predicate Formulas; Free and Bound Variables; The Universe of Discourse; Inference Theory of the Predicate Calculus, Valid Formulas and Equivalences; Some Valid Formulas over Finite Universes; Special Valid Formulas Involving Quantifiers; Theory of Inference for the Predicate Calculus; Formula Involving More Than One Quantifier.

Section B

Permutations, Combinations, and Discrete Probability: Introduction, The Rules of Sum and product; permutations; Combinations; Generation of permutations and combinations, Discrete probability, Information and Mutual Information.

Relations and Functions: Introduction, A Relational Model for Data Bases; properties of Binary Relations; Equivalence Relations and partitions; Partial Ordering Relations and Lattices; Chains and Antichains; A Job Scheduling problem; Functions and the Pigeonhole principle.

Section C

Graphs and Planner Graphs: Introduction, Basic Terminology, Multigraphs and Weighted Graphs, Paths and Circuits; Shortest paths in Weighted Graphs, Eulerian paths and circuits; Hamiltonian paths and circuits, The Traveling Salesperson problem; Factors of Graph; planar Graph.

Trees and cut-sets: Trees, Rooted Trees, path, Lengths in Rooted trees; prefix codes; Binary search trees; Spanning Trees and cut-sets; Minimum Spanning Trees; Transport Networks.

Section D

Recurrence Relations and Recursive Algorithms: Introduction; Recurrence Relations; Linear Recurrence Relations with constant coefficients; Homogeneous Solutions; Particular Solutions; total Solutions; solution by the Method of Generating Functions; Sorting Algorithms; Matrix Multiplication Algorithms.

Groups and Rings: Introduction, Groups, Subgroups; Generators and evaluation of Poers; Cosets and Lagrange's Theorem; permutation groups and Burnside's theorem; Codes and Group codes; Isomorphisms and Automorphisms; Homomorphisms and Normal Subgroups; Rings, Integral Domains, andf Fields; Fing Homomorphisms; Polynomial Rings and Cyclic Codes.

Books:

1. J.P. Trembley and R. Manohar, "Discrete mathematics Structures with Applications to Computer Science", (TaTa McGraw-Hill, 1997)
2. C.L.Liu, " Elements of Discrete Mathematics", 2nd Edition (TaTa McGraw-Hill, 1985)

Semester - IV
Operating Systems (CS - 4002)

Course Code	**CS - 4002**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Operating Systems**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

What is an Operation System? Simple Batch Systems; Multiprogrammed Batched Systems;Time-Sharing System; Personal-Computer systems; Parallel System; Distributed System; Real- Time Operating Systems. System Components System Calls, System Programs; System Structure; Virtual Machines.

Process concept: Process Scheduling; Operation on processes, Interprocess Communication,CPU Scheduling fundamental concepts, Scheduling criteria; Scheduling Algorithms; Multi- processor Scheduling; Real Time Scheduling, Threads: Overview; Multithreading

Section B

Process Synchronization: Race conditions; mutual exclusion requirements; Critical Section problem; s/w and h/w solutions; Semaphores; monitors; Classical IPC problem and solutions.

Deadlock: System Model; Deadlock Characterization, Methods of Handling Deadlock, deadlock Prevention; Deadlock Avoidance; Deadlock Detection, Recovery from deadlock; Combined approach to deadlock handling

File System Interface: File Concept; Access Methods; Directory Structure; Protection; Consistency Semantics;

File System Implementation: File System Structure; Allocation Methods, Free Space Management Directory Implementation; Efficiency and Performance; Recovery.

Section C

Memory Management: Logical Versus Physical Address Space, Swapping, Contiguous Allocation; Paging; Segmentation; Segmentation with paging.

Virtual Memory: Demand Paging Performance of Demand Paging page Replacement Page Replacement Algorithms; Allocation of Frames Thrashing; Demand Segmentation; Cache memory and implementation.

Secondary Storage Structure: Disk Structure; Disk Scheduling; Disk Management; Swap-space management; Disk Reliability; Stable-Storage Implementation.

Section D

I/O Systems: I/O hardware; I/O channels; Structure of I/O System; Principles of I/O Software Goals; interrupt handlers; device drivers; device independent I/O software;

Protection: Goals of protection; Domain of protection; Access matrix and its implementation; Revocation of Access Right; Capability- Based Systems; Language Based Protection.

Security: The Security Problem; Authentication; One Time passwords program Threats, System Threats; Threat Monitoring; Encryption and decryption; Computer-Security Classification; An example Security Model: windows NT

Books:

1. Operating Systems by Achiest S. God bole, Tmh
2. Operating Systems by D. M. Dhamdhare, Tmh
3. Understanding Operating System by Flynn & Métiers Thomsan
4. Operating Systems Design & Implementation by Andrew Dagenham, Albert S.Wood Hull Pearson
5. Operating System Concepts by Silberschatz & Galvin, Wiley
6. Operating System (5th) – Internals & Design Principles by William Stallings,Prentice Hall

Semester - IV
System Analysis & Design (CS - 4003)

Course Code	**CS - 4003**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**System Analysis & Design**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructi ons

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction To System (Overview): Definition of System, Common types of systems, Natural systems, Man made system, Automated systems, General systems principles

Participants to system development: Users, Management, Auditors, System analysts, System designers, Programmers, Operations, Personnel,.

System Development Life Cycle: phase 1: System Planning, phase 2: System Analysis, phase 3: Systems Design, phase 4: Systems Implementation, phase 5: Systems operation and support

PHASE 1: System Planning

Preliminary Investigation: Objectives and steps, Evaluation of system request, Evaluation of projects, Overview of Feasibility, Operational Feasibility, Economic Feasibility, Organizational Chart, Review current documentation

Feasibility and Cost Analysis Tools: Classification of Costs and Benefits, Cost Benefit Analysis (Payback analysis, ROI & Present value analysis)

Section B

PHASE2: Systems Analysis

Determining Requirements: Role and requirement of system analysis, system requirements, Users requirements, Technical requirements, Interviews, Other fact finding techniques, Recording and facts

Analyzing Requirements: Structured System Analysis, Functional Diagram, Data Flow Diagrams, Entity relationship diagrams, Identifying attributes, Data Dictionary: Documenting the data elements, data flows, data stores, processes, external entities, records and reports

Section C

PHASE 3: Systems Design: Introduction to output design, Types of Output and information delivery, Designing printed reports Designing screen outputs Designing other outputs, Tools and Techniques of design

Input Design: Introduction to input design, Source document design, input record Designing ,screen design, automated design tools.

Database design: The common problem of database design, An ideal database

structure, Physical database design, Designing process, Physical storage structure design

System Architecture: Processing methods, Processing functions, Processing support and software design

Section D

PHASE 4: System Implementation

Application Development: Documentation review and application design, coding and testing the application.

Documentation: Program documentation, System documentation, Operations documentation and user documentation.

Phase 5: System Operation and Support

Overview: Systems support and maintenance activities

Support Activities : User training and assistance , maintenance activities, Corrective maintenance, Adaptive maintenance , Perfective maintenance.

Managing systems operation and support: Maintenance team, Configuration management, managing system performance.

Books

1. Element of System Analysis, Marvin Gore, John Stubbe. Galgotia Book Source. 1994
2. Systems Analysis and design Methods. Whitten, Bently and Barlow. Galgotia Publication,1995
3. System Analysis and Design, Elias M. Awad. Galgotia publication, 1995.
4. System analysis and Design, P.S.Grover, BPB Publication, 1994
5. System analysis and Design, Harry Edwards. McGraw Hill International Ed., 1995
6. Introduction to System analysis and Design I.T. Hawryszkiewyez, Prentice Hill of India, 1994

Semester - IV
Advance Computer Architecture (CS - 4004)

Course Code	**CS - 4004**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Advance Computer Architecture**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction to SystemC: Introduction, Modules and Hierarchy, Processes, Ports and Signals, Data Types, Simulation and Debugging using SystemC.

Assessing and understanding Performance: Introduction, CPU Performance and its Factors, Evaluating Performance.

Instruction Set Principles and Examples (example of MIPS): Introduction, Classifying Instruction Set Architectures, Memory Addressing, Type and Size of Operands, Operations in the Instruction Set, Instructions for Control Flow, Encoding an Instruction Set, Role of Compilers, MIPS Instruction Set Architecture.

Section B

The Processor: Datapath and Control: Introduction, Building a Datapath for Supporting the ISA, Single Cycle Implementation, Multi Cycle Implementation, Exceptions, Micro-programming, Hard-wired Control

Enhancing Performance with Pipelining: An Overview of Pipelining, Pipelined Datapath, Pipelined Control, Data Hazards and Forwarding, Data Hazards and Stalls, Control Hazards, Exception Handling.

Instruction Level Parallelism and its Exploitation: Instruction Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Cost with Speculation, Overcoming Data Hazards with Dynamic Scheduling, Exploiting ILP Using Multiple Issue and Scheduling, Advanced Techniques for Instruction Delivery and Speculation.

Section C

Caches and Memory Hierarchy Design: Introduction, the Basics of Caches, Measuring and Improving Cache Performance, Basic Cache Optimizations, Virtual Memory, Memory Hierarchies, Scratch pad Memories.

Multiprocessors and Clusters: Introduction, Programming Multiprocessors, Multiprocessors Connected by a Single Bus, Multiprocessors Connected by a Network, Clusters, Network Topologies, Chip Multiprocessors and Multithreading

Section D

Vector Processors: Basic Vector Architecture, Vector Length and Stride, Enhancing Vector Performance, Effectiveness of Compiler Vectorization.

Hardware and Software for VLIW and EPIC: Introduction, Statically Exploiting ILP, detecting and Enhancing Loop Level Parallelism, Scheduling and Structuring Code, Predicated Instructions, Compiler Speculation.

Storage Systems: Advanced Topics in Disk Storage, Real Faults and Failures, I/O Performance, Reliability, Measures and Benchmarks.

Text and Reference Books

1. David A Patterson & John L Hennessy, "Computer Organization & Design: A Harware/Software Interface", Morgan Kaufmann Publishers.
2. John L Hennessy & David A Patterson, "Computer Architecture: A Quantitative Approach", Morgan Kaufmann Publishers.

Semester - IV
Analysis & Design of Algorithms (CS - 4005)

Course Code	**CS - 4005**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Analysis & Design of Algorithms**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introductory Concepts: The notation of algorithm; fundamentals of algorithmic problem solving; analyzing algorithms; Review of fundamental data structures; Arrays, Stacks; Queue; Linked list

Fundamentals of analysis of algorithms efficiency: Asymptotic notation and standard efficiency classes; mathematical analysis of recursive and non-recursive algorithms

Divide and Conquer: General Method; Merge sort; Quick sort; Selection sort

Sorting in Linear time: Counting sort; Radix sort and Bucket sort

Search: Linear Search; Binary Search

Section B

Graphs: Review of Graphs; Representation of Graphs; Breadth-first search; Depth-first Search; Topological Sort; Strongly connected Components

Trees: Review of Trees; Minimum spanning tree; Kruskal and Prim's algorithm; Single source shortest paths; Bellaman-Ford algorithm; Single source shortest path in directed acyclic graphs; Dijkstra's algorithm; All pairs shortest paths; Shortest paths and matrix multiplication; Floyd-Warshall algorithm; Johnson's algorithm

Section C

Dynamic Programming: Introduction; Elements of Dynamic Programming; Matrix Chain Multiplication; Longest Common Subsequence; Optimal binary search tree; Knapsack problem; Travelling sales person problem.

Greedy Method: An activity selection problem; Elements of Greedy Programming; Huffmann codes; A task scheduling problem

Backtracking and Branch and Bound: The 8 Queens problem; Graph coloring; Hamiltonian cycles; Least Cost Search(LC); The 15 puzzle

Bounding: Fifo branch and bound; LC branch and bound.

Section D:

Maximum Flow: Flow Networks; The Ford-Fulkerson method; Maximum Bipartite matching; **Sorting Networks:** Comparison networks; Zero-one principle; Bitonic sorting network; merging network; sorting

network

NP hard and NP complete problems: P; NP; NP hard and NP complete problems; Cook's theorem(proof not required); Basic introduction to clique problem; vertex cover problem; Hamiltonian cycle problem; Approximation algorithms; vertex cover problem; Travelling salesman problem.

Text and Reference Books

1. Cormen, Leiserson, Rivest, Stein "Introduction to Algorithms"
2. Horowitz Ellis And Sartaj Sahni "Fundamentals of Computer Algorithms"
3. Anany V. Levitin "Introduction to Design and analysis of algorithms"
4. Aho-Hopcroft and Ullman "The Design and Analysis of computer algorithms"
5. D.E. Kunth "The art of computer programming"

Semester - IV
Theory of Automata & Computation (CS - 4006)

Course Code	**CS - 4006**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Theory of Automata & Computation**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Finite Automata and Regular Expression: Finite State System; Basic Definitions; Non-Deterministic finite Automata (NDFA); Deterministic finite Automata(DFA);Equivalence of DFA and NDFA Finite Automata with E-moves; Regular expression; Equivalence of finite Automata and expression; Regular expression conversion and vice –versa.

Section B

Introduction to Machines: Concept of basic machines; Properties and limitation of FSM; Moore and Mealy Machines; Equivalence of Moore and Mealy Machines; Conversion of NFA to DFA by Arden's method

Properties of Regular Sets: The Pumping Lemma for Regular sets; Application of the pumping lemma; Closure properties of regular sets; Myhill-Nerode Theorem and minimization of Finite Automata; Minimization Algorithm; Kleene's Theorem.

Section C

Grammars: Definition; Context Free and context sensitive grammar; Ambiguity; Regular grammar; Reduced forms; Removal of useless Symbols and unit production; Chomsky Normal Form(CNF); Griebach Normal Form(GNF).

Pushdown Automata: Introduction to push-down machines; Application of pushdown machines.

Section D

Turing Machines: Deterministic and Non-Deterministic Turing Machines; Design of T.M; Halting problem of T.M; PCP problem.

Chomsky Hierarchy: Chomsky hierarchies of grammars; Unrestricted grammar; Context sensitive Language; Relation between language of classes.

Computability: Basic Concepts; Primitive Recursive Functions.

Text and Reference Books

1. Hopcroaft & O.D.Ullman, R.Motwani: Introduction to Automata Theory, languages & computations
2. K.L.P.Mishra & N.Chandershekaran: Theory of Computer Sc. (Automata, Language & Computation)
3. Peter Linz: Introduction to formal language & Automata
4. John C. Martin: Introduction to Languages and the Theory of Computation

Semester - IV

Operating System Laboratory (CS – 4007)

Course Code	**CS - 4007**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Operating System Laboratory - I (WINDOWS NT)**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).
(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

Course Description:

LIST OF EXPERIMENTS (Window)

CASE STUDIES on the following operating system to be done in consultation with the faculty incharge for the course:

1. Singal User System :MS-DOS and Windows98
2. Network Operating System: Windows 2000/Windows NT
3. Multiuser System :Unix/Linux
4. Virtual Machine Operating System
   a) Comparative feature of operating system –if possible segment the work into 2 to 8 above. (A group of 2 or 3 students work on each area and prepare a report and present it as seminar to the group. The activity requires 20 hrs of work for each student.
   b) Implementation of command – text & con.
      Identification of command – text/icon.
      Executing the command
      Return of control to CLI (Command Language interpreter).
   c) Process management: Simulation various scheduling algorithm.

Memory management: CBI package on virtual memory, cache memory page replacement algorithm
File system and protection: Implementation for documents. Virus and vaccines, computer security
Use application level command, close, spell check or integrate, differentiate, Mat Mult, plot, evaluate

LIST OF EXPERIMENTS (Linux)

1. Study the Linux operating system and implement various commands and shell scripting.
2. Implement the process synchronization using semaphores.
3. Write the program to mount the various devices (i.e. floppy, CD-Rom etc)
4. Write a program do the following thing…
   a) Find the attribute of file.
   b) To change the attribute of file.
   c) Create the directory.
   d) Delete the directory.
   e) Create the file.
   f) Delete the file.

g) Find the size of Hard Disk, RAM, and VRAM, cache.

5. Implement the various scheduling algorithm (preemptive and non-preemptive).
6. Implement the various page replacement algorithms.
7. Simulate the various memory allocation methods
   a) Paging.
   b) Segmentation.
   c) Virtual memory.
   d) Paged Segmentation.
   e) Protection and sharing.
8. Design TSR.
9. Implement various programs for virus and vaccine.

Note:- Record of the case studies to be presented as a project both electronically and hard copy for evaluation in groups of three students. Students will have to present seminars based on their case studies.

Semester - IV

Analysis & Design of Algorithms Lab (CS – 4008)

Course Code	**CS - 4008**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Analysis & Design of Algorithms Lab**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

List of Experiments:

1) a) Obtain the Topological ordering of vertices in a given digraph.
   b) Compute the transitive closure of a given directed graph using Warshall's algorithm.

2) Implement 0/1 Knapsack problem using Dynamic Programming.

3) From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra's algorithm.

4) Find Minimum Cost Spanning Tree of a given undirected graph using Kristal's algorithm.

5)
   a. Print all the nodes reachable from a given starting node in a digraph using BFS method.
   b. Check whether a given graph is connected or not using DFS method.

6) Find a subset of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6} and {1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

7) Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.

8) Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.

9) Implement All - Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using Open and determine the speed-up achieved.

10) Implement N Queen's problem using Back Tracking.

Online Resource:

http://vtucsenotes.files.wordpress.com/2013/06/design-and-analysis-of-algorithms-laboratory1.pdf

Semester - IV

SAD Project (CS – 4009)

Course Code	**CS - 4009**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**SAD Project**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester (50 Marks)

Course Description:

Aim of this Project

Aim of this Project is to equip students in the methodology of System Analysis and Design of a Live Project in the institute in which he is studying or in a place of work such as Bank, School, College and office in the vicinity of the institute. This will be a guide Project under the Close supervision of the faculty of the institute. Project should be presented in the form of a project report giving a candidate system for solving a life problem.

FIFTH SEMESTER

Semester - V
Software Engineering (CS - 5001)

Course Code	**CS - 5001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Software Engineering**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction- Need for software engineering, issue in the design of large software, software life cycle models.

Software Requirement Analysis and Specification- Requirements Engineering, problem analysis, Data dictionaries, Entity relationship diagram, approaches to problem analysis, Software prototyping, Nature of the SRS, characteristics of a good SRS. Organization of the SRS, Specifying behavioral requirements, finite state machines.

Section B

Software Metrics: What and why: Definition, areas of applications, problems during implementation, size metrics, The basic information Flow Model, Metrics analysis: using statistics for Assessment, Flow problems with metric data,

Software Project Planning: Cost estimation: Models, Static, single variable model, Static multivariable model, The constructive cost model: Basic model, International model, The Putnam resource allocation model: The trade off- -of-time versus cost, development sub cycle, software risk management: what is Risk, typical software risks, Risk management Activities, Risk identification, Risk projection, Risk management activity.

Section C

Software testing techniques: Software testing fundamental testing principles, testability, test case design, White box testing, flow graph notation, cyclomatic complexity, driving test cases, graph metrics, black box testing, graph base testing methods, equalization partitioning, comparison testing, orthogonal Array testing, Testing for real time system.

Unified Modeling Language: Visual modeling with UML, Use case model- use case, actor, and roles, Modeling with classes – association, multiplicity, generalization, process of creating class diagram – difficulties and risks in creating class diagram.

Modeling interaction and behavior – interaction diagrams, state diagram and activity diagram, implementing classes based on interaction and state diagram - difficulties and risks in modeling interactions and behavior**.**

Section D

Software maintenance: What is software maintenance; categories of maintenance, problem during maintenance, potential solution to maintenance problems, the maintenance process: program understanding, generating particular maintenance proposal, ripple effect, modified program testing, maintenance models: Quick fix model, iterative enhancement model, reuse oriented model, Boehm's model estimation of maintenance cost, Beladay and Lehman model, Boehm model, Configuration management activities, software version, Change control process..

Books:

1. Software Engineering- A practitioner's Approach, RogerS. Pressmen
2. Software Engineering-K.K. Aggarwal&Yogesh
3. Timothy C. Lethbridge, Robert Laganiere " Object-Oriented Software Engineering – A practical software development using UML and Java", Tata McGraw-Hill, New Delhi.
4. Mike O'Docherty "Object-Oriented Analysis & design – understanding system development with UML 2.0", John Wiley.
5. Bernd Bruegge, "Object oriented software engineering", Second Edition, Pearson Education.
6. Stephan R. Schach, "Object oriented software engineering", Tata McGraw Hill.
7. Booch, Jacobson, Rumbagh, "The UML user Guide", Pearson Education.
8. Ali Bahrami, "Object Oriented System Development", McGraw Hill.
9. David William Brown, "An Introduction to Object Oriented Analysis Objects and UML in Plain English", 2nf Edition, Wiley.

Semester - V
Database Management System (CS - 5002)

Course Code	**CS - 5002**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Database Management System**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Overview of DBMS, Components of DBMS: (users, language, structure, data-dictionary, data manager, DBA, etc.). File processing versus Data Management, File Oriented approach versus Database Oriented approach. SPARC 3-level architecture. A brief overview of three traditional models (hierarchical mode, network model and relational model).

Section B

Properties of relational model {Codd's 12 rules (integrity rules (concept of keys))}, Relational algebra (select, project, cross product, joins (theta-join, equi-join, natural-join, outer join)), Tuple relational calculus, Domain relational calculus, Entity-Relationship model as a tool for conceptual design entities, attributes and relationships, ER-Diagram, Converting ER-Model into relational schema.

Section C

Functional Dependencies, Multi-valued Dependencies, Normalization (up to 5^{th} level), Structured Query language (with special reference of SQL of Oracle): (INSERT, DELETE, UPDATE, VIEW definitions and use of Temporary tables, Nested Queries, Integrity constraints: Not null, unique, check, primary key, foreign key references), File Organization (Sequential file, index sequential files, direct files, Hashing, B-trees, index files).

Section D

Query processing (Introduction, steps in Query processing, General Processing Strategies, Query Optimisation), Recovery and security, Introduction to Object-Oriented Database, C/S Database, Knowledge Based Database and Distributed Database Management System.

Books:

1. C.J. Date, " An introduction to data base System", 7^{th} ed. Addison Wesly, 2000.
2. Abraham Silberschatz, Henry F. Korth, S. Sudershan, Database System Concepts, rd edition, The McGraw Hill Companies, Inc., 1997.
3. Naveen prakash,"Introduction to Database management ", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1991.
4. Bipin C desai, an introduction to database management system.

Semester - V
Principles of Engineering Economics & Management (CS - 5003)

Course Code	**CS - 5003**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Principles of Engineering Economics & Management**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

ECONOMICS: Definitions; Nature & scope of Economics; Economics Systems-meaning of Capitalism; Socialism & mixed economy.

DEMAND AND SUPPLIES ANALYSIS: Law of demand and supply, exception to the law of demand; Elasticity of demand and supply and their types; Methods of measuring elasticity of demand and supply.

Section B

THEORY OF PRODUCTION: Scales of production, Law of returns; Break even analysis.

MONETARY SYSTEM: Monetary policy Meaning; objectives, methods; Fiscal policy Meaning & objectives of fiscal policy in a developing country like India; Functions of Reserve Bank of India and commercial banks.

ECONOMICS & BUSINESS ENVIRONMENT: Privatization; Growth of private capitalism in India; Business/Trade Cycles – Meaning; Characteristics & classification; foreign capital & economic development.

Section C

MANAGEMENT PRINCIPLES: Meaning & types of Management; Concept of Scientific Management; Management By Objectives; System Approach to Management.

FINANCIAL MANAGEMENT: Meaning; Functional areas of financial management; Sources of Finance; Meaning of financial accounting; accounting principles-concepts & conventions; Importance of final accounts – profit & loss a/c and balance sheet; Need and importance of capital budgeting.

MARKETING MANAGEMENT: Introduction to marketing management; Market segmentation; Developing & managing advertising programs; Deciding on media & measuring effectiveness.

Section D

PRODUCTION MANAGEMENT: Procedure for production planning & Control; Plant Location & Lay-out; Routing; Scheduling; CPM & PERT

QUALITY MANAGEMENT: Statistical Quality Control; Introduction Control Charts; X Charts; R Charts; Control Charts for C (N. of defects per unit); Control chart for P (Fraction Defective), Advantages & Limitations of SQC

Quality Circles: Structure; Functions & Limitations.

Preferred Reading:

1. Business Organisation & Management by B.P.Singh, T.N.Chabra, Dhanpat Rai & Sons
2. Modern Economic Theory by K .K. Dewett, S.Chand & Co

3. Marketing Management by Philip Kotler, Prentice Hall of India
4. Financial Management by I.M. Pandey, Vikas Publishin g House
5. Indian Economic by Ruddar Dutt, K. P. M. Sundaram, S.Chand & Co
6. Advanced Economic Theory by H.L.Ahuja, S.Chand & Co
7. Production Operation Management by Dr. B.S. Goel, Pragati Prakash an
8. Statistical Quality Control by Grant, Leaven worth, Tata Mc. Graw Hill
9. Personnel Management by, Edwin B.Flippo, Tata Mc. Graw Hll
10. Management – A Global Perespective by Grant, Leaven worth ,TMH

Semester - V
Microprocessor Theory & Applications (EC – 5001)

Course Code	**EC(ID) – 5001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Microprocessor Theory & Applications**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction: Evolution of microprocessor; General Architecture of microprocessor; Registers; ALU; System buses; Instruction cycle; Fetch cycle; Execute cycle; Machine cycle; T states; Architecture of 8085; Block diagram; Pin diagram; Instruction formats; Addressing Modes; Timing diagrams.

Section B

Instruction Set & Programming: Instructions set of 8085; Data manipulation; Data transfer; Arithmetic & logical instructions; Status management instructions; Development of Assembly language program.

Section C

Interrupts & data transfer: Interrupts; Hardware & Software Interrupts; Polled and vectored interrupts; Level and edge triggered interrupts; Enabling, disabling and masking of interrupts; Data transfer schemes: DMA, Memory mapped, I/O mapped; Schemes of I/O interfacing; Interfacing memory Chips with a microprocessor; RAM; Concept of wait states.

Section D

Peripheral devices & applications of microprocessor: Description of peripheral IC's; 8155(Multi Function Device); 8251(Universal Synchronous Asynchronous Receiver; Transmitter); 8255(Programmable I/O); 8253(Programmable Interval Timer/Counter); 8257(Programmable DMA controller); 8259(Priority Interrupt Controller); 8279(Key board and Display Controller); Applications of microprocessor; A temperature Monitoring system; Water level control; Traffic control; Generation of square waves using I/O port and SOD lines

Preferred Reading:

1. Ramakant Gaonkar, Microprocessor & Architecture, programming and applications, Penram International Publisher.
2. B.Ram, Fundamentals of microprocessor & microcomputers, Dhanpat Rai & Sons.
3. A.P.Mathur, An introduction to microprocessor , Tata MC Graw Hills.

Semester - V
Web Technology (CS - 5004)

Course Code	**CS - 5004**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Web Technology**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section –A

Internet: Its Architecture / Structure, Current development modes of connecting to internet, World Wide Web, protocols, HTTP, SMTP, POP3, MIME, IMAP. Object Based Scripting for the web. Control Structures, Functions, Arrays, Objects, HTML 5, ISP, Internet addressing, DNS, Hypermedia approach to seamless integration of information distribution like FTP, telnet etc, MM Privacy & Security Topics: Digital signature, Firewalls, Encryption scheme etc.

Section B

Introduction to Web: Structure of Web pages, Basic principle of web page design and implementation guidelines, focus on communication, case of navigation within pages, Listing of site in database + directories searching method and adopted by search engine.

Server: Introduction web servers: PWS, IIS Apache Accessing & using these servers.

Section C

Techniques & Tools for Web Page Design:

1. HTML /DHTML, Dream weaver, Flash, Macromedia directors.
2. Java scripts: java scripts language, client and server and programming, Form and data in java script.
3. XML: Structure in Data – Name spaces – DTD – Vocabularies – DOM methods.

Section D

Multimedia: Audio and video speech synthesis and recognition, Electronic Commerce, E-Business Model, E-Marketing, Online Payments and Security, Web Servers, HTTP request types, System Architecture, Client Side Scripting and Server side Scripting, Accessing Web servers, IIS, Apache web server.

Web database & database Access issue: Middleware & current middleware, transaction processing issues capacity planning, Data transfer ratio, Recovery procedure, Reliable.

Books:

1. John R Hubbard, Programming with Java, Schaum's Outline Series, McGraw Hill International edition 1999.
2. Joseph L.Weber," Using Java 2 platform " prentice Hall of India Pvt Ltd, 2000.
3. Chuck Musciano 7 Bill Kennedy, HTML & XHTML: The Definitive Guide, O Reilly & Associate inc, 4th edition Aug. 2000

4. Ian S. Graham, XHTML 1.0 Language and design sourcebook, John Wiley & sons inc. 2000.
5. Peter Rossbach, Hendrik Schreiber Java Server & services Pearson education Ltd. 2000.
6. The Java developer tool kit Joshu Marketos, John Wiley and Sons, 1997.
7. Java Scripts Peercell Mara
8. ABC of java scripts BPB publications
9. Network firewall, Kironjeet Syan, New Ridden publication.
10. www.seeinf.com
11. www.hackers.com
12. Web Stragies
13. www.unleushed
14. Web Technology & Design, C. Xavier, New International Publishers, New Delhi.
15. Deitel & Deitel, Goldberg, "Internet and world wide web – How to Program", Pearson Education Asia.
16. Paul Deitel, Harvey Deitel, Abbey Deitel ,"Internet and world wide web – How to Program", Prentice Hall

Semester - V
Compiler Design (CS - 5005)

Course Code	**CS - 5005**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Compiler Design**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction: Assembler; Linker; Loader; Preprocessors; Compiler and Translators; Structure of Compiler; Different Phases of Compiler; Bookkeeping, Error Handling; Compiler Writing Tools; Bootstrapping

Lexical Analysis: Role of Lexical Analyser; Design of Lexical Analyser; Language for Specifying Lexical analyzer; Implementation of lexical Analyser

Section B

Syntax Analysis: Context-free Grammars; Derivation and Parse trees

Basic Parsing Techniques: Parsers; Shift Reduce Parsing; Operator Precedence Parsing; Top-down Parsing; Predictive Parsers

Automatic Construction of Efficient Parsers: LR Parsers; Canonical collection of LR (0) items; Constructing SLR parsing tables; Constructing canonical LR Parsing tables; Constructing LALR Parsing tables; Automatic Parser generators; Implementation of LR parsing tables

Section C

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; Control statements

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

Run Time Storage Administration: Implementation of a simple stack allocation scheme; Implementation of block structured languages; storage allocation in block- structured languages.

Section D

Error Detection And Recovery: Error; Lexical-phase errors; syntactic-phase errors; Semantic errors.

Code Optimization: The principle sources of optimization; Loop optimization; The DAG representation of basic blocks; Global dataflow analysis

Code Generation: Object programs; problems in code generation; A machine model; A Simple code generator; Register allocation and assignment; code generation from DAGs; Peephole optimization

Preferred Reading & Text Books:

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers Principles, Techniques and Tools”, Pearson Education
2. Allen I. Holub “Compiler Design in C”, Prentice Hall of India,
3. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings,
4. J.P. Bennet, “Introduction to Compiler Techniques”, Tata McGraw-Hill
5. Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI.
6. Kenneth C. Louden, “Compiler Construction: Principles and Practice”, Thompson Learning

Semester - V

RDBMS Laboratory (CS – 5006)

Course Code	**CS - 5006**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**RDBMS Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

1. Familiarization with RDBMS (ORACLE/FOXPRO) using VISUAL BASIC as front end) & developing a small application.
2. Create a database and write the programs to carry out the following operation:
   (i) Add a record in the database. (ii) Delete a record in the database. (iii) Modify the record in the database. (iv) Generate queries.(v) Generate the report. (vi) List all the records of database in ascending order.
3. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

   Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

   Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

   Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

   i) Creation of simple PL/SQL program which includes declaration Unit, executable Unit and exception Handling Unit (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
   ii) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

   Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

3. Develop a menu driven project management of database system: (i) Library information system
   - (a) Engineering
   - (b) MCA

   (ii) Inventory control system
   - (c) Computer Lab
   - (d) College Store

   (iii) Student Information System
   - (e) Academic
   - (f) Finance

   (iv) Time Table development system
   - (g) CSE, IT & MCA Departments.
   - (h) Electrical & Mechanical Departments.

Usage of S/W:

1. VB, ORACLE and/or DB2
2. VB, MSACCESS
3. VB, MS SQL SERVER 2002

Note: At least 5 or 10 more exercises to be given by the teacher concerned.

Semester - V

Web Technology Laboratory (CS – 5007)

Course Code	**CS - 5007**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Web Technology Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

To create dynamic animation, simulations and interactive web pages using HTML, Java Script.

Create databases using: HTML / Java Script / DHTML/XML.

WEB Technology:

1. Setting up intranet.
2. Learning of tools – DHTML, flash, director
3. Design of web pages/sites.
4. Development of web pages/site.
5. Evaluation of web site.
6. Registering of website.

Projects:

1. Create a HTML based static website.
2. Create a Animated movie in flash.
3. Create a full motion video movie in flash.
4. Create a post table game in flash.

Semester - V

Microprocessor Laboratory (EC – 5002)

Course Code	**EC – 5002**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Microprocessor Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

Microprocessor Laboratory:

This laboratory will based on microprocessor 8085 kits with following interfaces:

1. Keyboard & Display.
2. Analog to Digital conversion using DAC.
3. Analog to Digital conversing using Dual slope ADC.
4. Elevator simulator.
5. Logic controller.
6. Stepper motor.
7. DC motor.
8. General purpose PCB with connector.
9. Crystal Oscillator.
10. Modulator/Demodulator.
11. Serial data communication.

A few experiments, which can be performed (to be detailed later on)

1. Hexadecimal addition
2. Count up/count down
3. Timing delay
4. Flash a message like ‘UP’
5. Moving display
6. Display the code for the key pressed on the keyboard.
7. Display a digital clock with minutes and seconds.
8. Interfacing motor, keyboard etc.

Note: - Record to be maintained in the laboratory record book for evaluation.

Semester - V

Vocational Training (CS - 5008)

Course Code	**CS-5008**	**Credits-2**	**L-0, T-0, P-2**
Name of the Course	**Vocational Training**		
Semester End Examination	**Max Marks: 50**	**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Continuous Assessment	**Lab work 30%, Lab Record 25%, Viva 25% & Attendance 20%**	**Max Marks: 50**	**Min Pass Marks: 25**

Instructions for paper Setter / Candidates

This 6 weeks training will be related to Industrial Projects to be undertaken under the guidance of Faculty preferably at Industry / Software Park / Incubation Centre or related areas. This may also be undertaken with in the Institute. This training will be undertaken during vacation. Student is supposed to submit the project report at the end of the training.

Evaluation will be based on Project Report, presentation and comprehensive Viva-voce examination related to the project.

SIXTH SEMESTER

Semester - VI
Modeling and Simulation (CS - 6001)

Course Code	**CS - 6001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Modeling and Simulation**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Definition of systems: Types of system, continuous and discrete modeling process and definition of a model. Common type of mathematical models used for engineering and non-engineering system (such as differential and partial differential equation models.

Section B

Simulation Process: Discrete and continuous simulation procedures. Random number generation and its testing discrete and continuous random variables, density and distributive functions, study of few distributions such as Poisson, Norma.

Section C

Simulation of Queuing System: Elementary idea about networks of queuing with particular emphasis to computer system, environment (refer to section 9.1,9.2 & 9.3 of Trivedi's book.) **Verification & Validation:** Design of simulation experiments and validation of simulation experiments comparing model data units and real system data.

Section D

Simulation Language: A brief introduction to important discrete and continuous languages such as GPSS (Study & use of the language). Use of data base & AI techniques in the area of modeling and simulation.

Books:

1. Deo, Narsing: System Simulation with Digital Computers.
2. Gorden G: System Simulation, Prentice Hall (Two books above can be used as text books).
3. Shridhar Bhai Trivedi, Kishore: Probability & Statistics with reliability Queuing, Computer science Application.
4. Payer, T.A., Introduction to System Simulation, McGraw Hill.
5. Reitman, J., Modeling and performance measurement of Computer System.
6. Spriet, WI A., Computer Aided Modeling and Simulation (Academic Press).

Semester - VI
Computer Graphics & Multimedia (CS - 6002)

Course Code	**CS - 6002**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Computer Graphics & Multimedia**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction to computer graphics & graphics systems: Introduction to Computer Graphics; Computer Graphics Applications; Computer Graphics Hardware and software; Video Display Devices(Refresh cathode- ray tube, raster scan displays, random scan displays, color CRT-monitors, direct view storage tube, flat-panel display, 3D viewing devices); raster scan systems; random scan systems; graphics monitors and workstations.

Two dimensional Graphics Primitives: Points and Lines; Line drawing algorithms; DDA, Bresenham's(Circle drawing algorithms, Using polar coordinates, Bresenham's circle drawing, mid point circle drawing algorithm)

Filled area algorithms: Scanline, Polygon filling algorithm, boundary filled algorithm

Section B

Two/Three Dimensional Viewing: The 2-D viewing pipeline; Windows; Viewports; window to view port mapping; Clipping point, clipping line (algorithms); 4 bit code algorithm; Sutherland-cohen algorithm

Polygon clipping algorithm: Sutherland-Hodgeman polygon clipping algorithm

Two dimensional transformations: Transformations; Translation; Scaling; Rotation; Reflection; composite transformation

Three dimensional transformations: Three dimensional graphics concept; Matrix representation of 3-D Transformations; Composition of 3-D transformation

Viewing in 3D: Projections; types of projections; the mathematics of planner geometric projections

Section C

Curves: Curve representation(surfaces, designs, Bezier curves, B-spline curves, End conditions for periodic B-spline curves, rational B-spline curves)

Hidden surfaces: Depth comparison; Z-buffer algorithm; Back face detection; BSP tree method; the Painter's algorithm; scan-line algorithm; Hidden line elimination; wire frame methods; fractal - geometry

Color & shading models: Illumination; Shading; image manipulation; Illumination models; shading models for polygons; shadows; transparency

Section D

Multimedia: Introduction to Multimedia; uses of multimedia; hypertext and hypermedia; Image; video and audio standards

Audio: digital audio; MIDI; processing sound; sampling; compression

Video: MPEG compression standards; compression through spatial and temporal redundancy; inter-frame and intra-frame compression; overview of other image file formats GIF, TIFF, BMP, PNG etc.

Animation: Types; Techniques; key frame animation; utility; morphing; Virtual Reality concepts;

Preferred Reading & Text Books:

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers- Principles, Techniques and Tools, 2nd edition, Addison-Wesley.
2. D.M.Dhamdhere- System Programming and Operating Systems, 2nd revised edition, Tata McGraw – Hill.
3. Charles N. Fischer, Richard J. leBlanc, Jr.- Crafting a Compiler with C, Pearson Education.
4. Andrew W Apple- Modern Compiler Implementation in C, Cambridge University Press.

Semester - VI
Computer Networks (CS -6003)

Course Code	**CS - 6003**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Computer Networks**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction: Networks, switching, Internet, Hardware and software, TCP/IP protocol suit, OSI model

Application Layer: Services, Client server Paradigm, WWW, HTTP, FTP, Telnet, SSH, DNS, P2P Networks, (Distributed Hash table)

Section B

Transport layer: Services, stop and wait protocol , go back n, selective repeat, bi- directional protocol, Piggybacking , User Data gram Protocol (datagram, services, Applications)

Transmission Control Protocol (TCP): Services, features, segment, state transition diagram, Windows in TCP, flow control, error control, congestion control, timer, Options

Section C

Network Layer: Services, Packet switching, IPv4 Protocol (Data gram, address), IP packet forwarding, ICMPv4, Unicast Routing algorithms (Distance vector routing, Path vector routing, Unicast Routing protocols (RIP, OSPF, BGP4)

Data-Link Layer: Framing, error control, flow control, Random access, controlled access, channelization, Ethernet protocols (IEEE project 802, standard Ethernet, fast Ethernet, gigabit Ethernet, 10 gigabit Ethernet, virtual Lan)

Section D

Network Management: Configuration management, fault, performance, security, accounting, SNMP

Network security: security goals, Attacks, Services and Techniques, Symmetric key Ciphers, Asymmetric – key ciphers, Digital signatures, firewalls.

Books:

1. Behrouz A Forouzan & Firouz Mosharraf, "Computer Networks", Mc Graw Hill, (Special Indian Edition (SIE 2012.
2. A. S. Tanenbaum, " Computer Networks", Second Ed., Prentice Hall, India.
3. J. F. Hayes, "Modelling and analysis of Computer Communication Networks", Plenum Press (Reprinted in India by Khana Publishers).
4. D. Bertsekas and R. Gallager, " Data Networks", Second Ed., Prentice Hall, India.
5. D.E.Comer, " Internetworking with TCP/Ip", Vol. 1, Prentice Hall, India.
6. G. E. Keiser, " Local Area Networks", McGraw Hill, International Edition.
7. W. Stalling, "Data & Computer Communication", Maxwell Macmillan International Edition.

Semester - VI
Statistical Methods (CS - 6004)

Course Code	**CS - 6004**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Statistical Methods**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction: Theory of probability, probability concepts, random experiment and events, Mathematical Notion, probability function, law of addition of probability, extension of general law of addition of probabilities, multiplication law of probability and conditional probability, extension of multiplication law of probability, probability of occurrence of n independent events, independent events, conditions for mutual independence of n events, Bayes theorem.

Section B

Random Variables and Distribution Functions: Random variable, distribution function, discrete random variable, probability mass function, discrete distribution function, continuous random variable, probability density function, various measures of central tendency, dispersion, skewness and kurtosis for continuous distribution, continuous distribution function

Section C

Discrete Distribution, Bernoulli Distribution, binomial distribution, fitting of binomial distribution, Poisson distribution, the Poisson process, probability generating function of Poisson distribution, fitting of Poisson distribution, Normal distribution as a limit of binomial

Inferential statistics: Sampling, Sampling distribution, theory of estimation, hypothesis testing, z-test, student t - test, f- test, chi square test.

Section D

Measures of Central Tendency: Central tendency arithmetic mean, median & mode.

Measures of Dispersion: Meaning of dispersion, range, mean deviation, standard derivation, quartile derivation, measures of relative dispersion

Preferred Reading & Text Books:

1. Introduction to mathematical statistics Hogg and Craig Prentice Hall
2. Probability & Statistics with Reliability, Queuing, and Computer Science Application Kishore S. Trivedi Prentice Hall
3. Fundamentals of Statistics A.M. Goon, M.K. Gupta & B. Dasgupta, The World Press Pvt. Ltd
4. Inequalities theory application and measurements J.N. Kapoor, Mathematical Sciences Trust Society
5. Operational Research Kanti Swarup, P.K. Gupta, Manmohan,Sultan Chand and Sons
6. Fundamentals of Mathematics Statistics S.C. Gupta and V.K. Kapoor, Sultan Chand & Sons

Semester - VI
Core Java Programming (CS - 6005)

Course Code	**CS - 6005**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Core Java Programming**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction to Java, Difference between C/C++ and Java, Applets and Applications, Java Development Kit, Advantages of Java, (Data types, modifiers, expressions, operators in Java), Control Statements in Java, Classes statements and methods in Java

Section B

Classes, Inheritance (single, multilevel, hierarchical), Multiple Inheritance using Interfaces, Arrays, Strings and Object class, Java packages and interfaces, Exception handling, Exploring Wrapper classes, Enumeration Interface,
Multithreading: Java Thread Model, Thread Priorities, Creating Multiple Threads, Synchronization, Inter thread communication.

Section C

Applets: Applet Basic, Applet Architecture, Display Methods, HTML APPLET tag.
Java I/O: I/O Package, InputStream and OutputStream classes, Reader and Writer classes
Event Handling: Event Handling Models, Event classes, Event Listener Interfaces, Adapter Classes.

Section D

AWT Classes: Window fundamentals, working with frames windows, Panels, working woth color, fonts, AWT Controls, layout Manager & Menus. Applets, Graphics and AWT
Swing: Swing components classes and their brief description such as buttons, boxes, panes, tables, fields and trees.
Basic concepts of networking: Working with URLs; Concepts of URLs; Sockets

Books:

1. Programming with JAVA, John R. Hubbard, Schaum's Outline Series, McGraw Hill, New York.
2. Java Script, Don Gosselin, Thomson Learning, Cambridge, 2000.
3. Programming with Java, E. Balagurusamy, Tata McGraw Hill, New Delhi, 2002
4. The Complete Reference, Java 2, 3rd Edition, Patrick Naughton, Herbert Schildt, Tata McGraw Hill.

Semester - VI
Digital Communications (EC – 6001)

Course Code	**EC – 6001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Digital Communications**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Analog to Digital Conversion: Noisy communication channels, the sampling theorem, low pass signals and band pass signals, pulse amplitude modulation, channels bandwidth for a PAM signal. Pulse amplitude modulation, sampling, signal recovery an holding, Quantization of signal, Quantization error, pulse code modulation (PCM), Delta modulation, adaptive data modulation

Section B

Random Variables and Distribution Functions: Digital Modulation

Techniques: Binary Phase shift keying, Differential Phase shift keying, Differential encoded PSK, quadrature PSK, Quadrature Amplitude shift keying (QSK) Binary frequency shift keying.

Data Transmission: A baseband signal receiver, probability of error, the optimum filter, white noise- the matched filter, probability of error of the matched filter, coherent reception: correlation, correlation receiver for Q.PSK.

Section C

Noise in Pulse Code and Delta Modulation system: PCM transmission, Calculation of Quantization noise, the O/P signal power, the effect of thermal noise, O/P signal to noise ratio in PCM, Delta modulation, Quantization noise in Delta modulation, the O/P signal to quantization noise ratio in delta modulation, O/P signal to noise ratio in delta modulation.

Section D:

Computer Communication System: Introduction, types of networks, Design features of computer communication network, Examples of Digital communication: ISDN, LAN, pocket radio and satellite, ATM, etc.

Prefered Readings & Text Books:

Taub and Schilling, Principles of Communication systems (East West Press)
John R. Freer, Principles of communication an Network

Semester - VI

Java Programming Laboratory (CS – 6006)

Course Code	**CS - 6006**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Java Programming Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

Programming in Java Script, ASP and JAVA / Swing / JDBC / Servlets / Beans.

* To be done in consultation with the faculty in charge for the course and should lead to the projects in groups of two.

1. Write an application that demonstrates some static method of character class.
2. Create a string buffer object to illustrate how to
   (a) Display capacity and length of string buffer
   (b) Insert character at the beginning.
   (c) Append & Reverse the string.
3. Write a program that display all the factors of a number entered by user: e.g. If entered 8 it would response with 2 & 4.
4. Write an application that defines sphere class with three constructors first from accepts no arguments. It assumes that sphere is centered at origin & has radius of one unit. The record from accept one double value and represents radius and centered at origin, third from accepts four double arguments and specify radius and origin.
5. Write down a program to implement polymorphism using
   (a) Overloading
   (b) Overriding
6. Write a program that illustrate how to use throw statement, create class that has static method main (), a (), b (), c () and d (). Main invokes a (), a () invokes b (), b () invokes c() and so on. Method d () declares an array with ten elements and then attempts to access 20^{th} element. Therefore array index out of bond exception is generated.
7. Write an application that execute two threads one after another, Create threads by implementing.

(a) Thread Class

(b) Runnable Interface.

8. Write a Multithreaded program that simulate a set of grasshoppers jumping around in a bode. Each grasshopper jumps to a different location Every 2 to 12 seconds. Display the new location of grasshopper after each of these jumps.

9. Write down program in java to implement following in java.

(a) Linked List (b) Vector Class (c) Hashtable (d) Enumeration

10. Write a program to implement Applet that displays different Images based on the days of week. The Applet should accept seven parameters that identify the Image file.

11. Write a program that shows a solid circle that moves from left to right across the applet display area. The flicker effect should be noticeable.

12. Write a program to event handling in Java.

13. Write a program to implement frame, panels through different layout managers in applets and swings.

Semester - VI

Modeling & Simulation Laboratory (CS – 6007)

Course Code	**CS - 6007**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Modeling & Simulation Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

(For all the given exercise student has to make GUI)

1. Write a program for the random number generation and do its testing and validation for various discrete and random variables.
2. Do the modeling and simulation of queuing system (i.e. in computer system).
3. Do the modeling and simulation of the ATC (Air Traffic Control System).
4. Do the modeling and simulation of the Monte-Carlo method.
5. Study the GPSS and implement various program in it.

Semester - VI

Computer Networks Laboratory (EC – 6002)

Course Code	**EC – 6002**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Computer Networks Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

Computer Networks:

1. Construct a network of 2 or 3 system.
2. Simple communication between the systems in exchanging a binary word.
3. Encryption and decryption on the ASCII character set being transmitted.
4. Experimentation with standard set of protocols (Tanebaum).
5. Experimentation with protocol kit.
6. Experimentation with modulation.
7. Assure cables, connections, crimping.
8. JDM
9. Bridges, Routers, Hubs etc.

Note: - Record to be maintained in the laboratory record book for evaluation.

Semester - VI

Computer Graphics Laboratory (CS – 6008)

Course Code	**CS - 6008**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Computer Graphics Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

1. Familiarize yourself with creating and storing digital images using scanner and digital camera (compute the size of image when stored in different formats) and convert the stored images from one format to another (BMP, GIF, JPEG, TIFF, PNG, etc.) and analyze them.
2. Implement bresenham's line algorithm. Also provide Provision to change attributes of graph primitives such as stippling (Dotted and Dashed pattern), colors and Butt & round Caps.
3. Implement bresenham's circle algorithm. Also provide to change attributes of graph primitives such as stippling (Dotted and Dashed pattern) and colors.
4. Implement 2-D transformation with translation, scaling, rotation, reflection, Shearing and scaling
5. Construct Bezier curves and Spline curves with 6 or more control points entered through mouse.
6. Construct fractal geometric shapes using linear or non-linear procedures.
7. Consider a scene with two or more three dimensional polygonal object. Generate Different perspective views of scene by changing various 3D viewing parameters interactively.
8. Implement tweening procedure for animation with key frames having equal or different no. of edges.
9. Write a program for 2D line drawing as Raster Graphics Display.
10. Write a program for 2D circle drawing as Raster Graphics Display.
11. Write a program for 2D polygon filling as Raster Graphics Display.
12. Write a program for line clipping.
13. Write a program for polygon clipping.
14. Write a program for displaying 3D objects as 2D display using perspectives transformation.
15. Write a program for rotation of a 3D object about arbitrary axis.
16. Write a program for hidden surface removal from a 3D object.

SEVENTH SEMESTER

Semester - VII
Information Security (CS - 7001)

Course Code	**CS - 7001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Information Security**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction: Introduction to OSI Network Security Architectures, Services, Mechanisms and Attacks,Classical Encryption Techniques, Symmetric cipher model, Substitution techniques, Transposition techniques, Rotor Machines, Steganography.

Introduction To Finite Fields: Groups, Rings, and Fields, Modular Arithmetic, Euclid's Algorithm, Finite Fields of the Form *GF(p),* Polynomial Arithmetic, Finite Fields of the Form *GF(2n).*

Section B

Cryptographic Techniques: An overview of Cryptology, Primality test, *Perfect* security, Stream Cipher *Stream ciphers:*The one time pad. Pseudorandom key streams - properties and generation. Block Cipher -, Introduction to DES, differential and Linear Cryptanalysis, Block Cipher Cryptography, Triple DES Algorithm, International Data Encryption Algorithm (IDEA), Blowfish Algorithm, RC-x Algorithms, CAST-x Algorithms, Symmetric Block Cipher Schemes, Encryption Function Placement and Confidentiality problems. Cryptographic hash functions, Digital signatures.

Public-Key Cryptography and Message Authentication: The Key Distribution Problem, Random Number Generation, Public-Key Cryptosystems, The RSA Algorithm, The Key Management riddle, The Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. The Chinese Remainder Theorem, Discrete Logarithms., Introduction to Message Authentication, requirements and functions, Message Authentication Codes, Hash Functions, their Security and other considerations.

Section C

Authentication Applications: The Message Digest (MD5) Algorithm, Secure Hash Algorithm (SHA-1, SHA-2), RIPEMD-x and HMAC fundamentals, Digital Signature basics, Authentication Protocols, The Digital Signature Standard, Introduction to the Kerberos Authentication scheme, The X.319 Directory Authentication scheme.

Systems and Applications Security: Authentication, Access control policies, Mail security, PGP, *Data* (base) security, File system security, Program security, Memory security, Session security, SSH, Web security, Web applications security, Sandboxing, Linux security, Windows.

Section D

Security Protocols: Security properties, attacks, Design of a security protocol, Examples of security protocols,Contract signing protocols, *Formal* models of protocols and detecting leaks, Electronic voting protocols, IPSec,, SSL, TLS worms and viruses, micro payments, smart card security, Security of wired / wireless networks.

Intrusion detection: Key Management in Group Communication Systems, Router security, Denial of service and side-channel attacks, *Intrusion* Detection Systems, Intrusion detection techniques - centralized and distributed.

Text and Reference Books

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson

Education.
2. D Stinson, “Cryptography: Theory and Practice”, Chapman & Hall.
3. C. Kaufman, R. Perlman and M. Spenser, “Network Security”, PHI.
4. S. Bellovin and W. Chesvick, “Internet Security and Firewalls”, Addison-Wesley, Reading.
5. Trappe & Washington, “Introduction to Cryptography with Coding Theory”, Prentice-Hall.

Semester - VII
Artificial Intelligence (CS - 7002)

Course Code	**CS - 7002**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Artificial Intelligence**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction to AI: Definition of Artificial; Intelligence (AI); Problems; Techniques; Architecture of AI machines; logic family; Classification of logic; Introduction to LISP (List manipulations; Functions; Predicates; Conditionals; Input, output local variables; Iteration; recursion; Lists; Arrays); Problems Spaces & Search; Defining a problem as a space; Search; Production systems and its Architecture; Problem characteristics; Production system characteristics

Section B

Planning Planning as search, partial order planning, construction and use of planning graphs.

Representing and Reasoning with Uncertain Knowledge Probability, connection to logic, independence, Bayes rule, bayesian networks, probabilistic inference

Decision-Making Basics of utility theory, decision theory, sequential decision problems, elementary game theory. **Machine Learning and Knowledge Acquisition** Learning from memorization, examples, explanation, and exploration. Learning nearest neighbor, naive Bayes, and decision tree classifiers, Q-learning for learning action policies

Section C

Propositional Logic: Proposition; Tautologies; Theorem proving; Semantic method of theorem proving; Forward chaining; Backward chaining standard theorems; Method of substitution; Theorem proving using Wang's algorithm; Predicate Logic (Alphabet of first order logic (FOL), Predicate, Well formed formula, Clause form, Algorithm for writing sentence into clause form, Unification of predicates, Unification algorithm, Resolution Robinson's interface rule, Scene interpretation using predicate logic).

Knowledge Representation and Reasoning Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; frame representation, semantic network, predicate logic, resolution, natural deduction, situation calculus, description logics, reasoning with defaults, reasoning about knowledge.

Section D

Heuristic Search Techniques: Generate and test; Hill Climbing; Best – first search (A*); Problem Reduction (AO*); Constraint satisfaction; Means End Analysis; Game Playing And Search (Introduction Min-Max Algorithm, Alpha-beta cut off, Examples of games)

Expert System: Component of an expert system; Categories of an Expert System; Stages in development of Expert System; Expert System Development Tools; Expert System Architecture

Preferred Reading & Text Books:

1. Introduction to Artificial Intelligence & Expert System by D.W. Patterson, Prentice hall of India, New Delhi
2. Artificial Intelligence by Rich, E & Knight K , Tata McGraw Hill Pub Co, New Delhi
3. Principles of Artificial Intelligence by Nilson, N.J. , Narosa Pub, House
4. Artificial Intelligence and Soft Computing- Behavioral and cognitive Modeling of Human Brains by A. Konar, CRC Press, USA

5. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India Pvt Ltd
6. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education / Prentice Hall of India.
7. Saroj Kaushik, “Logic and Prolog Programming”, New Age International Pvt Ltd

Semester - VII

Mobile Computing (CS-7003)

Course Code	**CS - 7003**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Mobile Computing**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description

Section-A

Introduction

Challenges in mobile computing, coping with uncertainties, resource poorness, bandwidth, etc. Cellular architecture, co-channel interference, frequency reuse, capacity increase by cell splitting.

Medium Access Control Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

Section-B

Telecommunication Systems

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode.

Wireless LAN

Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development.

HIPERLAN

Protocol architecture, Physical layer, Channel access control. Sublayer, Medium access control Sublayer, Information bases And Networking.

Section-C

Bluetooth

User scenarios, Physical layer, MAC layer, Networking. Security, Link management.

Mobile Network Layer

Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing.

Mobile Transport Layer

Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/timeout freezing, Selective retransmission, Transaction oriented TCP.

Section-D

Data Dissemination and Management

Challenges, Data dissemination, Mobile data replication, Mobile data caching, Mobile cache maintenance, mobile web caching, caching in ad hoc networks.

Context Aware Computing
Ubiquitous computing, concept of context, context aware computing and applications, middleware support.
Mobile Middleware
Service discovery, adaptation, mobile agents.
Wireless security
Traditional security issues, mobile and wireless security issues, Problems in ad hoc networks.

Text and Reference Books
1. Frank Adelstein, S.K.S. Gupta, Golden G. Richard III and Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional.
2. Charles Perkins, "Ad hoc Networks", Addison Wesley.
3. David Taniar, "Mobile Computing: Concepts, Methodologies, Tools, and Applications".
4. Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, "Mobile Computing".
5. J. Schiller, "Mobile Communications", Addison Wesley.

Semester - VII
E-Commerce & ERP (CS - 7004)

Course Code	**CS - 7004**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**E-Commerce & ERP**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction and Concepts: Networks and Commercial Transactions – Internet and other novelties: networks and electronic transactions today, Model for commercial transactions; Internet environment – Internet advantage, worlds wide web and other Internet Sales venues; online commerce solutions.

Electronic Payment Methods: Updating traditional transactions; secure online offline secure processing; private data networks, Security protocols.

Section B

Electronic Commerce Providers: On-line Commerce options; Company profiles, Electronic Payment System: Digital payment system; First virtual Internet payment system; cyber cash model. On-line Commerce environments; E-commerce Servers, Digital Currencies Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards;

Electronic Data interchange: basics, EDI versus Internet and EDI over Internet. Strategies, Techniques and Tools, Shopping techniques and online selling techniques.

Section C

ERP - an Enterprise Perspective: Production finance, Personnel disciplines and their relationships, Transiting environment, MIS Integration for disciplines, Information / workflow, Network Structure, Client Server Integrator System, Virtual Enterprise.

ERP – Resource Management Perspective: Functional and Process of Resource, Management, Introduction to basic Modules of ERP System: HRD, Personnel Management, Training and Development, Skill Inventory, Material Planning and Control, Inventory, forecasting, Manufacturing, Production Planning, Production Scheduling, Production Control, Sales and Distributions, Finance, Resource Management in global scenario.

Section D

ERP – Information System Perspective: Functional to OLAP(Online Analysis and Processing), TP, OAS, KBS, MRP, BPR, SCM, REP, CRM, and Information Communication Technology.

ERP – Key Managerial Issues: Concept Selling, IT Infrastructure, Implication, of ERP System on business Organization, Critical success factors in ERP System, ERP Culture Implementation Issues, resistance to change, ERP Selection issues, return on Investment, pre and post Implementation Issues.

Books:

1. Ravi lalakota, Andrew Whinston: Frontiers of Electronics Commerce, 1996, Addison Wesley.
2. V.K. Garg and N.K. Venkita Krishna: Enterprise Resource Planning – Concepts and practice, 1998, PHI.
3. John Antonio, Fernandz: The SAP/3 Handbook, TMH.
4. Denial Amor: The E-Business Revolution, Addison Welsey.

5. From Edi to E-Commerce: A Business Initiative: Sokol TMH.
6. Greenstein and Feinman: E-Commerce, TMH.
7. Diwan, Sharma: E-Commerce Excel.
8. Asset International " Net Commerce", TMH.
9. E-Commerce – Jaffrey F. Rayport, Bernard J. Jaworski, 2002, TMH.
10. Bajan and Nag: E-Commerce: The cutting Edge of Business, TMH.
11. Electronic Commerce – Security, Risk Management and Control, Greenstein, Geinman, 2002, TMH.

Semester - VII
Advanced Java Programming (CS - 7005)

Course Code	**CS - 7005**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Advanced Java Programming**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Java Database Connectivity: JDBC Product; Types of Drivers; Two-Tier Client/Server Model; Three-Tier Client/Sever Model; Basic Steps of JDBC; Creating and Executing SQL Statement; The Result Set Object; Working with Database Meta-Data; Interface

Servlets: Servlet Interaction & Advanced Servlets; Life cycle of Servlet; Java Servlet Development Kit; Javax.servlet package; Reading Servlet Parameters; Reading Initialization Parameters; The javax.servlet.http Package; Handling HTTP

Section B

JavaServer Pages: JSP Technologies; Understanding the Client-Server Model; Understanding Web server software; Configuring the JSP Server; Handling JSP Errors; JSP Translation Time Errors; JSP Request Time Errors; Creating a JSP Error Page

RMI: RMI Architecture; Designing RMI application; Executing RMI application

Section C

EJB: Types of Enterprise Java beans; Session Bean & Entity Bean; Features of Session Bean; Life-cycle of state-full Session Bean; Features of Entity Bean; Life-cycle of Entity Bean; Container-managed Transactions & Bean-managed Transactions; Implementing a container-managed Entity Bean

XML: What is XML? XML Syntax Rules

Section D

Struts: Introduction to the Apache Struts; MVC Architecture; Struts Architecture; How Struts Works? Introduction to the Struts Controller; Introduction to the Struts Action Class; Using Struts ActionFrom Class; Using Struts HTML Tags; Introduction to Struts Validator Framework; Client Side Address; Validation in Struts; Custom Validators Example; Developing Application with Struts Tiles

Hibernate: Introduction to Hibernate 3.0; Hibernate Architecture; First Hibernate Application

Text Books and References:

1. Java Server Programming Java EE 5, Black Book, Kogent Solutions Inc., dreamtech Press.
2.

Semester - VII

Advanced Java Programming Laboratory (CS – 7006)

Course Code	**CS - 7006**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Advanced Java Programming Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

1. To create a user interface which inputs user's Name, email-ID, City etc. to store in the database through JDBC using SQL server or MS Access.
2. To display Juggler Bean by setting its properties and events.
3. To display the applet designed by the user in Bean Box.
4. To create a user interface using swings which displays pop-up window containing list of courses, option buttons for inputting Male or Female, Check Boxes to display the choices of various institutes and menu bars using event handling. Put the other controls accordingly.
5. To display a stop watch which rings the alarm at the time specified by the user using multithreading.
6. To create a user defined bean which may be used as Font selector in other applications.
7. To study the various types of beans and their corresponding properties:
   a) Jelly bean b) Tick Tock Bean c) ChangeReporter Bean d) OurButton Bean
8. To create a chat server using RMI or socket programming.

Semester - VII

E – Commerce & ERP Laboratory (CS – 7007)

Course Code	**CS - 7007**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**E – Commerce & ERP Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

This laboratory will be self-exploratory in nature with the undertaking of case studies such as by culling information from the Internet on

a) Pay roll
b) Back office accounting
c) Supply chain
d) Order Processing
e) Shipments
f) Web and Value addition to traditional business
g) Study of packages such as SAP oracle.

At the end of the laboratory a student is expected to make a presentation of his exploration in the area of e-commerce and ERP.

Semester - VII

Project-I (CS – 7008)

Course Code	**CS - 7008**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Minor Project**		
Lectures to be delivered	**60 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

This project work shall be carried out by the students during the entire semester under the guidance of Supervisor allotted by the institute and its viva will be conducted at the end of the semester.

Instructions for paper setter/candidates

Project Evaluation will consist of Three parts:

1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by internal examiner 30% marks.
2. Viva-voce examination (20% marks).
3. Software evaluation with test runs (10% marks)

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

Aim of this Project:

Aim of this project is to equip students in the methodology of the system analysis and design of a live project in the institution in which he is studying or in a place of work such as bank, school, college and office in the vicinity of the institute. This minor project can be a precursor to the major project to be undertaken in the eighth semester.

This will be a guided project under the close supervision of the faculty of the institute. Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

Semester - VII

Artificial Intelligence Laboratory (CS – 7010)

Course Code	**CS – 7010**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Artificial Intelligence Laboratory**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester

Course Description:

LIST OF EXPERIMENTS

1. Study of PROLOG/LISP.
2. Write a program to find a factorial of a number.
3. Write a program to the maximum of two numbers.
4. Write a program to illustrate the use of predicate not/fail.
5. To find the various relationships of a family.
6. Write a program to illustrate the procedural meaning of Prolog.
7. Medical diagnosis of Patient.
8. Write a program to solve 8 queens problem.
9. Solve any problem using breadth first search.
10. Solve any problem using depth first search.
11. Solve any problem using best first search.
12. Solve 8-puzzle problem using best first search.
13. Solve travelling salesman problem.
14. Implement these practical in LISP or Prolog in which you feel comfortable.
    a) Depth –bounded depth first search.
    b) A * Search.
    c) AO* Search.
    d) Min max Search.
    e) Alpha Beta Pruning.
15. Solve the water jug problem using AI technique.
16. Solve the Missionaries problem using AI technique.
17. Design the following expert system using LISP or Prolog in which you feel comfortable.
    a) Weather Forecasting System.
    b) Legal Expert System.
18. Design parser for NLP using Lex and Yacc utilities

Semester - VII

Vocational Training* (CS – 7009)

Course Code	**CS - 7009**	**Credits : 2**	**L-0, T-0, P-2**
Name of the Course	**Vocational Training***		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter / Candidates

This training will be related to Industrial Projects / Software Projects to be undertaken under the guidance of Faculty preferably at Industry / Software Park / Incubation Centre or related areas. This may also be undertaken with in the Institute. The training will be undertaken during vacation. Student is supposed to submit the project report at the end of the training.

Evaluation will be based on Project Report, presentation and comprehensive Vive-voce examination related to the project.

Professional Elective - I

Semester VII

Software Quality Engineering (CS – 7010)

Course Code	**CS - 7010**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Software Quality Engineering**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.
3. This course will be conducted in drawing hall fitted with drawing tables and drafters.

Course Description:

Section-A

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

Section-B:

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

Section-C:

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

Section-D:

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

Books:

1. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345-7.
2. Metrics and Models in Software Quality Engineering, Stephen H. Kan, Addison- Wesley (2002), ISBN: 0201729156

Semester VII

Communication Protocol Engineering (CS – 7011)

Course Code	**CS - 7011**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Communication Protocol Engineering**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Communication model, software, subsystems, protocol, protocol development methods, Protocol engineering process, Layered architecture, Network services and Interfaces, Protocol functions, OSI model ,TCP/IP protocol suite.

Section-B

Components of protocol, Specifications of Communication service, Protocol entity, Interface, Interactions, Multimedia protocol, Internet protocol, SDL, SDL based protocol other protocol specification languages.

Section-C

Protocol verification, Verification of a protocol using finite state machines, Protocol validation, protocol design errors, Protocol validation approaches, SDL based protocol verification and validation.

Section-D

Conformance testing methodology and frame work, Conformance test architectures, Test sequence generation methods, Distributed architecture by local methods, Conformance testing with TTCN, systems with semi controllable interfaces - RIP,SDL based tools for conformance testing, SDL based conformance testing of MPLS Performance testing, SDL based performance testing of TCP and OSPF, Interoperability testing, SDL based interoperability testing of CSMA/CD and CSMA/CA protocol using Bridge, Scalability testing.

Books:

1. Pallapa Venkataram and Sunilkumar S.Manvi, “Communication protocol Engineering”, Eastern Economy edition, 2004
2. Richard Lai and Jirachiefpattana, “Communication Protocol Specification and Verification”, Kluwer Publishers, Boston, 1998.
3. Tarnay, K., “Protocol Specification and Testing”, Plenum, New York, 1991.
4. Mohamed G. Gouda, “Elements of Network Protocol Design”, John Wiley & Sons, Inc. New York, USA, 1998
5. V.Ahuja, “Design and Analysis of Computer Communication networks”, McGraw- Hill, London, 1990.
6. G.J.Holtzmann, “Design and validation of Computer protocols”, Prentice Hall, New York, 1991

Semester VII

Design of Embedded Systems (CS – 7013)

Course Code	**CS - 7013**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Design of Embedded Systems**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Embedded Computers, Characteristics of Embedded Computing Applications, Challenges in Embedded Computing system design, Embedded system design process, Overview of embedded system development-embedded system IDE-ARM Family-Core Types,-Memory Mapping- and ARM Based embedded development system.

Section-B

Organization of CPU – Bus architecture –Memory management unit: virtual memory to physical memory address translation, TLB, Domains and memory access permission ,cache and write buffer ,single stage and two stage cache accessing ,significance of co-processor Fast Context Switch Extension.

Section-C

Basic Embedded system Development Tools-Embest embedded IDE for ARM, Study of
S3C3V40 based University Teaching Kit and Unet ICE JTAG emulator.-Embedded software development based on ARM including: ARM basic instruction set, Thumb instruction set- assembly programming- ARM processor mode switching-embedded C programming- C and assembly language mixed programming.

Section-D

I/O interface concepts-interrupts-types of interrupts-ARM interrupts-serial communication
real-time clock and simple digital LED interface - LCD display interfacing- GLCD display interfacing – TFT display interfacing -the keyboard interfacing-the touch screen interfacing. Synchronous and asynchronous data transfer- UART based communication-I2C Protocol basics -serial communication using I2C bus: RTC Interfacing, EEPROM data transfer Ethernet communication – I2S voice bus interface communication.

Books:

1. "ARM Architecture Reference Manual", 2011, ARM Ltd.
2. "The ARM-Thumb Procedure Call Standard", 2011 ARM Ltd.
3. Steve Furber, "ARM System-on-Chip Architecture", Second Edition, Addison -Wesley, 2000.
4. Todd D. Morton, "Embedded Microcontrollers", Prentice Hall, 2001.

5 "Embest ARM Teaching System User Manual", Embest Info & Tech, Ltd, Version2.01.
6. Embedded System Development and Labs for ARM , (Edited, revised and updated by Radu Muresan)

Semester VII

Global Positioning Systems (CS – 7015)

Course Code	**CS - 7015**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Global Positioning Systems**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

History of GPS , BC-4 System , HIRAN , NNSS , NAVSTAR GLONASS and GNSS Systems , GPS Constellation , Space Segment , Control Segment , User Segment , Single and Dual Frequency , Point Relative , Differential GPS , Static and Kinematic Positioning , 2D and 3D , reporting Anti Spoofing (AS); Selective Availability (SA) , DOP Factors.

Section-B

Coordinate Systems, Geo Centric Coordinate System, Conventional Terrestrial Reference System, Orbit Description, Keplerian Orbit, Kepler Elements, Satellite Visibility, Topocentric Motion, Disturbed Satellite Motion, Perturbed Motion, Disturbing Accelerations, Perturbed Orbit, Time Systems, Astronomical Time System, Atomic Time, GPS Time, Need for Coordination, Link to Earth Rotation, Time and Earth Motion Services.

Section-C

C/A code; P-code; Y-code; L1, L2 Carrier frequencies, Code Pseudo Ranges, Carrier Phases, Pseudo Ranges, Satellite Signal Signature, Navigation Messages and Formats , Undifferenced and Differenced Range Models, Delta Ranges, Signal Processing and Processing Techniques, Tracking Networks, Ephemerides, Data Combination: Narrow Lane; Wide Lane, OTF Ambiguity.

Section-D

Propagation Media, Multipath, Antenna Phase Centre, Atmosphere in brief, Elements of Wave Propagation, Ionospheric Effects on GPS Observations, Code Delay, Phase Advances, Integer Bias, Clock Error, Cycle Slip, Noise, Bias, Blunders, Tropospheric Effects on GPS Oberservables, Multipath Effect, Antenna Phase Centre Problems and Correction.

Books:

1. B.Hoffman - Wellenhof, H.Lichtenegger and J.Collins, "GPS: Theory and Practice", 4th revised edition, Springer, Wein, New york, 1997
2. A.Leick, "GPS Satellites Surveying", 3rd edition, John Wiley & Sons, NewYork, 2003
3. James Ba – Yen Tsui, "Fundamentals of GPS receivers – A software approach", John Wiley & Son, 2001.
4. L.Adams, "The GPS - A Shared National Asset", Chair, National Academy Press, Washington, DC, 1995

EIGHT SEMESTER

Semester - VIII
Data Warehouse & Data Mining (CS - 8001)

Course Code	**CS - 8001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Data Warehouse & Data Mining**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Data ware housing Definition, usage and trends, DBMS vs. Data warehouse, data marts, metadata, Multidimensional data mode, data cubes, Schemas for Multidimensional database: stars, snowflakes and fact constellations.

Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP types of OLAP, servers, 3 – Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager.

Section B

Data mining definition & task, KDD versus data mining, data mining techniques, tools and pplications**,** DBMS versus Data Mining, Data Mining application areas, Issues and challenges in Data Mining. Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification, Data mining techniques, tools and applications, Association rules, apriorl algorithm

Section C

Clustering techniques: Clustering paradigms, partition algorithm, hierarchical clustering, Decision tree knowledge discovery through neural Networks & Generic Algorithm, Rough Sets, Support Victor Machines and Fuzzy techniques.

Section D

Mining Complex data objects, Spatial databases, Multimedia databases,Time series and sequence data; mining text Databases and mining World Wide Web.

Books:

1. Data warehousing in Real World; Sam Anahory & Dennis Murray; 1997, Pearson
2. Data Mining – Concepts & Techniques; Jiawei Han & Micheline Kamber – 2001, Morgan kaufmann.
3. Data Mining Techniques; Arun Pujar; 2001, University Press; Hyderabad.

Reference Books: -

1. Data Mining; Pieter Adriaans & Dolf Zantinge; 1997, Pearson
2. Data Warehousing, Data Mining and OLAP; Alex Berson, 1997, McGraw Hill
3. Data Warehousing System; Mallach;2000, McGraw Hill
4. Building the Data Warehouses; W.H. Longhman, C.Klelly, John Wiley & Sons.
5. Developing the Data Warehouses; W.H. Longhman, C.Klelly, John Wiley & Sons.
6. Managing the Data Warehouses; W.H. Longhman, C.Klelly, John Wiley & Sons.
7. Decision support Systems & Data Warehouses, Ravindernath, B., New Age International Publishers, New Delhi.

Semester - VIII
Object Oriented Software Engineering (CS - 8002)

Course Code	**CS - 8002**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Object Oriented Software Engineering**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Software life cycle models: Waterfall, RAD, Spiral, Open-source Agile process
Understanding software process: Process metric; CMM levels
Planning & Estimation: Product metrics; Estimation- LOC, FP, COCOMO, models.
Project Management: Planning; Scheduling; Tracking.

Section B

Workflow of Software life cycle:
Requirement Workflow (Functional , Nonfunctional , Characteristics of Requirements, Requirement Elicitation Techniques, Requirement Documentation –Use case specification, Activity Diagram)
Analysis workflow (Static Analysis, Identifying Object – Methods of identifying objects and types - Boundary, Control, Entity, Dynamic Analysis, Identifying Interaction – Sequence and Collaboration diagrams, State chart diagram)

Section C

Design Workflow (System Design Concept – Coupling and Cohesion, Architectural Styles, Identifying Subsystems and Interfaces, Design Patterns)
Implementation Workflow (Mapping models to Code, Mapping Object Model to Database Schema)
Testing (FTR – Walkthrough and Inspection, Unit Testing, Integration, System and, Regression Testing, User Acceptance Testing)
Software Quality: Quality Standards , Quality Matrices, Testing & SQA: FTR, unit testing, integration testing, product testing, and acceptance testing

Section D

Software Configuration Management: Managing and controlling Changes, Managing and controlling versions
Maintenance: Types of maintenance, Maintenance Log and defect reports, Reverse and re-engineering

Text Books & References:

1. Bernd Bruegge, “Object oriented software engineering”, Second Edition, Pearson Education.
2. Stephan R. Schach, “Object oriented software engineering”, Tata McGraw Hill.
3. Roger Pressman, “Software Engineering”, sixth edition, Tata McGraw Hill.
4. Timothy C. Lethbridge, Robert Laganiere “ Object-Oriented Software Engineering – A practical software development using UML and Java”, Tata McGraw-Hill, New Delhi

Semester - VIII
Distributed Systems (CS - 8003)

Course Code	**CS - 8003**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Distributed Systems**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction to Distributed System: Distributed System; Goals; Hardware concepts; Software Concepts; Client-Server model; Examples of distributed systems

Communication: Layered protocols; Remote procedures call; Remote object invocation; Message oriented communication; Stream-oriented communication

Processes: Threads; Clients, Servers; Code Migration; Software agent

Section B

Naming: Naming entities; Locating mobile entities; Removing un-referenced entities

Synchronization: Clock synchronization; Logical clocks; Global state; Election algorithms; Mutual Exclusion; Distributed transactions

Section C

Consistency and Replication: Introduction; Data centric consistency models; Client centric consistency models; Distribution protocols; Consistency protocols

Security: Introduction; Secure channels; Access control; Security management

Section D

Distributed File System: Sun network file system; CODA files system

Case Study: CORBA; Distributed COM; Globe; Comparison of CORBA, DCOM, and Globe

Text Books & Preferred Reading:

1. G. Coulouris, J. Dollimore, and T. Kindberg: Distributed Systems: Concepts and Design
2. Taunenbaum: Distributed Systems: Principles and Paradigms
3. M. Singhal & N. Shivaratri: Advanced Concepts in Operating Systems

Semester - VIII

Project-II/ (CS-8004)

Course Code	**CS-8004**	**Credits-4**	**L-0, T-0, P-4**
Name of the Course	**Project-II**		
Project Evaluation	**On the basis of Multimedia Presentation of the Project executed**	**Max Marks: 250**	**Min Pass Marks: 50%**

Instructions for paper setter / Candidates

This project work shall be carried out by the students during the entire semester under the guidance of Supervisor allotted by the institute and its viva will be conducted at the end of the semester.

Project evaluation will consist of three parts:

(i) Evaluation or the Project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous Evaluation by the internal examiner 30% marks.

(ii) Viva voce examination (20% marks)

(iii) Software evaluation with test run (10% marks)

Viva-voce examination will be related to the project executed by the candidate during the course of semester.

Aim of the project

Project is one of the culmination points of the learning process, which puts to test the acquired ability of the candidate to independently take charge of the project or system development. The effort should be made to open up a window of opportunity with the industry the project can proceed in three steps using software engineering methodology

1. Preparation of required document
2. Preparation of Design Document
3. Writing of Code and its testing with demonstration cases.
4. An effort should be made by the institute faculty to liaison with the industry and conduct three reviews to meet the dead lines and satisfactory completion of the project.

Following format for documentation for the project be followed:

A. Forwarding Page

1. Title of the Project
2. Objectives.
3. Definitions of Key Term
   - Approach to Problem solving
   - Limitations. If any
4. Output Generated
5. Details of Hardware platform used
6. Details of software Tools used
7. Implementation Issues (Clearly defining the area of Application)
8. Miscellaneous
9. Signature of Candidate & date

B. Recommended Chapters/sections (Not Mandatory but only Guidelines)

1. Microscopic Summary
2. Details of candidate and Supervisor along with certificate of

- Original work;
- Assistance. If any;
- Credits;

3. Aims and Objectives
4. Approach to project and Time Frame
5. Project Design Description with Appendices to cover
    - Flow Charts/ Data Flow diagram- Macro/ Micro Level
    - Source Code; If any
    - Hardware platform
    - Software tools;
    - Security Measures
    - Quality Assurance
    - Auditability
6. Test Date and Result

Study of writing and presentation must follow the guidelines for effective3 technical writing. Times for submission.
Project must be submitted by the day of last paper in semester end examination Seminar/ Viva a comprehensive seminar/ viva-voce should be conducted as part of evaluation.

At the time of seminar/ viva-voce the industry guide/ supervisor may be invited.

Semester - VIII

General Proficiency (GP-8001)

Course Code	**GP-8001**	**Credits-1**	**L-0, T-0, P-1**
Name of the Course	**General Proficiency**		
Semester End Examination	**Max Marks: 50**	**Min Pass Marks: 20**	**Maximum Time: 3 hrs**

Instructions for paper setter / Candidates

a) Aim of this course id to judge the overall development of the candidate as a professional in the respective branch of skill and fitness to the profession

b) To test the general fitness of candidate for the pr4ofession of Engineering

c) A comprehensive viva-voce examination will be conducted by a committee of five members of the institute.

1. Director/ Principal of the institute
2. Head of the concerned branch of Engineering.
3. An eminent professional from industry/ Public Sector/ Technical; Institute nominated by the Director/ Principal.
4. A member drawn from among the faculty of Applied Science & Humanities.
5. A Faculty member of the concerned branch of engineering.

d) The topic of the Group Discussion will decided by the Committee as C

e) Due weightage be given to technical papers presented at National, International level, Prizes won by the candidate both in curricular and extra curricular activities. Extra curricular activities should include participation in clubs, NCC/ NSS organizational capacity, physical education, Yoga, community service, Technology for a common man and overall conduct.

Semester - VIII

Project Seminar (CS-8005)

Course Code	**CS-8005**	**Credits-4**	**L-0, T-0, P-4**
Name of the Course	**Project Seminar**		
Evaluation	**On the basis of Multimedia Presentation of the Project executed**	**Max Marks: 100**	**Min Pass Marks: 50%**

Instructions for paper setter / Candidates

This Seminar / Viva will be conducted on the project done by the candidate.

Professional Elective - II

Semester VIII

Neural Networks (CS – 8001)

Course Code	**CS-8001**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Neural Networks**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Overview of biological neurons: Structure of biological neurons relevant to ANNS. Fundamental concepts of Artificial Neural Networks: Models of ANNS; Fees forward & feedback networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner-take all learning rule etc.

Section B

Single layer Perception classifier: Classification model, Features & Decision regions; training & classification using discrete perceptron, algorithm, single layer continuous perceptron networks for linearly separable classifications.

Multiplayer Feed forward Networks: linearly non-separable pattern classification, Delta learning rule for multi perceptron layer. Generalized delta-learning rule. Error back-propagation training, learning factors. Examples

Section C

Single layer feed back Networks: Basic concepts Hopfield networks, training & Examples.

Associative Memories: Linear Association, Basic Concepts of recurrent Auto associative memory: retrieval algorithm, storage algorithm; By directional associative memory, architecture, Association encoding & decoding, Stability.

Section D

Self organizing networks: Unsupervised learning of clusters, winner – take – all learning, recall mode, Initialization of weights, seperability limitations of weights, seperability limitations.

Books: -

1. Introduction to Artificial Neural System by Jacek M. zurada, 1994, Jaico Publ. House.
2. "Neural Networks: A Comprehensive formulation", Simon Heykin,1998,AW.
3. "Neural Networks", Kosko,1992, PHI
4. "Neural Networks Fundamentals – N.K.Bose, P.Liang,2002. T.M.H.

Semester VIII

GPS and Application (CS – 8006)

Course Code	**CS-8006**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**GPS and Application**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction: Overview of techniques of surveying with satellites, introduction to GPS System, applications of using satellites and GPS for 3D position, velocity, determination as a function of time, interdisciplinary applications (e.g., crystal dynamics, user segment, history of GPS constellation, GPS measurement characteristics, selective availability (SA) and antispoofing (AS).

Section B

Satellite orbits and Reference Systems: Two –Body problem, orbit elements, time system and time transfer using GPS, coordinate systems, GPS orbit design, orbit determination problem, tracking networks, GPS force and measurement models for orbit determination, GPS broadcast ephemeris, precise GPS ephemeris. GPS Observable: Measurement types (C/A code, P-code, L1 and L2 frequencies for navigation, pseudoranges), atmospheric delays (tropospheric and ionospheric), data format(RINEX), data combination (narrow/ wide lane combinations, ionosphere – free combinations, single-, double-, triple – differences), undifferenced models, carrier phase vs integrated Doppler, integer biases, cycle slips, clock error.

Section C

Processing Techniques: Pseudorange and carrier phase processing, ambiguity removal, least squares method for state parameter determination, relative positioning, and dilution of precision.

Section D

Surveying with GPS: Kinematics positioning, differential GPS (DGPS): Traditional DGPS, wide Area Differential GPS (WADGPS), Wide Area Augmentation System (WAAS). GPS Applications: Surveying, geophysics, geodesy, airborne GPS, ground – transportation, space borne GPS orbit determination, attitude control, meteorological and climate research using GPS.

Books: -

1. A. Leick: GPS Satellite surveying, 2nd edition, John Wiley * Sons 1995.
2. B. Parkinson, J. Spilker: GPS: Theory and Applications, Jr. (Eds), Vol. I & II, AIAA, 370 L Enfant Promensale SW, Washington.
3. A. Kleusberb and P.teunnisen (Eds): GPS for Geodesy, Springer – Verlag, 1996
4. Elliott D. Kaplan: Understanding GPS – Principles and Applications, Publisher: Artech House, Published: March 1996.
5. B. Hofmann – Wellenhof, H. Lichenegger and J. Collins: GPS: Theory and Practice, 4th Revised Edition ($25), Springer, Wien, New York, 1997.
6. Scottie Barnes, Lafe Low: GPS Basic Essentials – Globe Pequot Press.

Semester VIII

Mobile Computing (CS – 8007)

Course Code	**CS - 8007**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Mobile Computing**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.
3. This course will be conducted in drawing hall fitted with drawing tables and drafters.

Course Description:

Section-A

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

Section-B

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Section-C

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations. Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV),

Section-D

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment. Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Books:

1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra , GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
4. Charles Perkins, Mobile IP, Addison Wesley.
5. Charles Perkins, Ad hoc Networks, Addison Wesley.

Semester VIII

Real Time Systems (CS – 8008)

Course Code	**CS - 8008**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Real Time Systems**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.
3. This course will be conducted in drawing hall fitted with drawing tables and drafters.

Course Description:

Section-A: Introduction

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

Section-B: Real Time Scheduling

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

Section-C: Resources Access Control

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

Section-D: Multiprocessor System Environment

Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

Books:

1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
2. Real-Time Systems: Scheduling, Analysis, and Verification by Prof. Albert M. K. Cheng, John Wiley and Sons Publications.

Semester VIII

Software Verification, Validation & Testing (CS – 8009)

Course Code	**CS - 8009**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Software Verification, Validation & Testing**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.
3. This course will be conducted in drawing hall fitted with drawing tables and drafters.

Course Description:

Section-A

What is software testing, Error, Fault, Failure , Incident & Test Cases, Testing Process, Limitations of Testing, No absolute proof of correctness, Overview of Graph Theory & Discrete Mathematics

Section-B

Functional Testing (Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique, Structural Testing. Path testing (DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

Section-C

Reducing the number of test cases, Prioritization guidelines: Priority category, Scheme, Risk Analysis, Regression Testing, Slice based testing. Testing Activities (Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging , Domain Testing

Section-D

Issues in Object Oriented Testing (Class Testing ,GUI Testing , Object Oriented Integration and System Testing), Testing Tools (Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools)

Books:

1 William Perry: Effective Methods for Software Testing
2 Cem Kaner, Jack Falk, Nguyen Quoc: Testing Computer Software
3 Boris Beizer: Software Testing Techniques
4 Louise Tamres,: Software Testing
5 Boris Beizer: Black-Box Testing – Techniques for Functional Testing of Software and Systems",

Semester VIII

Computer Network Management (CS - 8010)

Course Code	**CS - 8010**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Computer Network Management**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

System Design: Introduction, Resource Constraints and their metrics, Common design techniques, Performance Analysis And Tuning.

Network Management Tools: Network management Tools, Tool catalog, Bit error rate tester, Basic software tools, SNMP MIB tools, The Protocol Analyzer.

Network statistics Measurement System: Traffic load monitoring, Protocol Statistics, data and error statistics, Using MRTG to collect traffic statistics.

Section B

Network Management System: History of Enterprise Management.

Network Management System: Functional components, Multiple NMS configuration Network management, System requirements.

Commercial Network Management System: Hewlett-Packard's Open View Network Node Manager, Cabeltrons's spectrum platform, Sun network management system family.

System Management: High-End system management, Low end system management, Enterprise management solutions, Computer associates Unicenter TNG, Tivoli enterprise manager.

Network Management Application: Configuration Management, Network Provisioning, Inventory Management, Network topology, Fault management, Fault detection, Fault location and isolation techniques.

Performance Management: Performance Metrics, Data Monitoring, Problem isolation, Performance statistics.

Event Correlation Techniques: Rule Based Reasoning, Model Based Reasoning, Case Based reasoning, Codebook Correlation Model, State Transition Graph Model, Finite State Machine Model.

Security Management: Policies and Procedure, Security Breaches and the Resources needed to prevent them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication system, Message Transfer Security, Protection of Network from Virus Attacks. Accounting Management, Report management, Policy-Based management.

Section C

Web-Based Management: NMS with Web Interface and Web-Based Management, Web interface to SNMP management, Embedded Web- Based management, Desktop Management Interface, Web-Based Enterprise Management. WBEM: Windows Management Instrumentation.

Java Management Extension: Service Driven Network, Java Dynamic Management, Kit, JMX

Architecture Management of a Storage Area Network: The Jiro Platform, Future Direction.

Section D

Flow Control: Model, Classification, Open-loop flow control, Closed-loop flow control,hybrid flow control

Traffic Management: Introduction, An economic framework for traffic management, Traffic models, Traffic classes, Time scale of traffic management, Scheduling, Renegotiation, Signaling, Admission control, Peak-load pricing, Capacity planning.

Books: -

1. Network Management (Principles and Practice), Subramanian, Person Education Asia, 2nd edition.
2. An engineering approach to computer Networking, S. Keshav, Pearson Education Asia, 4th edition.
3. Computer Networks and Internets, Douglas E. Comer, Pearson Education, 2nd Edition.

Semester VIII

Digital Image Processing (CS – 8011)

Course Code	**CS - 8011**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Digital Image Processing**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.
3. This course will be conducted in drawing hall fitted with drawing tables and drafters.

Course Description:

Section-A

Image Fundamentals

Elements of digital image processing systems, Elements of visual perception, brightness, contrast, hue, saturation, Mach Band effect, Image sampling, Quantization, Dither, Two dimensional mathematical preliminaries, Basic Principles of Tomography, Tomography, Projection, Image Reconstruction, Radon Transform, Central Slice Theorem.

Section-B

Image transformation & Enhancement

1D DFT, 2D transforms - DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet transform.Histogram modification, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic and Yp mean filters, Design of 2D FIR filters, Image restoration - degradation model, Unconstrained and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations, spatial transformations, Gray Level interpolation.

Section-C

Image Segmentation and Recognition

Image segmentation , Edge detection, Edge linking and boundary detection, Region growing, Region splitting and Merging, Image Recognition , Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation, Neural networks, Back propagation network and training, Neural network to recognize shapes.

Section-D

Image Registration and Visualization

Notation and terminology in Image Registration, Classification of Image Registration techniques, Types of Transformation, Non Rigid Registration - Registration Using Basis Functions -Registration Using Splines - Thin-Plate Splines – B-Splines -Elastic Registration - Fluid Registration - Role of Registration in Clinical Applications and Remote Sensing - Image Registration in Nuclear Medicine . Image visualization - Rigid body visualization - 2D display methods, 3D display methods, Virtual Reality based interactive visualization.

Books:

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Addison Wesley, (3rd Edition), 2007.
2. Anil K. Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 2002.
3. William K. Pratt, “Digital Image Processing”, John Wiley, New York, 2007.
4. Mark A. Haidekker, “Advanced Biomedical Image Analysis”, Wiley Publications, 2010
5. A. Ardeshir Goshtasby “2-D and 3-D Image Registration for Medical- Remote Sensingand Industrial Applications” Wiley Interscience Publication, 2005.
6. Atam P.Dhawan , “Medical Image Analysis” Wiley Interscience Publication, NJ, US 2003.

Open Electives

Semester VIII

Soft Computing (CS – 8020)

Course Code	**CS-8020**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Soft Computing**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Introduction To Soft Computing And Neural Networks , Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

Section-B

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning Machine Learning Approach to Knowledge Acquisition.

Section-C

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks –Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

Section-D

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies.

Books:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.
4. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
5. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.
6. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
7. S.N.Sivanandam · S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2007.
8. Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishers, 1992

Semester VIII

Computational Complexity (EC-8021)

Course Code	**EC-8021**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Computational Complexity**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Models of Computation, resources (time and space), algorithms, computability, complexity.

Section-B

Complexity classes, P/NP/PSPACE, reductions, hardness, completeness, hierarchy, relationships between complexity classes.

Section-C

Randomized computation and complexity; Logical characterizations, incompleteness; Approximability. Circuit complexity, lower bounds;

Section-D

Parallel computation and complexity; Counting problems; Interactive proofs. Probabilistically checkable proofs; Communication complexity; Quantum computation

Books:

1. Combinatorial Optimization: Algorithms and Complexity (Hardcover) by Christos H. Papadimitriou.
2. Complexity Theory: A Modern Approach Sanjeev Arora and Boaz Barak
3. Computability and Complexity Theory (Texts in Computer Science) (Hardcover) by Steven Homer (Author), Alan L. Selman (Author) Publisher: Springer; 1 edition.

Semester VIII

Software Project Management (CS-8018)

Course Code	**CS-8018**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Software Project Management**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Introduction and Software Project Planning

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

Section-B

Project Organization and Scheduling

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

Section-C

Project Monitoring and Control

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

Section-D

Software Quality Assurance and Testing

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

Books:

1. Software Project Management by M. Cotterell
2. Information Technology Project Management
3. Management Information and Control by
4. Software Project Managemnet by S. A. Kelkar

Semester VIII

Computational Geometry (EE-8009)

Course Code	**EE-8009**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Computational Geometry**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Convex hulls: construction in 2d and 3d, lower bounds; Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs;

Section-B

Voronoi diagrams: construction and applications, variants; Delayney triangulations: divide-and-conquer, flip and incremental algorithms, duality of Voronoi diagrams, minmax angle properties;

Section-C

Geometric searching: point-location, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees; Visibility: algorithms for weak and strong visibility, visibility with reflections, art-gallery problems;

Section-D

Arrangements of lines: arrangements of hyper planes, zone theorems, many-faces complexity and algorithms; Combinatorial geometry: Ham-sandwich cuts. Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements; Robust geometric computing; Applications of computational geometry;

Books:

1. Computational Geometry: An Introduction by Franco P. Preparata and Michael Ian Shamos; SpringerVerlag, 1985.
2. Computational Geometry, Algorithms and Applications by Mark de Berg, Marc van Kreveld, Mark Overmars, and Otfried Schwarzkopf; Springer-Verlag, 1997. from Springer.
3. Algorithmische Geometrie (auf deutsch)by Rolf Klein Addison-Wesley, 1996
4. Computational Geometry and Computer Graphics in C++ by Michael J. Laszlo (Nova Southeastern University) Prentice-Hall, 1996.
5. Computational Geometry: An Introduction Through Randomized Algorithms by Ketan Mulmuley Prentice-Hall, 1994
6. Computational Geometry in C by Joseph O'Rourke Cambridge University Press, second edition, 1998.

Semester VIII

Bioinformatics (CS-8020)

Course Code	**CS-8020**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Bioinformatics**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section-A

Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online.

Molecular Biology and Bioinformatics: Systems approach in biology,Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, Overview of the bioinformatics applications.

Section-B

Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, -Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA,DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein interaction.

Section-C

Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, Understanding and Using Biological Databases, Java clients, CORBA, Introduction to biostatics. sequences, macromolecular structures, chemical compounds, generic variability and its connection to clinical data.

Section-D

Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Books:

1. O'Reilly, " Developing Bio informatics computer skills", Indian Edition's publication
2. Rastogi, Mendiratta, Rastogi, "Bioinformatics concepts, skills & Applications", CBS Publishers
3. Rashidi, Hooman and Lukas K. Buehler, "Bioinformatics Basic Applications" CRC Press.
4. Stephen Misner & Stephen Krawetz, " Bioinformatics- Methods & Protocols"

Semester VIII

Communication Network Security (CS – 8021)

Course Code	**CS-8021**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Communication Network Security**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Security Goals, Types of Attacks: Passive attack, active attack, attacks on confidentiality, attacks on Integrity and availability. Security services and mechanisms, Techniques Cryptography, Steganography, Revision on Mathematics for Cryptography.

Section-B

Substitutional Ciphers, Transposition Ciphers, Stream and Block Ciphers, Data Encryption Standards (DES), Advanced Encryption Standard (AES), RC4, principle of asymmetric key algorithms, RSA Cryptosystem

Section-C

Message Integrity, Hash functions: SHA, Digital signatures: Digital signature standards. Authentication, Entity Authentication: Biometrics, Key management Techniques.

Section-D

Introduction on Firewalls, Types of Firewalls, Firewall Configuration and Limitation of Firewall. IP Security Overview, IP security Architecture, authentication Header, Security payload, security associations, Key Management, Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature, Security Attack issues specific to Wireless systems: Worm hole, Tunneling, DoS, WEP for Wi-Fi network and Security for 4G networks: Secure Ad hoc Network, Secure Sensor

Book

1. Behrouz A. Fourcuzan, “Cryptography and Network security” Tata McGraw- Hill, 2008. [UNIT – I, II, III]
2. William Stallings, "Cryptography and Network Security", 3rd Edition, Pearson Education, New Delhi, 2003 [UNIT – IV]
3. Tom Karygiannis, Les Owens,"Wireless Network Security 802.11, Bluetooth and Handheld Devices", National Institute of Standards and Technology, US Dept. of Commerce Special Publication 800-48, 2002 [UNIT – V]
4. B.A. Forouzan, "Cryptography & Network Security", TaTa McGrawHill, 2007
5. Eric Cole “Network Security Bible” , 2009
6. Mark D. Ciampa “Security+ Guide to Network Security Fundamentals”,2008.
7. “William Stallings” Network Security Essentials: Applications and Standards” 4th Edition , 2010

8. Stuart McClure , Joel Scambray and George Kurtz “Hacking Exposed: Network Security Secrets and Solutions”, Sixth Edition 2009
9. Chris McNab”Network Security Assessment: Know Your Network”, 2007

Semester VIII

Storage Technologies (CS-8023)

Course Code	**CS-8023**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Storage Technologies**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Introduction to Storage Technology

Introduction to storage network, Five pillars of IT, parameters related with storage, data proliferation, problem caused by data proliferation, Hierarchical storage management, Information life cycle management (ILM), Role of ILM, Information value vs. time mapping, Evolution of storage, Storage infrastructure component, basic storage management skills and activities, Introduction to Datacenters, Technical & Physical components for building datacenters.

Technologies for Storage network

Server centric IT architecture & its limitations, Storage centric IT architecture & advantages, replacing a server with storage networks, Disk subsystems, Architecture of disk subsystem, Hard disks and Internal I/O channel, JBOD, RAID& RAID levels, RAID parity, comparison of RAID levels, Hot sparing, Hot swapping, Caching : acceleration of hard disk access, Intelligent Disk subsystem architecture.

Section-B

Tape drives

Introduction to tape drives, Tape media, caring for Tape& Tape heads, Tape drive performance, Linear tape technology, Helical scan tape technology.

I/O techniques

I/O path from CPU to storage systems, SCSI technology – basics & protocol, SCSI and storage networks, Limitations of SCSI.

Section-C

Fibre channel

Fibre channel, characteristic of fibre channel, serial data transfer vs. parallel data transfer, Fibre channel protocol stack, Links, ports & topologies, Data transport in fibre channel, Addressing in fibre channel, Designing of FC-SAN, components, Interoperability of FCSAN, FC products.

IP Storage

IP storage standards (iSCSI, iFCP, FCIP, iSNS), IPSAN products, Security in IP SAN, introduction to infiniband, Architecture of Infiniband. **NAS** Evolution, elements & connectivity, NAS architecture.

Section-D

Storage Virtualization

Introduction to storage virtualization, products, definition, core concepts, virtualization on various levels of storage network, advantages and disadvantages, Symmetric and asymmetric virtualization, performance of San virtualization, Scaling storage with virtualization.

Management of storage Networks

Management of storage network, SNMP protocol, requirements of management systems, Management interfaces, Standardized and proprietary mechanism, In-band& Out-band management.

Books

1. R. Spalding,"Storage Networks: The Complete Reference", McGraw-Hill.
2. Marc Farley, "Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems, Applications, Management, and Filing Systems", Cisco Press.
3. Tom Clark, "Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel and IP SANs", Addison Wesley.

Semester VIII

Mathematics and Quantitative Techniques For Financial Decisions (HU-8021)

Course Code	**HU-8021**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Mathematics And Quantitative Techniques For Financial Decisions**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Time Value of Money : Concept and Applications – Present Value, Future/Compound Value, Annuities (Ordinary Due and Perpetual) Amortization, Discount rate, Equal Monthly Installments. Bonds and Debentures : Simple yield, current yield, yield to maturity, redemption yield, coupon rate, principal, Face value, Maturity, Discount, Premium, Simple Interest, Compound Interest, Quarterly Compounding, Semi-annual Compounding, duration, Conversion premium. Warrants, futures, Options, Swaps, GDRs, ADRs, ECBs, Rights.

Section-B

Concept of Index Numbers : Stock Exchange Indices- Sensex, Down Jones, Nasdaq etc., Composition of indices, full Capitalisation vs Free Float, Basic applications of Indices, Beta. Mathematics of Life Insurance and Mutual Funds(Amortization of Front – end Fees, NAV discount/premium to NAV, impact of 'loading' on returns). Simulation.

Section-C

Business forecasting – Importance of Forecasting – Techniques of forecasting –Theories of Forecasting. Operation Research Techniques : an Introduction, Linear Programming, Transportation and Assignment Problems, Replacement Decisions.

Section-D

Operation Research Techniques: Network analysis – PERT and CPM, Game Theory, Queuing Theory, Sequencing Problems.

Books :

1. Mathematics of Finance – Frank Ayres
2. Financial Management – Prasanna Chandra
3. Operations Research – Kanti swarup
4. Operations Research – V.K.Kapoor

Semester VIII

Adhoc Networks (CS – 8022)

Course Code	**CS-8022**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Adhoc Networks**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Introduction – Issues in Adhoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

Section-B

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast
routing – Classifications, Tree based, Mesh based. Adhoc Transport Layer Issues. TCP Over Adhoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

Section-C

Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC. Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network
Localization. QoS in WSN.

Section-D

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture Opportunistic routing – Self configuration and Auto configuration – Capacity Models Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

Books:

1. C.Siva Ram Murthy and B.Smanoj, " Adhoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.[Units I to IV]
2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.[Units V]
3. C.K.Toh, "Adhoc Mobile Wireless Networks", Pearson Education, 2002.
4. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007

Semester VIII

Parallel Algorithms (CS-8019)

Course Code	**CS-8019**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Parallel Algorithms**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Section-A

Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

Section-B

Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Costoptimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.

Section-C

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC/, Parallel Sorting Networks on CREW/EREW/MCC/, linear array , Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms- Permutation, Combinations, Derrangements.

Section-D

Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

Books:

1. M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer" by Mc Graw Hill.
2. S.G. Akl, "Design and Analysis of Parallel Algorithms"
3. S.G. Akl, "Parallel Sorting Algorithm" by Academic Press

Semester VIII

FUZZY SYSTEMS (CS-8024)

Course Code	**CS-8024**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**FUZZY SYSTEMS**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Introduction, Basic Types, Basic Concepts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets, Types of Operations. Fuzzy Complements, Fuzzy Intersections: t- Norms., Fuzzy Unions: t-Conorms, Combinations of Operations. Aggregation Operations. Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Fuzzy Equations

Section-B

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on a Single Set. Fuzzy Equivalence Relations, Fuzzy Compatibility Relations. Fuzzy Ordering Relations, Fuzzy Morphisms, Sup-i Compositions of Fuzzy Relations., Inf-Compositions of Fuzzy Relations.

Section-C

Fuzzy Measures, Fuzzy Sets and Possibility Theory, Classical Logic: An Overview. Multivalued Logics. Fuzzy Propositions. Fuzzy Quantifiers. Linguistic Hedges. Inference from Conditional Fuzzy Propositions. Inference from Conditional and Qualified Propositions. Inference from Quantified Propositions, Information and Uncertainty, Nonspecificity of Fuzzy Sets. Fuzziness of Fuzzy Sets. Principles of Uncertainty

Section-D

Fuzzy Expert Systems: An Overview. Fuzzy Implications. Selection of Fuzzy Implications. Multiconditional Approximate Reasoning. The Role of Fuzzy Relation Equations, Fuzzy Controllers: Overview, Fuzzy Neural Networks. Fuzzy Automata. Fuzzy Dynamic Systems. Fuzzy Databases. Fuzzy Information Retrieval, Individual Decision Making, Multiperson Decision Making, Multicriteria Decision Making, Multistage Decision Making, Fuzzy Systems and Genetic Algorithms.

Books:

1. George J. Klir, Bo Yuan, "Fuzzy Sets and Fuzzy Logic", PHI
2. Witold Pedrvcz and Femando Gomide. "An Introduction to Fuzzy Sets", PHI

Semester VIII

Digital Speech Signal Processing (ME-8021)

Course Code	**ME-8021**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Digital Speech Signal Processing**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Speech production mechanism , Nature of Speech signal , Discrete time modeling of Speech production , Representation of Speech signals , Classification of Speech sounds , Phones , Phonemes , Phonetic and Phonemic alphabets , Articulatory features. Music production, auditory perception, Anatomical pathways from the ear to the perception of sound, peripheral auditory system, Psycho acoustics

Section-B

Time domain parameters of Speech signal , Methods for extracting the parameters Energy, Average Magnitude , Zero crossing Rate , Silence Discrimination using ZCR and energy , Short Time Auto Correlation Function , Pitch period estimation using Auto Correlation Function

Section-C

Short Time Fourier analysis, Filter bank analysis, Formant extraction, Pitch Extraction Analysis by Synthesis, Analysis synthesis systems, Phase vocoder, Channel Vocoder. Homomorphic Speech Analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoders.

Section-D

Formulation of Linear Prediction problem in Time Domain, Basic Principle, Auto correlation method, Covariance method, Solution of LPC equations, Cholesky method, Durbin's Recursive algorithm, lattice formation and solutions, Comparison of different methods, Application of LPC parameters, Pitch detection using LPC parameters, Formant analysis, VELP , CELP.

Books:

1. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing", 2nd Edition, John Wiley and Sons Inc., Singapore, 2004.
2. Quatieri, "Discrete-time Speech Signal Processing", Pearson Education, 2008
3. Lawrence Rabiner and Ronald Schafer, Theory and Applications of Digital Speech Processing " Pearson Education , 2010.
4. A.Nejat Ince , " Digital Speech Processing-Speech Coding, Synthesis and Recognition", The Springer International Series in Engineering and Computer Science , 2010

Semester VIII

Disaster Management (CS-8022)

Course Code	**CS-8022**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Disaster Management**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A:

Understanding disaster

Concept of disaster , Different approaches , Concept of Risk , Levels of disasters , Disaster phenomena and events *(Global, national and regional)*.

Hazards and Vulnerability

Natural and man-made hazards; response time, frequency and forewarning levels of different hazards, Characteristics and damage potential of natural hazards; hazard assessment, Dimensions of vulnerability factors; vulnerability assessment, Vulnerability and disaster risk, Vulnerabilities to flood and earthquake hazards

Section-B:

Disaster management mechanism

Concepts of risk management and crisis management, Disaster management cycle, Response and Recovery, Development, Prevention, Mitigation and Preparedness, Planning for relief

Capacity building

Capacity building: Concept ,Structural and nonstructural measures, Capacity assessment; strengthening capacity for reducing risk, Counter-disaster resources and their utility in disaster management, Legislative support at the state and national levels

Section-C:

Coping with disaster

Coping strategies; alternative adjustment processes, Changing concepts of disaster management, Industrial safety plan; safety norms and survival kits, Mass media and disaster management

Section-D:

Planning for disaster management

Strategies for disaster management planning, Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy in India, Organisational structure for disaster management in India, Preparation of state and district disaster management plans

Books

1. Alexander, D. *Natural Disasters*, ULC press Ltd, London, 1993.
2. Carter, W. N. *Disaster Management: A Disaster Management Handbook,* Asian Development Bank, Bangkok, 1991.

3. Chakrabarty, U. K. *Industrial Disaster Management and Emergency Response,* Asian Books Pvt. Ltd., New Delhi 2007.

References

1. Abarquez I. & Murshed Z. *Community Based Disaster Risk Management: Field Practitioner's Handbook,* ADPC, Bangkok, 2004.
2. Goudie, A. *Geomorphological Techniques,* Unwin Hyman, London 1990.
3. Goswami, S. C. *Remote Sensing Application in North East India,* Purbanchal Prakesh, Guwahati, 1997.
4. *Manual on Natural Disaster Management in India,* NCDM, New Delhi, 2001.
5. *Disaster Management in India,* Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. *National Policy on Disaster Management,* NDMA, New Delhi, 2009.
7. *Disaster Management Act. (2005),* Ministry of Home Affairs, Government of India, New Delhi, 2005.

Semester VIII

Mobile Application Development (CS-8025)

Course Code	**CS-8025**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Mobile Application Development**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section:A

Introduction : Introduction to Mobile Computing :Introduction to Android Development Environment. Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools . Generic UI Development . Android User

Section:B

Mobile devices vs. desktop devices, ARM and Intel architectures , Power Management, Screen resolution , Touch interfaces , Application deployment , App Store, Google Play, Windows Store, Development environments : XCode , Eclipse , VS2012 , PhoneGAP, etc. Native vs. web applications

Section:C

VUIs and Mobile Apps : Text to Speech Techniques , Designing the Right UI , Multichannel and Multimodial UIs Comparing and Contrasting architectures of all three: Android, iOS and Windows.

Section:D

Underlying OS (Darwin vs. Linux vs. Win 8) , Kernel structure and native level programming. Mobile malware , Device protections

References Material:

1. http://www.saylor.org/site/syllabus.php?cid=258
2. http://www.sap.com/pc/tech/mobile/software/solutions/platform/overview.html
3. http://www.impetus.com/mobility
4. http://mobile.openxcell.com/mobile-application-development.html

Semester VIII
Cloud Computing (CS-8026)

Course Code	**CS-8026**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Cloud Computing**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section-A

Overview of Computing Paradigm: Recent trends in Computing ,Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Evolution of cloud computing, Business driver for adopting cloud computing.

Introduction to Cloud Computing Cloud Computing (NIST Model),Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers ,Properties, Characteristics & Disadvantages,Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing. Role of Open Standards

Section-B

Cloud Computing Architecture Cloud computing stack, Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services. Service Models (XaaS): Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud

Infrastructure as a Service(IaaS): Introduction to IaaS, IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM), Resource Virtualization: Server, Storage , NetworkVirtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service)

Section-c

Platform as a Service(PaaS): Introduction to PaaS, What is PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Computation & Storage,

Software as a Service(PaaS): Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS

Section -D

Service Management in Cloud Computing: Service Level Agreements(SLAs),Billing & Accounting,Comparing Scaling Hardware: Traditional vs. Cloud,Economics of scaling: Benefitting enormously ,Managing Data :Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud ,Large Scale Data Processing

Cloud Security: Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk

Authentication in cloud computing: Client access in cloud, Cloud contracting Model, Commercial and business considerations.

Reference Books

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

Semester VIII
Intrusion Detection System (CS-8027)

Course Code	**CS-8027**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Intrusion Detection System**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section -A

Firewall Planning and Design, Developing a Security Policy , Firewall Configuration Strategies, Packet Filtering, Working with Proxy Servers and Application-Level Firewalls, Authenticating Users , Encryption and Firewalls , Choosing a Bastion Host , Setting Up a Virtual Private Network, Building Your Own Firewall

Section-B

Access control models: Discretionary access control , Mandatory access control, Access control models: Covert channels and Chinese Wall, Commercial security and RBAC, Software Security. Intrusion Detection, Introduction to cryptography, Secret key cryptosystems , Key escrow, Modular Arithmetic and Public key cryptosystems, Public key cryptosystems, Diffie-Hellman and RSA

Section-c

Message digests, digital signatures, Identification and authentication, Passwords, Biometrics, One-time passwords and challenge response schemes, Kerberos, SSL, SSH, Examine and classify Intrusion Detection Systems (IDS) ,Navigate the IDS such as SNORT, NIDS, NNID and HIDS

Section-D

Identify IDS signatures such as a anomaly detection, pattern matching and statistical analysis.

Books

1. Greg Holden, Guide to Firewalls and Network Security: Intrusion Detection and VPNs, 2003, ,ISBN: 0-619-13039-3
2. Charles P. Pfleeger, "Security in Computing", Prentice Hall

Semester VIII
Wireless Communication (CS-8028)

Course Code	**CS-8028**	**Credits-4**	**L-3, T-1, P-0**
Name of the Course	**Wireless Communication**		
Lectures to be Delivered	**52 (1 Hr Each) (L=39, T=13 for each semester)**		
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

Course Description:

Section A

Introduction to Wireless Communication System: Evolution of mobile radio communication, examples of wireless comm. system, paging system, Cordless telephone system. Comparison of various wireless systems, GSM

Modern Wireless Communication System: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, blue tooth and personal area networks.

Section B

Introduction to Cellular Mobile System: Spectrum Allocation, basic cellular system, Performance Criteria. Operation of Cellular System, Analog cellular system, Digital Cellular System.

Cellular System Design Fundamentals: Frequency Reuse, Channel assignment strategies, handoff strategies. Interference and System capacity,Improving Coverage and capacity.

Section C

Multiple Access Techniques for Wireless Communication: Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum Multiple Access, Space division multiple access, packet ratio, capacity of a cellular system.

Wireless Networking: Difference between wireless and fixed telephone networks, Development of Wireless Networks, Wireless Data Services, Common Channel Signaling, ISDN (Integrated Service Digital Network, Advanced Intelligent Networks.

Section D

Intelligent Cell Concept and Application: Intelligent cell concept, Application of Intelligent – cell system, In Building Communication, CDMA Cellular Radio Networks, VSAT-Review of latest cellular technologies(GPS)

Books:

1. Wireless Communication: Theodore S. Rappaport: Pearsons.
2. Mobile Cellular Telecommunication: W.C.Y.Lee: McGraw Hill.
3. Mobile Communications: Jochen Schiller; Pearson.