SCHEME OF EXAMINATION

and

SYLLABI

for

Bachelor of Technology
Computer Science and Engineering

Offered by

University School of Engineering and Technology

1st SEMESTER TO 8th SEMESTER

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

Guru Gobind Singh Indraprastha University
Dwarka, Delhi – 110078 [INDIA]
www.ipu.ac.in

BACHELOR OF TECHNOLOGY
(COMMON TO ALL BRANCHES)
FIRST SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA-101		Applied Mathematics-I	3	1	4	M
ETPH-103		Applied Physics-I	2	1	3	M
ETME-105		Manufacturing Processes	3	0	3	M
ETEE-107		Electrical Technology	3	0	3	M
ETHS-109		Human Values and Professional Ethics-I#	1	1	1	--
ETCS-111		Fundamentals of Computing	2	0	2	--
ETCH-113		Applied Chemistry	2	1	3	M
PRACTICAL/VIVA VOCE						
ETPH-151		Applied Physics Lab-I	------	2	1	
ETEE-153		Electrical Technology Lab	------	2	1	M
ETME-155		Workshop Practice	------	3	2	M
ETME-157		Engineering Graphics Lab	------	3	2	
ETCS-157		Fundamentals of Computing Lab	------	2	1	--
ETCH-161		Applied Chemistry Lab	------	2	1	--
		NCC/NSS*#	------	------	------	--
TOTAL			**16**	**18**	**27**	

M: Mandatory for award of degree
#NUES (Non University Examination System)
**#NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards. The camps/classes will be held either during Weekends/Holidays or Winter/Summer Vacations.*

BACHELOR OF TECHNOLOGY
(COMMON TO ALL BRANCHES)
SECOND SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA-102		Applied Mathematics-II	3	1	4	M
ETPH-104		Applied Physics-II	2	1	3	
ETEC-106		Electronic Devices	3	0	3	M
ETCS-108		Introduction to Programming	3	0	3	M
ETME-110		Engineering Mechanics	2	1	3	--
ETHS-112		Communication Skills	2	1	3	--
ETEN-114		Environmental Studies	2	1	3	--
PRACTICAL/VIVA VOCE						
ETPH-152		Applied Physics Lab-II	-------	2	1	
ETCS-154		Programming Lab	-------	2	1	M
ETEC-156		Electronic Devices Lab	------	2	1	M
ETME-158		Engineering Mechanics Lab	-------	2	1	--
ETEN-160		Environmental Studies Lab	-------	2	1	--
		NCC/NSS*#	-------	------	------	--
TOTAL			**17**	**15**	**27**	

M: Mandatory for award of degree
#NUES (Non University Examination System)
**#NCC/NSS can be completed in any one semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards. The camps/classes will be held either during Weekends/Holidays or Winter/Summer Vacations.*

BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE AND ENGINEERING)
THIRD SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA 201		Applied Mathematics – III	3	1	4	
ETCS 203		Foundation of Computer Science	3	1	4	M
ETEC 205		Switching Theory and Logic Design	3	1	4	
ETEE 207		Circuits and Systems	3	1	4	
ETCS 209		Data Structure	3	1	4	M
ETCS 211		Computer Graphics and Multimedia	3	1	4	
PRACTICAL VIVA-VOCA						
ETEC 253		Switching Theory and Logic Design Lab	0	2	1	
ETCS 255		Data Structure Lab	0	2	1	
ETEE 257		Circuits and Systems Lab	0	2	1	
ETCS 257		Computer Graphics and Multimedia Lab	0	2	1	
		NCC/NSS*#	-	-	-	
TOTAL			**18**	**14**	**28**	

M: Mandatory for award of degree

**NCC/NSS can be completed in any semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards.*

#NUES(Non University Examination System)

BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE AND ENGINEERING)
FOURTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETMA 202		Applied Mathematics – IV	3	1	4	
ETCS 204		Computer Organization and Architecture	3	1	4	M
ETCS 206		Theory of Computation	3	1	4	M
ETCS 208		Database Management Systems	3	1	4	M
ETCS 210		Object Oriented Programming	3	0	3	
ETEC 212		Communication Systems	3	1	4	
PRACTICAL/VIVA VOCE						
ETMA 252		Applied Mathematics Lab	0	2	1	
ETCS 260		Computer Organization and Architecture Lab	0	2	1	
ETCS 256		Database Management Systems Lab	0	2	1	
ETCS 258		Object Oriented Programming Lab	0	2	1	
ETEC 256		Communication Systems Lab	0	2	1	
ETSS 250		NCC/NSS*#	-	-	1	
TOTAL			**18**	**15**	**29**	

M: Mandatory for award of degree

**NCC/NSS can be completed in any semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards.*

NOTE: 4 weeks Industrial / In-house Workshop will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester.

#NUES(Non University Examination System)

BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE AND ENGINEERING)
FIFTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETCS301		Algorithms Design and Analysis	3	1	4	M
ETCS303		Software Engineering	3	1	4	M
ETCS 307		Java Programming	3	1	4	
ETMS 311		Industrial Management	3	0	3	
ETEC-303		Digital Communication	3	1	4	
ETHS 301		Communication Skills for Professionals	2	0	1	
PRACTICAL/VIVA VOCE						
ETCS 351		Algorithms Design and Analysis Lab	0	2	1	
ETCS 353		Software Engineering Lab^	0	2	1	
ETCS 357		Java Programming Lab	0	2	1	
ETCS 359		Viva Industrial Training / In-house Workshop*	0	0	1	
ETEC-357		Digital Communication Lab@	0	2	1	
ETHS 351		Communication Skills for Professionals Lab	0	2	1	
TOTAL			**17**	**14**	**26**	

M: Mandatory for award of degree

*Viva-Voce for evaluation of Industrial Training / In-house Workshop will be conducted in this semester.

@A few lab experiments must be performed using any circuit simulation software e.g. PSPICE/MATLAB/ETAP/Lab View.

^Using UML 2.0

BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE AND ENGINEERING)
SIXTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits	Status
THEORY PAPERS						
ETCS 302		Compiler Design	3	1	4	M
ETCS304		Operating Systems	3	1	4	M
ETCS 306		Computer Networks	3	1	4	M
ETCS 308		Web Technology	3	0	3	
ETCS310		Artificial Intelligence	3	1	4	
ETEE-310		Microprocessor and Microcontroller	3	1	4	
PRACTICAL/VIVA VOCE						
ETCS 352		Operating Systems (Linux Programming and Administration) Lab	0	2	1	
ETCS 354		Computer Networks Lab	0	2	1	
ETCS 356		Web Engineering Lab	0	2	1	
ETEE-358		Microprocessor and Microcontroller Lab	0	2	1	
TOTAL			**18**	**13**	**27**	

M: Mandatory for award of degree

Note: Minimum of 4-6 weeks of industrial training related to CSE will be held after 6th semester; however, viva-voce will be conducted in 7th Semester (ETCS 459).

Imp:- Elective Paper will be floated in 7th Semester, if one-third of the total students opt for the same. It is advised that the decision about the elective subject for 7h Semester is done before 15th April every year before end of 6th semester.

BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE AND ENGINEERING)
SEVENTH SEMESTER EXAMINATION

Code No.	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETCS401		Information Security	3	1	4
ETCS403		Software Testing and Quality Assurance	3	0	3
ETEC405		Wireless Communication	3	0	3
ELECTIVE (SELECT ANY TWO, ONE FROM EACH GROUP)					
GROUP-A					
ETCS407		Complexity Theory	3	0	3
ETCS409		Intellectual Property Rights	3	0	3
ETEC-401		Embedded Systems	3	0	3
ETCS413		Data Mining and Business Intelligence	3	0	3
ETCS415		Advanced Computer Architecture	3	0	3
ETCS 410		Natural Language Processing	3	0	3
GROUP-B					
ETIT 415		Digital Signal Processing	3	0	3
ETCS 421		Simulation and Modelling	3	0	3
ETCS 423		Advanced DBMS	3	0	3
ETCS 427		Parallel Computing	3	0	3
ETIT 401		Advanced Computer Networks	3	0	3
ETEE-429		Control System	3	0	3
ETHS-419		Sociology and Elements of Indian History for Engineers	3	0	3
PRACTICAL/VIVA VOCE					
ETCS 451		Information Security Lab	0	2	1
ETCS 453		Software Testing and QA Lab	0	2	1
ETEC 463		Wireless Communication Lab	0	2	1
ETCS 457		Lab based on Elective I or II	0	2	1
ETCS 459		Summer Training / Industrial Workshop/ Certification	0	0	1
ETCS 461		Minor Project+	0	6	3
TOTAL			**15**	**15**	**24**

Imp:- Elective Paper will be floated if one-third of the total students opt for the same. It is advised that the decision about the elective subject for 8th Semester is done before 15th November every year before end of seventh semester. New Electives may be added as per requirement after getting it duly approved by BOS and AC respectively.

+ The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports.

BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE AND ENGINEERING)
EIGHTH SEMESTER EXAMINATION

Paper Code	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETIT-402		Mobile Computing	3	1	4
ETCS-402		Machine Learning	3	0	3
ETHS-402		Human Values and Professional Ethics-II	1	0	1
ELECTIVE (SELECT ANY TWO, ONE FROM EACH GROUP)					
GROUP A					
ETIT-418		Digital Image Processing	3	0	3
ETCS408		Microelectronics	3	0	3
ETEC-406		Ad Hoc and Sensor Networks	3	0	3
ETIT 410		Soft Computing	3	0	3
ETIC-414		VLSI Design	3	0	3
ETIT 430		Distributed Systems	3	0	3
ETCS412		Object Oriented Software Engineering	3	0	3
ETCS 414		Computer Vision	3	0	3
ETCS416		Software Project Management	3	0	3
GROUP B					
ETCS-404		Human Computer Interaction	3	0	3
ETIT-416		Information Theory and Coding	3	0	3
ETCS-418		Web Intelligence and Big Data	3	0	3
ETCS-420		Service Oriented Architecture	3	0	3
ETCS-422		Multiagent Systems	3	0	3
ETCS-424		Principles of Programming Languages	3	0	3
ETCS-426		Telecommunication Networks	3	0	3
ETCS-428		Selected Topics of Recent Trends in Computer Science and Engineering**	3	0	3
PRACTICAL/VIVA VOCE					
ETIT-452		Mobile Computing Lab	0	2	1
ETCS-454		Machine Learning Lab	0	2	1
ETCS-456		Lab based on Elective – I	0	2	1
ETCS-458		Lab based on Elective - II	0	2	1
ETCS-460		*Major Project	0	12	8
TOTAL			**13**	**21**	**26**

*The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to major project should be delivered one month after staring of Semester. The progress will be monitored through seminars and progress reports.

**Syllabus may be revised after 2 years.

NOTE:

1. The total number of the credits of the B.Tech. (CSE) Programme = 216.
2. Student shall be required to appear in examinations of all courses. However, to award the degree a student shall be required to earn a minimum of 200 credits, including mandatory papers (M).

FOR LATERAL ENTRY STUDENTS:

1. The total number of the credits of the B.Tech. (CSE) Programme = 162.
2. Each student shall be required to appear for examinations in all courses Third Semester onwards. However, for the award of the degree a student shall be required to earn a minimum of 150 credits, including mandatory papers (M).

NOMENCLATURE OF CODES GIVEN IN THE SCHEME OF

B.TECH AND M.TECH

1. **ET** stands for Engineering and Technology.
2. **PE** stands for Power Engineering.
3. **ME** stands for Mechanical Engineering.
4. **MT** stands for Mechatronics.
5. **AT** stands for Mechanical and Automation Engineering.
6. **EE** stands for Electrical and Electronics Engineering.
7. **EL** stands for Electrical Engineering.
8. **IT** stands for Information Technology
9. **CS** stands for Computer Science and Engineering
10. **CE** stands for Civil Engineering
11. **EC** stands for Electronics and Communications Engineering**.**
12. **EN** stands for Environmental Engineering
13. **TE** stands for Tool Engineering
14. **MA** stands for Mathematics
15. **HS** stands for Humanities and Social Sciences
16. **SS** stands for Social Services

APPLIED MATHEMATICS-III

Paper Code: ETMA-201	**L**	**T/P**	**C**
Paper: Applied Mathematics-III	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives: The objective of this course is to teach the students the applications of fourier series, fourier transform, difference equation and numerical methods to solve various engineering problems.

UNIT-I

Fourier series: Definition, Euler's formula, conditions for Fourier expansion, functions having points of discontinuity, change of intervals, even and odd functions ,half range series, Harmonic analysis. Fourier Transforms: Definition, Fourier integral, Fourier transform, inverse Fourier transform, Fourier sine and cosine transforms, properties of Fourier transforms (linearity, scaling, shifting, modulation), Application to partial differential equations.

[T2][No. of hrs 11]

UNIT-II

Difference equation: Definition, formation, solution of linear difference equation with constant coefficients ,simultaneous difference equations with constant coefficients, applications of difference equations .Z- transform: Definition, Z- transform of basic functions, properties of Z-transform (linearity, damping, shifting, multiplication),initial value theorem, final value theorem, convolution theorem, convergence of Z- transform, inverse of Z- transform, Application to difference equations.

[T2][No. of hrs 11]

UNIT-III

Numerical Methods: Solution of algebraic and transcendental equations using bisection method, Regula-Falsi method and Newton – Raphson method. Solution of linear simultaneous equations using Gauss-Jacobi's iteration method and Gauss-Seidal's iteration methods.Finite differences: Forward differences, backward differences and Central differences. Interpolation: Newton's interpolation for equi-spaced values. Stirling's central difference interpolation formula, Divided differences and interpolation formula in terms of divided differences , Lagrange's interpolation formula for unequi-spaced values.

[T1,T2] [No. of hrs 11]

UNIT-IV

Numerical Differentiation, maxima and minima of a tabulated function. Numerical Integration: Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's one-third rule and Simpson's three-eighth rule .Numerical solution of ordinary differential equations: Picard's method, Taylor's method,Euler's method, modified Euler's method, Runge-Kutta method of fourth order.

[T1,T2][No. of hrs 11]

Text Books:

[T1] R.K. Jain and S.R.K. Iyengar," Numerical methods for Scientific and Engineering Computation", New Age Publishing Delhi-2014.
[T2] B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications, 2014 Edition.

Reference Books:

[R1] E. kresyzig," Advance Engineering Mathematics", Wiley publications
[R2] P. B. Patil and U. P. Verma, " Numerical Computational Methods", Narosa
[R3]. Partial Differential Equations" Schaum's Outline Series, McGraw Hill.
[R4] Michael Greenberg, " Advance Engineering mathematics" , Pearson.
[R5] Schaum's Outline on Fourier Analysis with Applications to Boundary Value Problem, Tata McGraw-Hill

FOUNDATION OF COMPUTER SCIENCE

Paper Code: ETCS-203	**L**	**T**	**C**
Paper: Foundation of Computer Science	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, the student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: Objective: To give basic knowledge of combinatorial problems, algebraic structures and graph theory.

UNIT- I

Formal Logic**:** Preposition, Symbolic Representation and logical entailment theory of Inferences and tautologies, Predicates, Quantifiers, Theory of inferences for predicate calculus, resolution. Techniques for theorem proving: Direct Proof, Proof by Contraposition, proof by contradiction.

[T1,T2][No. of hrs. 10]

UNIT- II

Overview of Sets and set operations, permutation and combination, principle of inclusion, exclusion (with proof) and pigeonhole principle (with proof), Relation, operation and representation of a relation, equivalence relation, POSET, Hasse Diagrams, extremal Elements, Lattices, composition of function, inverse, binary and n-ary operations.

[T1,T2][No. of hrs. 12]

UNIT- III

Principle of mathematical induction, principle of complete induction, solution methods for linear and non-linear first-order recurrence relations with constant coefficients, Graph Theory: Terminology, isomorphic graphs, Euler's formula (proof) ,chromatic number of a graph, five color theorem(with proof), Euler &Hamiltonian paths.

[T1,T2][No of hrs 11]

UNIT-IV

Groups, Symmetry, subgroups, normal subgroups, cyclic group, permutation group and cayles's theorem(without proof), cosets lagrange's theorem(with proof) homomorphism, isomorphism, automorphism, rings, Boolean function, Boolean expression, representation & minimization of Boolean function**.**

[T1,T2][No of hrs 11]

Text Books:

[T1] Norman L. Biggs**, "**Discrete Mathematics", Oxford, second edition.
[T2] Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH, seventh edition.

Reference Books:

[R1] Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI, 1996.
[R2] C.L. Liu, "Elements of Discrete Mathematics", TMH, 2000.
[R3] J. P. Trembly& P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill, 1997.

SWITCHING THEORY AND LOGIC DESIGN

Paper Code: ETEC-205	**L**	**T/P**	**C**
Paper: Switching Theory and Logic Design	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the knowledge of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Digital Systems and Computer Architecture.

UNIT- I

Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

Switching Theory: - Boolean Algebra- Postulates and Theorems, De' Morgan's Theorem, Switching Functions- Canonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine Mc-Clusky Methods.

Combinational Logic Circuits:- Review of basic gates- Universal gates, Adder, Subtractor ,Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Look-ahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and De-multiplexer, ALU, PLA and PAL.

[T2,T3][No. of Hrs. 14]

UNIT- II

Integrated circuits: - TTL and CMOS logic families and their characteristics. Brief introduction to RAM and ROM.

Sequential Logic Circuits: - Latches and Flip Flops- SR, , D, T and MS-JK Flip Flops, Asynchronous Inputs.

Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD, Decade and Up/Down Counters , Shift Registers, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.

[T2,T3][No. of hrs. 10]

UNIT- III

Synchronous Sequential Circuits:- State Tables State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and merger chart methods-concept of minimal cover table.

[T1][No. of hrs. 10]

UNIT- IV

Algorithmic State Machine: Representation of sequential circuits using ASM charts synthesis of output and next state functions, Data path control path partition-based design.

Fault Detection and Location: Fault models for combinational and sequential circuits, Fault detection in combinational circuits; Homing experiments, distinguishing experiments, machine identification and fault detection experiments in sequential circuits.

[T1][No. of hrs. 10]

Text Book:

[T1] Zyi Kohavi, "Switching & Finite Automata Theory", TMH, 2nd Edition
[T2] Morris Mano, Digital Logic and Computer Design", Pearson
[T3] R.P. Jain, "Modern Digital Electronics", TMH, 2nd Ed,

Reference Books:

[R1] A Anand Kumar, "Fundamentals of Digital Logic Circuits", PHI
[R2] Taub ,Helbert and Schilling, "Digital Integrated Electronics", TMH

CIRCUITS & SYSTEMS

Paper Code: ETEE 207	**L**	**T/P**	**C**
Paper: Circuits & Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No.1 rest of the paper shall consist of four units as per the syllabus, every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The purpose of this course is for each student to learn and further explore the techniques of advanced circuit analysis. The concepts and analytical techniques gained in this course (e.g., signals, Laplace transformation, frequency response) will enable students to build an essential foundation of many fields within electrical engineering, such as control theory, analog electronic circuits, signal processing.

UNIT-I

Introduction to signals, their classification and properties, different types of systems, LTI systems and their properties, periodic waveforms and signal synthesis, properties and applications of Laplace transform of complex waveform.

[T1,T2][No. of Hours: 10]

UNIT-II

System modeling in terms of differential equations and transient response of R, L, C, series and parallel circuits for impulse, step, ramp, sinusoidal and exponential signals by classical method and using Laplace transform.

[T1,T2][No. of Hours: 12]

UNIT-III

Graph theory: concept of tree, tie set matrix, cut set matrix and application to solve electric networks.

Two port networks – Introduction of two port parameters and their interconversion, interconnection of two 2-port networks, open circuit and short circuit impedances and ABCD constants, relation between image impedances and short circuit and open circuit impedances. Network functions, their properties and concept of transform impedance, Hurwitz polynomial.

[T1,T2][No. of Hours: 10]

Unit IV

Positive real function and synthesis of LC, RC, RL Networks in Foster's I and II, Cauer's I& II forms, Introduction of passive filter and their classification, frequency response, characteristic impedance of low pass, high pass, Band Pass and Band reject prototype section.

[T1,T2][No. of Hours: 10]

Text Books:

[T1] W H Hayt "Engineering Circuit Analysis" TMH Eighth Edition
[T2] D. R. Choudhary, "Networks and Systems" New Age International, 1999.

Reference Books

[R1] S Salivahanan "Circuit Theory " Vikas Publishing House 1st Edition 2014
[R2] Valkenburg, " Network analysis" PHI, 2000.
[R3] Bhise, Chadda, Kulshreshtha, " Engineering network analysis and filter design" Umesh publication, 2000.
[R4] Kuo, "Network analysis and synthesis" John Weily and Sons, 2nd Edition.
[R5] Allan H Robbins, W.C.Miller "Circuit Analysis theory and Practice"Cengage Learning Pub 5th Edition 2013
[R6] Bell "Electric Circuit" Oxford Publications 7th Edition

DATA STRUCTURES

Paper Code: ETCS-209	**L**	**T**	**C**
Paper: Data Structures	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, the student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand the programming and the various techniques for enhancing the programming skills for solving and getting efficient results.

UNIT – 1:

Introduction to programm ing methodologies and design of algorithms. Abstract Data Type, array, array organization, sparse array. Stacks and Stack ADT, Stack Manipulation, Prefix, infix and postfix expressions, their interconversion and expression evaluation. Queues and Queue ADT, Queue manipulation. General Lists and List ADT, List manipulations, Single, double and circular lists.

[T1,T2][No. of hrs. 12]

UNIT – II:

Trees, Properties of Trees, Binary trees, Binary Tree traversal, Tree manipulation algorithms, Expreession trees and their usage, binary search trees, AVL Trees, Heaps and their implementation.

[T1,T2][No. of hrs. 12]

UNIT – III:

Multiway trees, B-Trees, 2-3 trees, 2-3-4 trees, B* and B+ Trees. Graphs, Graph representation, Graph traversal.

[T1,T2][No. of hrs. 12]

UNIT – IV:

Sorting concept, order, stability, Selection sorts (straight, heap), insertion sort (Straight Insertion, Shell sort), Exchange Sort (Bubble, quicksort), Merge sort (only 2-way merge sort). Searching – List search, sequential search, binary search, hashing concepts, hashing methods (Direct, subtraction, modulo-division, midsquare, folding, pseudorandom hashing), collision resolution (by open addressing: linear probe, quadratic probe, pseudorandom collision resolution, linked list collision resolution), Bucket hashing.

[T1,T2][No. of hrs. 12]

Text Books:

[T1] R. F. Gilberg, and B. A. Forouzan, "Data structures: A Pseudocode approach with C", Thomson Learning.
[T2] A .V. Aho, J . E . Hopcroft, J . D . Ulman "Data Structures and Algorithm", Pearson Education.

Reference Books:

[R1] S. Sahni and E. Horowitz, "Data Structures", Galgotia Publications.
[R2] Tanenbaum: "Data Structures using C", Pearson/PHI.
[R3] T .H . Cormen, C . E . Leiserson, R .L . Rivest "Introduction to Algorithms", PHI/Pearson.
[R4] A.K.Sharma, "Data Structures", Pearson
[R5] Ellis Horowitz and Sartaz Sahani "Fundamentals of Computer Algorithms", Computer Science Press.

COMPUTER GRAPHICS & MULTIMEDIA

Paper Code: ETCS-211	**L**	**T**	**C**
Paper: Computer Graphics & Multimedia	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, the student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand various aspects of media and to learn the concept of sound, images and videos.

UNIT- I

Introduction, Applications areas, Components of Interactive Computer Graphics System. Overview of Input devices, Output devices, raster scan CRT displays, random scan CRT displays. DDA and Bresenham's Line Drawing Algorithms, Bresenham's and Mid Point Circle Drawing Algorithms. Homogeneous Coordinate System for 2D and 3D, Various 2D, 3D Transformations (Translation, Scaling, Rotation, Shear).

[T1,T2][No. of hrs. 12]

UNIT- II

Clipping Algorithms, Sutherland-Cohen line Clipping Algorithm Bezier Curves, B-Spline Curves. Parallel Projection, Perspective Projection, Illumination Model for diffused Reflection, Ambient light, Specular Reflection Model, Reflection Vector.

[T1,T2][No. of hrs. 11]

UNIT- III

Shading Models, Flat shading, Gourard Shading, Phong Model. Visible surface detection, Back Face Detection, Depth Buffer (Z-Buffer, A-Buffer) Method. Overview of multimedia: Classification, basic concepts of sound/audio MIDI: devices, messages, software. , Authoring tools, Video and Animation: controlling animation, display and transmission of animation

[T1,T2][No of hrs 10]

UNIT- IV

Data Compression: storage space, coding requirements, Basic compression techniques: run length code, Huffman code, Lempel-Ziv JPEG: Image preparation, Lossy sequential DCT, expanded lossy DCT, Lossless mode, Hierarchical mode. MPEG, Media synchronization, Media Integration, Production Standards.

[T1,T2][No of hrs 11]

Text Books:

[T1] Donald Hearn and M.Pauline Baker, "Computer Graphics C version", Second Edition, Pearson Education.

[T2] Ralf Steinmetz & Klara Nahrstedt, "Multimedia Computing Communication & Applications", Pearson Education.

Reference Books:

[R1] C, Foley, VanDam, Feiner and Hughes, "Computer Graphics Principles & practice", 2nd Edition

[R2] R. Plastock and G. Kalley, Schaum's Series, "Theory and Problems of Computer Graphics", McGraw Hill, 2nd edition.

[R3] Fred Halsall, "Multimedia Communications Applications, Networks, Protocols & Standards", Pearson Education.

[R4] David F. Rogers, "Procedural elements for computer graphics", McGraw- Hill.

SWITCHING THEORY AND LOGIC DESIGN LAB

Paper Code: ETEC-253	**L**	**T/P**	**C**
Paper: Switching Theory and Logic Design Lab	**0**	**2**	**1**

List of Experiments:

1. Realize all gates using NAND & NOR gates
2. Realize Half Adder, Full Adder, Half subtracter, Full subtracter
3. Realize a BCD adder
4. Realize a Serial Adder
5. Realize a four bit ALU
6. Realize Master-Save J K Flip-Flop, using NAND/NOR gates
7. Realize Universal Shift Register
8. Realize Self-Starting, Self Correcting Ring Counter
9. Realize Multiplexer and De-Multiplexer
10. Realize Carry Look ahead Adder / Priority Encoder
11. Simulation of PAL and PLA
12. Simulation Mealy and Moore State machines

NOTE: - At least 8 Experiments out of the list must be done in the semester

CIRCUITS AND SYSTEMS LAB

Paper Code: ETEE 257	**L**	**T**	**C**
Paper: Circuits and Systems Lab	**0**	**2**	**1**

List of Experiments

1. Study the transient response of series RLC circuit for different types of waveforms on CRO and verify using MATLAB
2. Study the time response of a simulated linear system and verify the unit step and square wave response of first order and second order, type 0,1 system
3. Using MATLAB determine current in various resistors connected in network using mesh current and node voltage analysis.
4. To determine Z and Y parameters of the given two port network.
5. To determine ABCD parameters of the given two port network.
6. To verify Reciprocity Theorem for the given two port network.
7. To determine Hybrid parameters of the given two port network.
8. To design Cascade Connection and determine ABCD parameters of the given two port network.
9. To design Series-Series Connection and determine Z parameters of the given two port network.
10. To design Parallel-Parallel Connection and determine Y parameters of the given two port network.
11. To design Series-Parallel Connection and determine h parameters of the given two port network
12. Study the frequency response of different filter circuits.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

DATA STRUCTURES LAB

Paper Code: ETCS-255	**L**	**T/P**	**C**
Paper: Data Structures Lab	**0**	**2**	**1**

List of Experiments :

1. Perform Linear Search and Binary Search on an array.
   Description of programs:
   a. Read an array of type integer.
   b. Input element from user for searching.
   c. Search the element by passing the array to a function and then returning the position of the element from the function else return -1 if the element is not found.
   d. Display the position where the element has been found.
2. Implement sparse matrix using array.
   Description of program:
   a. Read a 2D array from the user.
   b. Store it in the sparse matrix form, use array of structures.
   c. Print the final array.
3. Create a linked list with nodes having information about a student and perform
   I. Insert a new node at specified position.
   II. Delete of a node with the roll number of student specified.
   III. Reversal of that linked list.

4. Create doubly linked list with nodes having information about an employee and perform Insertion at front of doubly linked list and perform deletion at end of that doubly linked list.
5. Create circular linked list having information about an college and perform Insertion at front perform Deletion at end.
6. Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linked list.
7. Create a Linear Queue using Linked List and implement different operations such as Insert, Delete, and Display the queue elements.
8. Create a Binary Tree (Display using Graphics) perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.
9. Implement insertion, deletion and display (inorder, preorder and postorder) on binary search tree with the information in the tree about the details of a automobile (type, company, year of make).
10. To implement Insertion sort, Merge sort, Quick sort, Bubble sort, Bucket sort, Radix sort, Shell sort, Selection sort, Heap sort and Exchange sort using array as a data structure.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMPUTER GRAPHICS & MULTIMEDIA LAB

	L	T	C
Paper Code: ETCS-257			
Paper: Computer Graphics & Multimedia Lab	**0**	**2**	**1**

List of Experiments:

1. Study of Fundamental Graphics Functions.
2. Implementation of Line drawing algorithms: DDA Algorithm, Bresenham's Algorithm
3. Implementation of Circle drawing algorithms: Bresenham's Algorithm, Mid Point Algorithm.
4. Programs on 2D and 3D transformations
5. Write a program to implement cohen Sutherland line clipping algorithm
6. Write a program to draw Bezier curve.
7. Using Flash/Maya perform different operations (rotation, scaling move etc..) on objects
8. Create a Bouncing Ball using Key frame animation and Path animation.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

APPLIED MATHEMATICS-IV

Paper Code: ETMA-202	**L**	**T/P**	**C**
Paper: Applied Mathematics-IV	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives: The objective of this course is to teach the students about the difference equation, probability, curve fitting etc. and other numerical methods to solve various engineering problems.

UNIT – I

Partial Differential Equation: linear partial differential equations with constant coefficient, homogeneous and non homogeneous linear equations. Method of separation of variables. Laplace equation, wave equation and heat flow equation in Cartesian coordinates only with initial and boundary value.

[T1][No. of Hrs. 11]

UNIT II

Probability Theory: Definition, addition law of probability, multiplication law of probability, conditional probability, Baye's theorem, Random variable: discrete probability distribution, continuous probability distribution, expectation, moments, moment generating function, skewness, kurtosis, binomial distribution, Poisson distribution, normal distribution.

[T1,T2][No. of Hrs. 12]

UNIT-III

Curve Fitting: Principle of least square Method of least square and curve fitting for linear and parabolic curve, Correlation Coefficient, Rank correlation, line of regressions and properties of regression coefficients. Sampling distribution: Testing of hypothesis, level of significance, sampling distribution of mean and variance, Chi-square distribution, Student's T- distribution, F- distribution, Fisher's Z- distribution.

[T1,T2][No. of Hrs. 12]

UNIT IV

Linear Programming: Introduction, formulation of problem, Graphical method, Canonical and Standard form of LPP, Simplex method, Duality concept, Dual simplex method, Transportation and Assignment problem.

[T1][No. of Hrs. 10]

Text Books:

[T1] B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications.
[T2] N.M. Kapoor, "Fundamentals of Mathematical Statistics", Pitambar Publications

References Books:

[R1] E. kresyzig," Advance Engineering Mathematics", Wiley publications
[R2] Miller and Freund, " Probability and statistics for Engineers" , PHI
[R3] Gupta and Kapoor, " Fundamentals of Mathematical Statistics" Sultan Chand and Sons
[R4] G. Hadley, "Linear Programming", Narosa.
[R5] Schaum's Outline on Probability and Statistics" Tata McGraw-Hill
[R6] Gupta and Manmohan, " Problems in Operations Research", Sultan Chand and Sons.
[R7] R.K. Jain and S.R.K. Iyengar,"Advanced Engineering Mathematics "Narosa Publications.

COMPUTER ORGANIZATION & ARCHITECTURE

Paper Code: ETCS-204	**L**	**T/P**	**C**
Paper: Computer Organization & Architecture	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To equip the students with the internal architecture, organization and design of computer systems.

UNIT- I

Computer Arithmetic and Register transfer language:

Unsigned notation, signed notation, binary coded decimal, floating point numbers, IEEE 754 floating point standard, Micro-operation, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro operation, Arithmetic Logic Shift Unit.

[T1,T2][No. of hrs. 11]

UNIT- II

Instruction set architecture & computer organization:

Levels of programming languages, assembly language instructions, 8085 instruction set architecture, Instruction Codes, Computer Registers, Computer Instructions, Timing & Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupts

[T1,T2][No. of hrs. 11]

UNIT- III

Control Design:

Instruction sequencing & interpretation, Hardwired & Micro Programmed (Control Unit), Micrprogrammed computers, Microcoded CPU: Pentium processor. Specifying a CPU, Design & implementation of simple CPU, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Internal architecture of 8085 microprocessor.

[T1,T2][No. of hrs. 11]

UNIT- IV

Memory & Input/Output organization: Memory Technology, Main Memory (RAM and ROM Chips), Virtual memory, High-speed memories

Asynchronous Data Transfers, Programmed I/O, interrupts, Direct memory Access, Serial communication, UARTs, **RS-232-C & RS-422** standard

[T1,T2][No. of hrs. 11]

Text Books:

[T1] J. D. Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 2006.
[T2] J. P. Hayes, "Computer Architecture and Organization", McGraw Hill, 1988.

Reference Books:

[R1] J. L Hennessy and D. A. Patterson, "Computer Architecture: A quantitative approach", Morgon Kauffman, 1992.
[R2] W. Stallings, "Computer organization and Architecture", PHI, 7th ed, 2005.
[R3] B. Parhami, "Computer Architecture: From Microprocessors to Supercomputers", Oxford University press, 2006.

THEORY OF COMPUTATION

Paper Code: ETCS-206	**L**	**T/P**	**C**
Paper: Theory of Computation	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand fundamental requirements for building algorithms of any language.

UNIT- I

Overview: Alphabets, Strings & Languages, Chomsky Classification of Languages, Finite Automata, Deterministic finite Automata (DFA) & Nondeterministic finite Automata (NDFA), Equivalence of NDFA and DFA, Minimization of Finite Automata, Moore and Mealy machine and their equivalence, Regular expression and Kleen's Theorem(with proof), Closure properties of Regular Languages, Pumping Lemma for regular Languages(with proof).

[T1,T2][No. of hrs. 11]

UNIT- II

Context free grammar, Derivation trees, Ambiguity in grammar and its removal, Simplification of Context Free grammar, Normal forms for CFGs: Chomsky Normal Form & Greibach Normal Form, Pumping Lemma for Context Free languages, Closure properties of CFL(proof required), Push Down Automata (PDA), Deterministic PDA, Non Deterministic PDA ,Equivalence of PDA and CFG, Overview of LEX and YACC.

[T1,T2][No. of hrs. 11]

UNIT- III

Turing machines, Turing Church's Thesis, Variants and equivalence of Turing Machine, Recursive and recursively enumerable languages, Halting problem, Undecidability, Examples of Undecidable problem.

[T1,T2][No. of hrs. 11]

UNIT- IV

Introduction to Complexity classes, Computability and Intractability, time complexity, P, NP, Co-NP, Proof of Cook's Theorem, Space Complexity, SPACE, PSPACE, Proof of Savitch's Theorem, L ,NL ,Co-NL complexity classes.

[T1,T2][No. of hrs. 11]

Text Books:

[T1] Hopcroft, John E.; Motwani, Rajeev; Ullman, Jeffrey D "Introduction to Automata Theory, Languages, and Computation", Third Edition, Pearson.
[T2] Sipser, Michael, "Introduction to the theory of Computation", Third Edition, Cengage.

References Books:

[R1] Martin J. C., "Introduction to Languages and Theory of Computations", Third Edition, TMH.
[R2] Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI.
[R3] Daniel I.A. Cohen, "Introduction to Computer Theory",Second Edition, John Wiley.

DATABASE MANAGEMENT SYSTEMS

Paper Code: ETCS-208	**L**	**T/P**	**C**
Paper: Database Management Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The concepts related to database, database techniques, SQL and database operations are introduced in this subject. This creates strong foundation for application data design.

UNIT-I : Introductory Concepts of DBMS: Introduction and application of DBMS, Data Independence, Database System Architecture – levels, Mapping, Database users and DBA, Entity – Relationship model, constraints, keys, Design issues, E-R Diagram, Extended E-R features- Generalization, Specialization, Aggregation, Translating E-R model into Relational model.

[T1, T2][No. of Hrs. 10]

UNIT-II : Relational Model: The relational Model, The catalog, Types, Keys, Relational Algebra, Fundamental operations, Additional Operations-, SQL fundamentals, DDL,DML,DCL PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Integrity – Triggers.

[T2, R3][No. of Hrs. 10]

UNIT-III: Functional Dependencies, Non-loss Decomposition, First, Second, Third Normal Forms, Dependency Preservation, Boyce/Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

[T2, R1, R3][No. of Hrs. 10]

UNIT-IV: Transaction Management: ACID properties, serializability of Transaction, Testing for Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, Database recovery management.

Implementation Techniques: Overview of Physical Storage Media, File Organization, Indexing and Hashing, B+ tree Index Files, Query Processing Overview, Catalog Information for Cost Estimation, Selection Operation, Sorting, Join Operation, Materialized views, Database Tuning.

[T1, T2, R2][No. of Hrs. 12]

Text Books:

[T1] Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 5th Edition, Tata McGraw Hill, 2006

[T2] Elmsari and Navathe, "Fundamentals of Database Systems", 6th Ed., Pearson, 2013

References Books:

[R1] C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

[R2] J. D. Ullman, "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

[R3] Vipin C. Desai, "An Introduction to Database Systems", West Publishing Co.,

OBJECT ORIENTED PROGRAMMING

Paper Code: ETCS-210	**L**	**T/P**	**C**
Paper: Object Oriented Programming	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To learn object oriented concepts to enhance programming skills.

UNIT – 1:

Objects, relating to other paradigms (functional, data decomposition), basic terms and ideas (abstraction, encapsulation, inheritance, polymorphism). Review of C, difference between C and C++, cin, cout, new, delete operators.

[T1,T2][No. of hrs. 11]

UNIT – II:

Encapsulation, information hiding, abstract data types, object & classes, attributes, methods. C++ class declaration, state identity and behavior of an object, constructors and destructors, instantiation of objects, default parameter value, object types, C++ garbage collection, dynamic memory allocation, metaclass/abstract classes.

[T1,T2][No. of hrs. 11]

UNIT – III:

Inheritance, Class hierarchy, derivation – public, private & protected; aggregation, composition vs classification hierarchies, polymorphism, categorization of polymorphic techniques, method polymorphism, polymorphism by parameter, operator overloading, parametric polymorphism, generic function – template function, function name overloading, overriding inheritance methods, run time polymorphism.

[T1,T2][No. of hrs. 11]

UNIT – IV:

Standard C++ classes, using multiple inheritance, persistant objects, streams and files, namespaces, exception handling, generic classes, standard template library: Library organization and containers, standard containers, algorithm and Function objects, iterators and allocators, strings, streams, manipulators, user defined manipulators, vectors, valarray, slice, generalized numeric algorithm.

[T1,T2][No. of hrs. 11]

Text Books:

[T1] Rumbaugh et. al. “Object Oriented Modelling & Design”, Prentice Hall
[T2] A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH

Reference Books:

[R1] A.K. Sharma, “Object Oriented Programming using C++”, Pearson
[R2] G . Booch “Object Oriented Design & Applications”, Benjamin,Cummings.
[R3] E.Balaguruswamy, “Objected Oriented Programming with C++”, TMH
[R4] S. B. Lippman & J. Lajoie, “C++ Primer”, 3rd Edition, Addison Wesley, 2000.
[R4] R. Lafore, “Object Oriented Programming using C++”, Galgotia.
[R5] D . Parasons, “Object Oriented Programming with C++”,BPB Publication.
[R6] Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication.

COMMUNICATION SYSTEMS

Paper Code: ETEC-212	**L**	**T/P**	**C**
Paper: Communication Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Objective: This is the first course which introduces the concepts of communication systems, channels and various analog modulation methods. Further, an insight into the behavior of noise is dealt.

UNIT I

Introduction: Overview of Communication system, Communication channels, Mathematical Models for Communication Channels

Introduction of random Variables: Definition of random variables, PDF, CDF and its properties, joint PDF, CDF, Marginalized PDF, CDF, WSS wide stationery, strict sense stationery, non stationery signals, UDF, GDF, RDF, Binomial distribution, White process, Poisson process, Wiener process.

[T1, T2][No. of Hrs. 11]

UNIT II

Amplitude Modulation: Need for modulation, Representation of Band Pass signals and systems: Hilbert Transform, In-phase, Quad-phase representations, Power relation, modulation index, Bandwidth efficiency, AM: modulation and demodulation, DSB-SC: Modulation and demodulation, SSB: modulation and demodulation, VSB: modulation and demodulation.

[T1, T2][No. of Hrs. 11]

UNIT III

Angle Modulation Systems: Frequency Modulation, Types of Frequency Modulation, Generation of NBFM, WBFM, Transmission BW of FM Signal, Phase Modulation, Relationship between PM& FM.

Radio Receivers: Functions & Classification of Radio Receivers, Tuned Radio Frequency (TRF) Receiver, Superheterodyne Receiver, Basic Elements, Receiver Characteristics, Frequency Mixers, AGC Characteristics.

[T1, T2][No. of Hrs. 11]

UNIT IV

Noise Theory: Noise, Types of noise, Addition of Noise due to several sources in series and parallel, Generalized Nyquist Theorem for Thermal Noise, Calculation of Thermal Noise for a Single Noise Source, RC Circuits & Multiple Noise sources. Equivalent Noise Bandwidth, Signal to Noise Ratio, Noise-Figure, Noise Temperature, Calculation of Noise Figure

Performance of Communication Systems: Receiver Model, Noise in DSB-SC Receivers, Noise in SSB-SC Receivers, Noise in AM receiver (Using Envelope Detection), Noise in FM Receivers, FM Threshold Effect, Threshold Improvement through Pre-Emphasis and De-Emphasis, Noise in PM system – Comparison of Noise performance in PM and FM, Link budget analysis for radio channels.

[T1, T2][No. of Hrs. 11]

Text Books

[T1] John G. Proakis & Masoud Salehi, "Communication System Engineering", Pearson Education.
[T2] Haykin, S., "Communication Systems", John Wiley (2009) 4th ed.

Reference Books

[R1] Taub, H., "Principles of Communication Systems", McGraw-Hill (2008) 3rd ed.
[R2] Kennedy, G., "Electronic Communication Systems", McGraw-Hill (2008) 4th ed.
[R3] V. Chandra Sekar "Analog Communication", Oxford University Press, Incorporated, 2010
[R4] John G Proakis, M.Salehi and G.Bauch "Modern Communication System Using MATLAB**"** Cengage Learning, 3rd edition, 2013
[R5] J. C. Hancock, "An Introduction to the Principles of Communication Theory", TMH, 1998.
[R6] Peebles, "Probability and Stochastic Process" Prentice Hall; 3 edition

APPLIED MATHEMATICS LAB

Paper Code: ETMA-252	**L**	**T/P**	**C**
Paper: Applied Mathematics Lab	**0**	**2**	**1**

List of Experiments:-

1. Solution of algebraic and transcendental equation.
2. Algebra of matrices: Addition, multiplication, transpose etc.
3. Inverse of a system of linear equations using Gauss-Jordan method.
4. Numerical Integration.
5. Solution of ordinary differential equations using Runge-Kutta Method.
6. Solution of Initial value problem.
7. Calculation of eigen values and eigen vectors of a matrix.
8. Plotting of Unit step function and square wave function.

It is expected that atleast 12 experiments be performed, including the above specified 8 experiments which are compulsory. The remaining experiments may be developed by faculty and students based on applications of Mathematics in Real Life problem.

Text Books:

1. B.S. Grewal., "Numerical Methods in Engg. And Science", Khanna Publications
2. P. Dechaumphai & N. Wansophark, "Numerical Methods in Engg.: Theories with Matlab, Fortran, C & Pascal Programs", Narosa Publications

Reference Books:

1. P.B. Patil & U.P. Verma, "Numerical Computational Methods", Narosa Publications
2. John C. Polking & David Arnold, "Ordinary Differential Equations using MATLAB", Pearson Publications
3. Rudra Pratap, "Getting Started With MatLab" Oxford University Press
4. Byrom Gottfried, "Programming With C" Shaum's Outline
5. Santosh Kumar, "Computer based Numerical & Statistical Techniques", S. Chand Publications.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMPUTER ORGANIZATION & ARCHITECTURE LAB

Paper Code: ETCS-260	**L**	**T/P**	**C**
Paper: Computer Organization & Architecture Lab	**0**	**2**	**1**

List of Experiments:

Based on 8085 simulator

1. To draw and explain
   i. Block diagram and pin diagram of 8085.
   ii. Instruction set of 8085.
2. Write a program to perform :
   i. Addition of two 8 bit numbers without carry.
   ii. Addition of two 8 bit numbers with carry
3. Write a program to perform:
   i. Subtraction of two 8 bit numbers without borrows.
   ii. Subtraction of two 8 bit numbers with borrows.
4. Write a program to find 1's complement of an 8 bit number.
5. Write a program to find 2's complement of an 8 bit number.
6. Write a program to perform Multiplication of two 8 bit numbers.
7. Write a program to find to find the smallest and largest number from the given series.
8. Write a program to find sum of series of n consecutive numbers.
9. Write a program to find factorial of a number.
10. Write a program to reverse an 8 bit number.
11. Write a program to sort array in ascending/ descending order.
12. Write a program to perform division of two 8 bit numbers.

The instructor is advised to develop lab programs based on the learning concepts of architecture and insight into operating systems.

NOTE:- At least 8 Experiments from the syllabus must be done in the semester.

DATABASE MANAGEMENT SYSTEMS LAB

	L	T/P	C
Paper Code: ETCS-256			
Paper: Database Management Systems Lab	**0**	**2**	**1**

LAB BASED ON DBMS

Lab includes implementation of DDL, DCL, DML i.e SQL in Oracle.

List of Experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the queries for implementing the following functions: MAX (), MIN (),AVG (),COUNT ()
6. Write the queries to implement the concept of Integrity constrains
7. Write the queries to create the views
8. Perform the queries for triggers
9. Perform the following operation for demonstrating the insertion, updation and deletion using the referential integrity constraints

TEXT BOOK:

1. SQL/ PL/SQL, The programming language of Oracle, Ivan Bayross, 4th Edition BPB Publications

NOTE:- At least 8 Experiments out of the list must be done in the semester.

OBJECT ORIENTED PROGRAMMING LAB

	L	T/P	C
Paper Code: ETCS-258			
Paper: Object Oriented Programming Lab	**0**	**2**	**1**

List of Experiment:

1. Write a program for multiplication of two matrices using OOP.
2. Write a program to perform addition of two complex numbers using constructor overloading. The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imag parts to equal values and third which takes two argument is used to initialized real and imag to two different values.
3. Write a program to find the greatest of two given numbers in two different classes using friend function.
4. Implement a class string containing the following functions:
   - Overload + operator to carry out the concatenation of strings.
   - Overload = operator to carry out string copy.
   - Overload <= operator to carry out the comparison of strings.
   - Function to display the length of a string.
   - Function tolower( ) to convert upper case letters to lower case.
   - Function toupper( ) to convert lower case letters to upper case.
5. Create a class called LIST with two pure virtual function store() and retrieve().To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
6. Write a program to define the function template for calculating the square of given numbers with different data types.
7. Write a program to demonstrate the use of special functions, constructor and destructor in the class template. The program is used to find the bigger of two entered numbers.
8. Write a program to perform the deletion of white spaces such as horizontal tab, vertical tab, space ,line feed ,new line and carriage return from a text file and store the contents of the file without the white spaces on another file.
9. Write a program to read the class object of student info such as name , age ,sex ,height and weight from the keyboard and to store them on a specified file using read() and write() functions. Again the same file is opened for reading and displaying the contents of the file on the screen.
10. Write a program to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMMUNICATION SYSTEMS LAB

Paper Code: ETEC-256	**L**	**T/P**	**C**
Paper: Communication Systems Lab	**0**	**2**	**1**

List of Experiments:

1. Generation of DSB-SC AM signal using balanced modulator.
2. To study amplitude demodulation by linear diode detector
3. Generation of SSB AM signal.
4. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
5. To generate FM signal using voltage controlled oscillator.
6. To generate a FM Signal using Varactor & reactance modulation.
7. Detection of FM Signal using PLL & foster seelay method.
8. To study Super heterodyne AM receiver and measurement of receiver parameters viz.sensitivity, selectivity & fidelity.
9. To study Pre-emphasis and De-emphasis in FM.
10. Generation of Phase modulated and demodulated signal.

Simulations study of some of the above experiments using P-spice or Multisim softwares

NOTE:- At least 8 Experiments out of the list must be done in the semester.

ALGORITHMS DESIGN AND ANALYSIS

Paper Code: ETCS-301	**L**	**T/P**	**C**
Paper: Algorithms Design and Analysis	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective*: The objective of this paper is to teach the students various problem solving strategies like divide and conquer, Greedy method, Dynamic programming and also the mathematical background for various algorithms. After doing this course, students will be able to select an appropriate problem solving strategies for real world problems. This will also help them to calculate the time, complexity and space complexity of various algorithms.*

UNIT – I

Asymptotic notations for time and space complexity, Big-Oh notation, Θ notation, Ω notation, the little-oh notation, the little-omega notation, Recurrence relations: iteration method, recursion tree method, substitution method, master method (with proof), subtract and conquer master method(with proof), Data Structures for Disjoint Sets, Medians and Order statistics. Complexity analysis, Insertion sort, Merge Sort, Quick sort. Strassen's algorithm for Matrix Multiplications.

[T1][R1][R2][No. of Hrs. 10]

UNIT – II

Dynamic Programming: Ingredients of Dynamic Programming, emphasis on optimal substructure , overlapping substructures, memorization. Matrix Chain Multiplication, Longest common subsequence and optimal binary search trees problems, 0-1 knapsack problem, Binomial coefficient computation through dynamic programming. Floyd Warshall algorithm.

[T1][T2][R1] [R3][No. of Hrs. 10]

UNIT – III

Greedy Algorithms: Elements of Greedy strategy, overview of local and global optima, matroid, Activity selection problem, Fractional Knapsack problem, Huffman Codes, A task scheduling problem. Minimum **Spanning Trees:** Kruskal's and Prim's Algorithm, Single source shortest path: Dijkstra's and Bellman Ford Algorithm(with proof of correctness of algorithms).

[T1][T2][R4] [No. of Hrs. 10]

UNIT – IV

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

NP-Complete Problem: Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP –hard ,Case study of NP-Complete problems (vertex cover problem, clique problem).

[T1][R1] [No. of Hrs.: 10]

Text Books:

[T1] T. H. Cormen, C. E. Leiserson, R. L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Ed., PHI, 2013.
[T2] Jon Klenberg,Eva Tardos,"Algorithm Design", Pearson Publications,2014

Reference Books:

[R1] Sara Basse, "introduction to Design & analysis",Pearson
[R2] Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Computer Algorithms/C++ "Second Edition, Universities Press.
[R3] A. V. Aho, J. E. Hopcroft, J. D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Publication, 2013.
[R4] Richard Neapolitan, "Foundations of Algorithms" , Fifth Edition, Jones & Bartlett Learning

SOFTWARE ENGINEERING

Paper Code: ETCS-303	**L**	**T/P**	**C**
Paper: Software Engineering	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To improvise the concept to build any software.

UNIT – I

Introduction:

Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM.

Software Metrics:

Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics.

[T1][R1][R2][No. of Hrs.: 10]

UNIT – II

Software Project Planning:

Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Software Requirement Analysis and Specifications:

Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping.

[T1][R1][R2][No. of Hrs.: 11]

UNIT – III

Software Design:

Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.

Software Reliability:

Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation.

[T1][R1][R2] [No. of Hrs.: 12]

UNIT – IV

Software Testing:

Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Software Maintenance:

Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

[T1][R1][R2] [No. of Hrs.: 11]

TEXT BOOKS:

[T1] R. S. Pressman, "Software Engineering – A practitioner's approach", 3rd ed., McGraw Hill Int. Ed., 1992.
[T2] K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2001

Reference:

[R1] R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
[R2] P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
[R3] Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
[R4] James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons
[R5] I. Sommerville, "Software Engineering", Addison Wesley, 1999.

JAVA PROGRAMMING

Paper Code: ETCS-307	**L**	**T/P**	**C**
Paper: Java Programming	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To learn object oriented concepts and enhancing programming skills.

UNIT I

Overview and characteristics of Java, Java program Compilation and Execution Process Organization of the Java Virtual Machine, JVM as an interpreter and emulator, Instruction Set, class File Format, Verification, Class Area, Java Stack, Heap, Garbage Collection. Security Promises of the JVM, Security Architecture and Security Policy. Class loaders and security aspects, sandbox model

[T1,R2][No. of Hrs.: 11]

UNIT II

Java Fundamentals, Data Types & Literals Variables, Wrapper Classes, Arrays, Arithmetic Operators, Logical Operators, Control of Flow, Classes and Instances, Class Member Modifiers Anonymous Inner Class Interfaces and Abstract Classes, inheritance, throw and throws clauses, user defined Exceptions, The String Buffer Class, tokenizer, applets, Life cycle of applet and Security concerns.

[T1,T2][No. of Hrs.: 12]

UNIT III

Threads: Creating Threads, Thread Priority, Blocked States, Extending Thread Class, Runnable Interface, Starting Threads, Thread Synchronization, Synchronize Threads, Sync Code Block, Overriding Synced Methods, Thread Communication, wait, notify and notify all.

AWT Components, Component Class, Container Class, Layout Manager Interface Default Layouts, Insets and Dimensions, Border Layout, Flow Layout, Grid Layout, Card Layout Grid Bag Layout AWT Events, Event Models, Listeners, Class Listener, Adapters, Action Event Methods Focus Event Key Event, Mouse Events, Window Event

[T2][No. of Hrs.: 11]

UNIT IV

Input/Output Stream, Stream Filters, Buffered Streams, Data input and Output Stream, Print Stream Random Access File, JDBC (Database connectivity with MS-Access, Oracle, MS-SQL Server), Object serialization, Sockets, development of client Server applications, design of multithreaded server. Remote Method invocation, Java Native interfaces, Development of a JNI based application.

Collection API Interfaces, Vector, stack, Hashtable classes, enumerations, set, List, Map, Iterators.

[T1][R1][No. of Hrs.: 10]

Text Books:

[T1] Patrick Naughton and Herbertz Schidt, "Java-2 the complete Reference",TMH
[T2] Sierra & bates, "Head First Java", O'Reilly

Reference Books:

[R1] E. Balaguruswamy, "Programming with Java", TMH
[R2] Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
[R3] Decker & Hirshfield, "Programming.Java", Vikas Publication.

INDUSTRIAL MANAGEMENT

Paper Code: ETMS-311	**L**	**T/P**	**C**
Paper: Industrial Management	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The course provides a broad introduction to some aspects of business management and running of business organization.

UNIT I

Industrial relations- Definition and main aspects. Industrial disputes and strikes. Collective bargaining.
Labour Legislation- Labour management cooperation/worker's participation in management. Factory legislation. International Labour Organization.

[T1,T2][No. of Hrs. 10]

UNIT II

Trade Unionism- Definition, Origin, Objectives of Trade Unions. Methods of Trade unions. Size and finance of Indian Trade unions-size, frequency distribution, factors responsible for the small size. Finance-sources of income, ways of improving finance.

[T1,T2][No. of Hrs. 10]

UNIT III

Work Study-Method study and time study. Foundations of work study. Main components of method study. Time study standards. Involvement of worker's unions. Work Sampling. Application of work study to office work.

[T1,T2][No. of Hrs. 10]

UNIT IV

Quality Management- What is Quality? Control Charts. Quality is everybody's job. Taguchi Philosophy. Service Quality. What is Total Quality Management (TQM)? Roadmap for TQM. Criticism of TQM. Six Sigma.

[T1,T2][No. of Hrs. 10]

Text Books:

[T1] Sinha, P.R.N., Sinha I.B. and Shekhar S.M.(2013), Industrial Relations, Trade Unions and Labour Legislation. Pearson Education
[T2] Chary, S.N. (2012), Production and Operations Management. Tata McGraw Hill Education.

Reference Books:

[R1] Srivastava, S.C. (2012), Industrial Relations and Labour Laws, Vikas Publishing
[R2] Shankar R (2012), Industrial Engineering and Management. Galgotia Publications
[R3] Telsang, M. (2006), Industrial Engineering and Production Management. S.Chand
[R4] Thukaram, Rao (2004), M.E. Industrial Management. Himalaya Publishing House.

DIGITAL COMMUNICATION

Paper Code: ETEC-303	**L**	**T/P**	**C**
Paper: Digital Communication	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To enable the students

1. *To distinguish between analog and digital communication.*
2. *To understand the concept of digital communication system.*
3. *To understand the concept of random variables and random process.*
4. *To learn the digital modulation techniques.*

UNIT- I Introduction to Digital Communication:

Line coding: NRZ, RZ, Manchester encoding, differential Manchester encoding, AMI coding, high density bipolar code, binary with n-zero substitution codes,

Review of Sampling theorem, uniform and non-uniform quantization, companding, μ-Law and A-Law compressors, Concept and Analysis of PCM, DPCM, DM and ADM modulators and demodulators, M-ary waveforms, S/N ratio for all modulation, probability of error for PCM in AWGN Channel and other modulation techniques, Duo Binary pulse.

[T1, R2][No. of Hours: 11]

UNIT- II Random Signal Theory:

Probability, Concept of Random variable (Stationary, Non stationary, WSS, SSS), Random process, CDF, PDF, Joint CDF, Joint PDF, marginal PDF, Mean, Moments, Central Moment Auto-correlation & Cross-correlation, covariance functions, ergodicity, power spectral density, Gaussian distribution, Uniform distribution, Rayleigh distribution, Binomial distribution, Poission distribution, Weiner distribution, Wiener-Khinchin theorem, Central limit theorem.

[T1, T2, R2] [No. of Hours: 11]

UNIT- III Designing of Receiver:

Analysis of digital receiver, Prediction Filter, Design and Property of Matched filter, Correlator Receiver, Orthogonal Signal, Gram-Schmidt Orthogonalization Procedure, Maximum likelihood receiver, Coherent receiver design, Inter Symbol Interference, Eye Pattern.

[T1, T2, R1, R2] [No. of Hours: 11]

UNIT- IV Digital modulation schemes:

Coherent Binary Schemes: ASK, FSK, PSK, QPSK, MSK, G-MSK. Coherent M-ary Schemes, Incoherent Schemes (DPSK and DEPSK), Calculation of average probability of error for different modulation schemes, Power spectra of digitally modulated signals, Performance comparison of different digital modulation schemes. Review of 2 Latest Research Paper.

[T1, T2, R2][No. of Hours: 11]

Text Books:

[T1] Simon Haykin, "Communication Systems" John Wiley & Sons, Inc 4th Edition.
[T2] Taub Schilling, "Principles of Communication Systems" TMH, 2nd Edition

Reference Books:

[R1] George Kennedy, "Communication System" TMH – 4th Edition
[R2] B. P. Lathi, "Modern Digital and Analog Communication System" Oxford University Press – 3rd Edition.
[R3] Digital Communications by John G.Proakis; McGraw Hill.

COMMUNICATION SKILLS FOR PROFESSIONALS

Paper Code: ETHS-301	**L**	**T/P**	**C**
Paper: Communication Skills for Professionals	**2**	**0**	**1**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision. This course will also equip them with the basic skills required for a variety of practical applications of communication such as applying for a job, writing reports and proposals. Further, it will make them aware of the new developments in communication that have become part of business organisations today.

UNIT I

Organizational Communication: Meaning, importance and function of communication, Process of communication, Communication Cycle - message, sender, encoding, channel, receiver, decoding, feedback, Characteristics, Media and Types of communication, Formal and informal channels of communication, 7 C's of communication, Barriers to communication, Ethics of communication (plagiarism, language sensitivity)

Soft Skills: Personality Development, Self Analysis through SWOT, Johari Window, Interpersonal skills -Time management, Team building, Leadership skills. Emotional Intelligence.Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, Career planning, Self esteem.

[T1,T2][No. of Hrs. 08]

UNIT II

Introduction to Phonetics: IPA system (as in Oxford Advanced Learner's Dictionary), Speech Mechanism, The Description of Speech Sounds, Phoneme, Diphthong, Syllable, Stress, Intonation, Prosodic Features; Pronunciation; Phonetic Transcription - Conversion of words to phonetic symbols and from phonetic symbols to words. British & American English (basic difference in vocabulary, spelling, pronunciation, structure)

Non-Verbal Language: Importance, characteristics, types – Paralanguage (voice, tone, volume, speed, pitch, effective pause), Body Language (posture, gesture, eye contact, facial expressions), Proxemics, Chronemics, Appearance, Symbols.

[T1,T2][No. of Hrs. 08]

UNIT III

Letters at the Workplace – letter writing (hard copy and soft copy): request, sales, enquiry, order, complaint.
Job Application -- resume and cover letter

Meeting Documentation-- notice, memo, circular, agenda and minutes of meeting.

Report Writing - Significance, purpose, characteristics, types of reports, planning, organizing and writing a report, structure of formal report. Writing an abstract, summary, Basics of formatting and style sheet (*IEEE Editorial Style Manual)*, development of thesis argument, data collection, inside citations, bibliography; Preparing a written report for presentation and submission. Writing a paper for conference presentation/journal submission.

[T1,T2][No. of Hrs. 08]

UNIT IV

Listening and Speaking Skills: Importance, purpose and types of listening, process of listening, difference between hearing and listening, Barriers to effective listening, Traits of a good listener, Tips for effective listening. Analytical thinking; Speech, Rhetoric, Polemics; Audience analysis. Telephone Skills - making and receiving calls, leaving a message, asking and giving information, etiquettes.

Presentations: Mode, mean and purpose of presentation, organizing the contents, nuances of delivery, voice and body language in effective presentation, time dimension.

Group Discussion: Purpose, types of GDs, strategies for GDs, body language and guidelines for group discussion.

Interview Skills: Purpose, types of interviews, preparing for the interview, attending the interview, interview process, employers expectations, general etiquettes.

[T1,T2][No. of Hrs. 07]

Text Books:

[T1] Anna Dept. Of English. Mindscapes: English for Technologists & Engineers PB. New Delhi: Orient Blackswan.

[T2] Farhathullah, T. M. Communication Skills for Technical Students. Orient Blackswan, 2002.

References Books:

[R1] Masters, Ann and Harold R. Wallace. Personal Development for Life and Work, 10th Edition.Cengage Learning India, 2012.

[R2] Institute of Electrical and Electronics Engineers. IEEE Editorial Style Manual. IEEE, n.d. Web. 9 Sept. 2009.

[R3] Sethi and Dhamija. A Course in Phonetics and Spoken English. PHI Learning, 1999.

[R4] Khera, Shiv. You Can Win. New York: Macmillan, 2003.

ALGORITHMS ANALYSIS AND DESIGN LAB

Paper Code: ETCS-351	**L**	**T/P**	**C**
Paper: Algorithms Analysis and Design Lab	**0**	**2**	**1**

List of Experiments:

1. To implement following algorithm using array as a data structure and analyse its time complexity.
    a. Merge sort
    b. Quick sort
    c. Bubble sort
    d. Bucket sort
    e. Radix sort
    f. Shell sort
    g. Selection sort
    h. Heap sort
2. To implement Linear search and Binary search and analyse its time complexity.
3. To implement Matrix Multiplication and analyse its time complexity.
4. To implement Longest Common Subsequence problem and analyse its time complexity.
5. To implement Optimal Binary Search Tree problem and analyse its time complexity.
6. To implement Huffman Coding and analyse its time complexity.
7. To implement Dijkstra's algorithm and analyse its time complexity.
8. To implement Bellman Ford algorithm and analyse its time complexity.
9. To implement naïve String Matching algorithm, Rabin Karp algorithm and Knuth Morris Pratt algorithm and analyse its time complexity.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

SOFTWARE ENGINEERING LAB

Paper Code: ETCS-353	**L**	**T/P**	**C**
Paper: Software Engineering Lab	**0**	**2**	**1**

Tool Required: Rational Rose Enterprise Edition

List of Experiments:

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user's view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram : State-chart diagram, Activity diagram
7. To perform the behavioral view diagram for the suggested system : Sequence diagram, Collaboration diagram
8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system.
11. 10 Perform Estimation of effort using FP Estimation for chosen system.
12. 11 To Prepare time line chart/Gantt Chart/PERT Chart for selected software project.

Text Books:

1. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2005
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Second Edition, Springer.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

JAVA PROGRAMMING LAB

	L	T/P	C
Paper Code: ETCS-357			
Paper: Java Programming Lab	**0**	**2**	**1**

List of Experiments:

1. Create a java program to implement stack and queue concept.
2. Write a java package to show dynamic polymorphism and interfaces.
3. Write a java program to show multithreaded producer and consumer application.
4. Create a customized exception and also make use of all the 5 exception keywords.
5. Convert the content of a given file into the uppercase content of the same file.
6. Develop an analog clock using applet.
7. Develop a scientific calculator using swings.
8. Create an editor like MS-word using swings.
9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.
10. Create a simple java bean having bound and constrained properties.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

DIGITAL COMMUNICATION LAB

Paper Code: ETEC–357	**L**	**T/P**	**C**
Paper: Digital Communication Lab	**0**	**2**	**1**

List of Experiments: MATLAB/ LABVIEW based practical on:

1. To Study Sampling Theorem.
2. To Study of Pulse Code Modulation and Probability of error.
3. To calculate S/N ratio and Probability of error of Differential Pulse Code Modulation.
4. To calculate S/N ratio and Probability of error of Delta Modulation.
5. To calculate S/N ratio and Probability of error of Adaptive Delta Modulation.
6. To calculate S/N ratio and Probability of error of Amplitude Shift Keying (ASK).
7. To calculate S/N ratio and Probability of error of Phase Shift Keying (PSK).
8. To calculate S/N ratio and Probability of error of frequency Shift Keying (FSK).
9. To calculate S/N ratio and Probability of error Differential Phase Shift Keying Modulation (DPSK).
10. To calculate S/N ratio and Probability of error of Quadrature Phase Shift Keying Modulation (QPSK).
11. To calculate S/N ratio and Probability of error of QAM
12. Faculty can opt for practical of Digital Communication to be performed on Kit.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMMUNICATION SKILLS FOR PROFESSIONALS LAB

Paper Code: ETHS-351	**L**	**T/P**	**C**
Paper: Communication Skills for Professionals Lab	**0**	**2**	**1**

Objective: *To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision .These activities will enhance students' communication skills with a focus on improving their oral communication both in formal and informal situations. They will develop confidence in facing interviews and participating in group discussions which have become an integral part of placement procedures of most business organisations today.*

Lab Activities to be conducted:

1. **Listening and Comprehension Activities** – Listening to selected lectures, seminars, news (BBC, CNN, etc.). Writing a brief summary or answering questions on the material listened to.
2. **Reading Activities** -- Reading different types of texts for different purposes with focus on the sound structure and intonation patterns of English. Emphasis on correct pronunciation.
3. **Conversation Activities**-- Effective Conversation Skills; Formal/Informal Conversation; Addressing higher officials, colleagues, subordinates, a public gathering; Participating in a video conference.
4. **Making an Oral Presentation**–Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Connecting with the audience during presentation; Projecting a positive image while speaking; Emphasis on effective body language.
5. **Making a Power Point Presentation** -- Structure and format; Covering elements of an effective presentation; Body language dynamics.
6. **Making a Speech** -- Basics of public speaking; Preparing for a speech; Features of a good speech; Speaking with a microphone. Famous speeches may be played as model speeches for learning the art of public speaking. Some suggested speeches: Barack Obama, John F Kennedy, Nelson Mandela, Mahatma Gandhi, Jawahar Lal Nehru, Atal Bihari Vajpayee, Subhash Chandra Bose, Winston Churchill, Martin Luther King Jr.
7. **Participating in a Group Discussion** -- Structure and dynamics of a GD; Techniques of effective participation in group discussion; Preparing for group discussion; Accepting others' views / ideas; Arguing against others' views or ideas, etc.
8. **Participating in Mock Interviews** -- Job Interviews: purpose and process; How to prepare for an interview; Language and style to be used in an interview; Types of interview questions and how to answer them.

Suggested Lab Activities:

1. Interview through telephone/video-conferencing
2. Extempore, Story Telling, Poetry Recitation
3. Mock Situations and Role Play; Enacting a short skit
4. Debate (Developing an Argument), News Reading and Anchoring.

Reference Books:

1. Patnaik, Priyadarshi. *Group Discussion and Interview Skills*: *With VCD*. Cambridge University Press India (Foundation Books), 2012 edition.
2. Kaul,Asha. *Business Communication.* PHI Learning: 2009.
3. Hartman and Lemay. *Presentation Success: A Step-by-Step Approach*. Thomson Learning, 2000.

Note: The Communication Skills Lab should be equipped with computers, microphones, an internet connection, overhead projector, screen, sound system, audio/video recording facilities, and seating arrangement for GDs and mock interviews. The student activities may be recorded and students may replay them to analyse and improve their pronunciation, tone, expressions, body language, etc.

Traditional language lab softwares are not mandatory and may be used by students to practice and enhance their language competence. Such softwares are usually elementary in nature and are mostly based on British/American English (pronunciation, accent and expression). They should preferably be in Indian English.

COMPILER DESIGN

Paper Code: ETCS-302	**L**	**T/P**	**C**
Paper: Compiler Design	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: This course aims to teach students the principles involved in compiler design. It will cover all the basic components of a compiler, its optimizations and machine code generation. Students will be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.

UNIT- I

Brief overview of the compilation process, structure of compiler & its different phases, lexical analyzer, cross compiler, Bootstrapping, quick & dirty compiler, Shift-reduce parsing, operator- precedence parsing, top-down parsing, predictive parsing ,LL(1) and LL(k) grammar, bottom up parsing, SLR, LR(0), LALR parsing techniques.

[T1][T2][R1][No. of Hrs. 12]

UNIT- II

Design and implementation of a lexical analyzer and parsing using automated compiler construction tools(eg. Lex, YACC, PLY), Syntax-directed translation schemes, implementation of syntax directed translations, intermediate code, postfix notation, three address code, quadruples, and triples, translation of assignment statements, Boolean expressions, control statements, Semantic Analysis, Type Systems, Type Expressions, Type Checker, Type Conversion

[T2][R1][R3][R4][R5][No. of Hrs. 12]

UNIT- III

Symbol table, data structures and implementation of symbol tables, representing scope information.

Run Time Storage Administration, implementation of a simple stack allocation scheme, storage allocation in block structured languages and non block structured languages, Error, Lexical-phase errors, syntactic-phase errors, semantic errors.

[T1][T2]][R2][No. of Hrs. 10]

UNIT-IV

The principle sources of optimization, loop optimization, the DAG representation of basic blocks, value number and algebraic laws, global dataflow analysis, Object programs, problems in code generation, a machine model, a single code generator, register allocation and assignment, code generation from DAGs, peephole optimization.

[T1][T2] [No. of Hrs. 10]

Text Books:

[T1] Alfred V. Aho & J.D. Ullman, “Compiler Principles ,Techniques& Tools”, Pearson
[T2] Kenneth C. Louden, “Compiler Design”,Cengage Publication

Reference Books:

[R1] Kakde O.G., “Complier Design”, Laxmi Publication
[R2] Trembley and Sorenson, “Theory and Practice of Compiler Writing”, McGraw Hill
[R3] Vinu V. DAS, “Compiler Design Using FLEX and YACC , PHI
[R4] Jhon R. Levine, Tony Mason and Doug Brown, “Lex &Yacc”, O’Reilly.pdf
[R5] Andrew W. Appel, Maia Ginsburg, “Modern Compiler Implementation in C”, Cambridge University Press

OPERATING SYSTEMS

Paper Code: ETCS-304	**L**	**T/P**	**C**
Paper: Operating Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: *The goal of this course is to provide an introduction to the internal operation of modern operating systems. The course will cover processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems.*

UNIT I

Introduction: What is an Operating System, Simple Batch Systems, Multiprogrammed Batches systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems, OS – A Resource Manager.

Memory Organization & Management: Memory Organization, Memory Hierarchy, Memory Management Strategies, Contiguous versus non- Contiguous memory allocation, Partition Management Techniques, Logical versus Physical Address space, swapping, Paging, Segmentation, Segmentation with Paging

Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Thrashing, Demand Segmentation, and Overlay Concepts.

[T1] [T2][R2][R3] [No. of hrs. 10]

UNIT II

Processes: Introduction, Process states, process management, Interrupts, Interprocess Communication

Threads: Introduction, Thread states, Thread Operation, Threading Models.

Processor Scheduling: Scheduling levels, pre emptive vs no pre emptive scheduling, priorities, scheduling objective, scheduling criteria, scheduling algorithms, demand scheduling, real time scheduling.

Process Synchronization: Mutual exclusion, software solution to Mutual exclusion problem, hardware solution to Mutual exclusion problem, semaphores, Critical section problems. Case study on Dining philosopher problem, Barber shop problem etc.

[T1][T2][[R3] [No. of hrs. 10]

UNIT III

Deadlocks: examples of deadlock, resource concepts, necessary conditions for deadlock, deadlock solution, deadlock prevention, deadlock avoidance with Bankers algorithms, deadlock detection, deadlock recovery.

Device Management: Disk Scheduling Strategies, Rotational Optimization, System Consideration, Caching and Buffering

[T1][T2][R1] [No. of hrs. 10]

UNIT IV

File System: Introduction, File Organization, Logical File System, Physical File System , File Allocation strategy, Free Space Management, File Access Control, Data Access Techniques, Data Integrity Protection, Case study on file system viz FAT32, NTFS, Ext2/Ext3 etc.

[T1] [T2][R4][R5] [No. of hrs. 10]

Text Books:

[T1] Deitel & Dietel, "Operating System", Pearson, 3rd Ed., 2011
[T2] Silbersachatz and Galvin, "Operating System Concepts", Pearson, 5th Ed., 2001
[T3] Madnick & Donovan, "Operating System", TMH,1st Ed., 2001

Reference Books:

[R1] Tannenbaum, "Operating Systems", PHI, 4th Edition, 2000
[R2] Godbole, "Operating Systems", Tata McGraw Hill, 3rd edition, 2014
[R3] Chauhan, "Principles of Operating Systems", Oxford Uni. Press, 2014
[R4] Dhamdhere, "Operating Systems", Tata McGraw Hill, 3rd edition, 2012
[R5] Loomis, "Data Management & File Structure", PHI, 2nd Ed.

COMPUTER NETWORKS

Paper Code: ETCS-306	**L**	**T/P**	**C**
Paper: Computer Networks	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To understand the basics of networking with reference to OSI and TCP/IP models.

UNIT–I

Introduction: Internet History, Uses of computer networks, Network hardware, network software, Protocol layering, Reference models (OSI & TCP/IP), Network standardization. The Physical Layer: Theoretical basis for data communication, Transmission media: Guided and Unguided media, Switching (circuit, packet), Multiplexing (FDM, WDM, and TDM), Overview of PSTN, ISDN, and ATM.

[T1,T2][No. of Hrs. 10]

UNIT-II

The Data Link Layer: Data link layer design issues, Error detection and Correction Techniques, Elementary data link control protocols, Sliding window protocols, Example data link protocols (HDLC and PPP). The Medium Access Sub layer: The channel allocation problem, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLANs, Network devices-repeaters, hubs, Bridge, Switches and Routers.

[T1][T2][No. of Hrs. 12]

UNIT-III **III**

Transmission Networks: PDH Networks, SONET/SDH Networks, DWDM Networks, Introduction to Cell Switched Networks e.g Asynchronous Transfer Mode (ATM) and Packet Switched Networks. The Network Layer: Network layer design issues, routing algorithms, congestion control algorithms ,Quality of Service, Introduction to IPv4 Addressing, Subnetworks and Subneting, IPv4 protocol Packet Format, Forwarding of IP packets, IPv4 vs IPv6, Congestion control algorithms. Delay Models in Data Networks: Queueing Models, M/M/1 Queueing System, M/M/m/m and Markov Systems.

[T1][T2][No. of Hrs. 12]

UNIT - IV

Transport layer: Transport layer services, Elements of transport protocols, Overview of UDP and TCP.

[T1][No. of Hrs. 12]

Text Books:

[T1] Dimitri Bertsekas and Robert Gallager, "Data Networks", PHI.
[T2] Behrouz A.Forouzan, 'Data Communication and Networking', 5E, Tata McGraw Hill, 2013.

Reference Books:

[R1] Uyless Black, "Computer Networks-Protocols, Standards and Interfaces", 2nd edition, PHI, 1996.
[R2] A. Tannenbaum,"Computer Networks", 5th edition, Pearson.

WEB TECHNOLOGY

Paper Code: ETCS-308	**L**	**T/P**	**C**
Paper: Web Technology	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: This paper gives understanding of web designing to the students.

UNIT - I

History of the Internet, Basic internet protocols, World Wide Web (W3C), HTTP: Hypertext Transfer Protocol.

Markup languages-XHTML: Introduction to HTML, basics of XTHML, HTML elements, HTML tags, lists, tables, frames, forms, defining XHTML's abstract syntax, defining HTML documents.

CSS style sheets: Introduction, CSS core syntax, text properties, CSS box model, normal flow box layout, other properties like list, tables, DHTML, XML, XML documents & vocabulary, XML versions & declarations, Introduction to WML.

[T1,T2][No. of hrs. 10]

UNIT – II

Client Side Programming: JAVA Scripts, basic syntax, variables & data-types, literals, functions, objects, arrays, built-in objects, JAVA Script form programming, Intrinsic event handling, modifying element style, document trees,

Server side programming – Java Servlets: Servlet architecture, life cycle, parameter data, sessions, cookies, servlets capabilities, servlets & concurrency. Introduction to JSP, JSP Tags, JSP life cycle, custom tags.

[T1,T2][No. of hrs. 12]

UNIT - III

Security Threats, Security risks of a site, Web attacks and their prevention, Web security model, Session management, authentication, HTTPS and certificates, Application vulnerabilities and defenses.

Client-side security, Cookies security policy, HTTP security extensions, Plugins, extensions, and web apps, Web user tracking.

Server-side security tools, Web Application Firewalls (WAFs) and Fuzzers.

[T1,T2][No. of hrs. 10]

UNIT – IV

Introduction to Web 2.0 and Web 3.0, Concepts and Issues, Latest Trends in Web Technologies. Web Security concerns. Applications of Web Engineering Technologies in distributed systems etc. Case studies using different tools.

[T1,T2][No. of hrs. 12]

Text Books:

[T1] Web Technologies: A Computer Science Perspective, Jackson, Pearson Education India, 2007.
[T2] Web Engineering: A Practitioner's Approach by Roger S Pressman, David Lowe, TMH, 2008.

Reference Books:

[R1] Achyut Godbole,Atul Kahate, "Web Technologies", McGraw-Hill Education, Third Edition.
[R2] Uttam K Roy, "Web Technologies", Oxford University Press, 2012.
[R3] Chris Bates, "Web Programming", Wiley
[R4] Web Engineering by Gertel Keppel, Birgit Proll, Siegfried Reich, Werner R., John Wiley.
[R5] Thinking on the Web: Berner's LEE, Godel and Turing, John Wiley & Sons Inc.

ARTIFICIAL INTELLIGENCE

Paper Code: ETCS-310	**L**	**T/P**	**C**
Paper: Artificial Intelligence	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To learn the basics of designing intelligent agents that can solve general purpose problems, represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences

UNIT-I

Introduction: Introduction to intelligent agents

Problem solving: Problem formulation, uninformed search strategies, heuristics, informed search strategies, constraint satisfaction Solving problems by searching, state space formulation, depth first and breadth first search, iterative deepening

[T1,T2][No. of hrs. 12]

UNIT-II

Logical Reasoning : Logical agents , propositional logic, inferences ,first-order logic, inferences in first order logic, forward chaining, backward chaining, unification , resolution

[T1,T2][No. of hrs. 10]

UNIT-III

Game Playing: Scope of AI -Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction

[T1,T2][No. of hrs. 12]

UNIT-IV

Learning from observations: Inductive learning, learning decision trees, computational learning theory, Explanation based learning

Applications: Environmental Science, Robotics, Aerospace, Medical Sciences etc.

[T1,T2][No. of hrs. 10]

Text Book:

[T1] Rich and Knight, “Artificial Intelligence”, Tata McGraw Hill, 1992
[T2] S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Edu.

Reference Books:

[R1] KM Fu, "Neural Networks in Computer Intelligence", McGraw Hill
[R2] Russel and Norvig, "Artificial Intelligence: A modern approach", Pearson Education

MICROPROCESSORS AND MICROCONTROLLERS

Paper Code: ETEE-310	**L**	**T/P**	**C**
Paper: Microprocessors and Microcontrollers	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The objective of the paper is to facilitate the student with the knowledge of microprocessor systems and microcontroller.

UNIT- I

Introduction to Microprocessor Systems: Architecture and PIN diagram of 8085, Timing Diagram, memory organization, Addressing modes, Interrupts. Assembly Language Programming.

[T1][No. of hrs. 10]

UNIT- II

8086 Microprocessor: 8086 Architecture, difference between 8085 and 8086 architecture, generation of physical address, PIN diagram of 8086, Minimum Mode and Maximum mode, Bus cycle, Memory Organization, Memory Interfacing, Addressing Modes, Assembler Directives, Instruction set of 8086, Assembly Language Programming, Hardware and Software Interrupts.

[T2][No. of hrs. :12]

UNIT- III

Interfacing of 8086 with 8255, 8254/ 8253, 8251, 8259: Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255, Sample-and-Hold Circuit and Multiplexer, Keyboard and Display Interface, Keyboard and Display Controller (8279), Programmable Interval timers (Intel 8253/8254), USART (8251), PIC (8259), DAC, ADC, LCD, Stepper Motor.

[T1][No. of hrs. :12]

UNIT-IV

Overview of Microcontroller 8051: Introduction to 8051 Micro-controller, Architecture, Memory organization, Special function registers, Port Operation, Memory Interfacing, I/O Interfacing, Programming 8051 resources, interrupts, Programmer's model of 8051, Operand types, Operand addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions, Timer & Counter Programming, Interrupt Programming.

[T3][No. of hrs. 11]

Text Books:

[T1] Muhammad Ali Mazidi, "Microprocessors and Microcontrollers", Pearson, 2006

[T2] Douglas V Hall, "Microprocessors and Interfacing, Programming and Hardware" Tata McGraw Hill, 2006.

[T3] Ramesh Gaonkar, "MicroProcessor Architecture, Programming and Applications with the 8085", PHI

References Books:

[R1] Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. MCKinlay "The 8051 Microcontroller and Embedded Systems",2nd Edition, Pearson Education 2008.

[R2] Kenneth J. Ayala, "The 8086 Microprocessor: Programming & Interfacing The PC", Delmar Publishers, 2007.

[R3] A K Ray, K M Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill, 2007.

[R4] Vaneet Singh, Gurmeet Singh, "Microprocessor and Interfacing", Satya Prakashan, 2007.

OPERATING SYSTEMS (LINUX PROGRAMMING AND ADMINISTRATION) LAB

	L	T/P	C
Paper Code: ETCS-352			
Paper: Operating Systems (Linux Programming and Administration) Lab	**0**	**2**	**1**

List of Experiments:

1. Write a program to implement CPU scheduling for first come first serve.
2. Write a program to implement CPU scheduling for shortest job first.
3. Write a program to perform priority scheduling.
4. Write a program to implement CPU scheduling for Round Robin.
5. Write a program for page replacement policy using a) LRU b) FIFO c) Optimal.
6. Write a program to implement first fit, best fit and worst fit algorithm for memory management.
7. Write a program to implement reader/writer problem using semaphore.
8. Write a program to implement Banker's algorithm for deadlock avoidance.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMPUTER NETWORKS LAB

	L	T/P	C
Paper Code: ETCS-354			
Paper: Computer Networks	**0**	**2**	**1**

List of Experiments:

1. Introduction to Computer Network laboratory
   Introduction to Discrete Event Simulation
   Discrete Event Simulation Tools - ns2/ns3, Omnet++

2. Using Free Open Source Software tools for network simulation – I Preliminary usage of the tool ns3
   Simulate telnet and ftp between N sources - N sinks (N = 1, 2, 3). Evaluate the effect of increasing data rate on congestion.

3. Using Free Open Source Software tools for network simulation - II
   Advanced usage of the tool ns3
   Simulating the effect of queueing disciplines on network performance - Random Early Detection/Weighted RED / Adaptive RED (This can be used as a lead up to DiffServ / IntServ later).

4. Using Free Open Source Software tools for network simulation - III
   Advanced usage of the tool ns3 Simulate http, ftp and DBMS access in networks

5. Using Free Open Source Software tools for network simulation - IV
   Advanced usage of the tool ns3
   Effect of VLAN on network performance - multiple VLANs and single router.

6. Using Free Open Source Software tools for network simulation - IV
   Advanced usage of the tool ns3
   Effect of VLAN on network performance - multiple VLANs with separate multiple routers.

7. Using Free Open Source Software tools for network simulation - V
   Advanced usage of the tool ns3

   Simulating the effect of DiffServ / IntServ in routers on throughput enhancement.

8. Using Free Open Source Software tools for network simulation - VI
   Advanced usage of the tool ns3
   Simulating the performance of wireless networks

9. Case Study I : Evaluating the effect of Network Components on Network Performance
   To Design and Implement LAN With Various Topologies and To Evaluate Network Performance Parameters for DBMS etc)

10. Case Study II : Evaluating the effect of Network Components on Network Performance
    To Design and Implement LAN Using Switch/Hub/Router As Interconnecting Devices For Two Different LANs and To Evaluate Network Performance Parameters.

11. Mini project - one experiment to be styled as a project of duration 1 month (the last month)

NOTE:- At least 8 Experiments out of the list must be done in the semester.

WEB ENGINEERING LAB

Paper Code: ETCS-356	**L**	**T/P**	**C**
Paper: Web Engineering Lab	**0**	**2**	**1**

Web Engineering Lab experiment based on syllabus of (ETCS-308).

NOTE:- At least 8 Experiments from the syllabus must be done in the semester.

MICROPROCESSORS AND MICROCONTROLLERS LAB

Paper Code: ETEE-358	**L**	**T/P**	**C**
Paper: Microprocessors and Microcontrollers Lab	**0**	**2**	**1**

List of Experiments:

1. Write a program to add and subtract two 16-bit numbers with/ without carry using 8086.
2. Write a program to multiply two 8 bit numbers by repetitive addition method using 8086.
3. Write a Program to generate Fibonacci series.
4. Write a Program to generate Factorial of a number.
5. Write a Program to read 16 bit Data from a port and display the same in another port.
6. Write a Program to generate a square wave using 8254.
7. Write a Program to generate a square wave of 10 kHz using Timer 1 in mode 1(using 8051).
8. Write a Program to transfer data from external ROM to internal (using 8051).
9. Design a Minor project using 8086 Micro processor (Ex: Traffic light controller/temperature controller etc)
10. Design a Minor project using 8051 Micro controller

NOTE: - At least 8 Experiments out of the list must be done in the semester.

INFORMATION SECURITY

Paper Code: ETCS-401	**L**	**T/P**	**C**
Paper: Information Security	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To understand the basic concepts of web threats, legal ethical and professional issues of information security.

UNIT- I

Information and Security:

Information Systems: Recent History, Distributed Information System and its Importance, Role of Internet and Web Services, Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security. Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles, Privacy of Data.

[T1, T2][No. of hrs. 12]

UNIT-II

Networks and E-Security:

Concepts in Internet and World Wide Web: Brief review of Internet Protocols-TCP/IP, IPV4, IPV6. **Functions of various networking components:** Routers, bridges, switches, hub, gateway and Modulation Techniques. Need for security, Legal, Ethical and Professional Issues in Information Security, Risk Management, 11 Security Threats to E-Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards,

Digital forensics including digital evidence handling: Media forensics, Cyber forensics, Software forensics, Mobile forensics.

[T1, T2][No. of hrs. 11]

UNIT-III

Physical Security and Bio-metrics as Security:

Physical Security: Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges Framework for Information Security, Security Metrics, Information Security Vs Privacy

[T1, T2][No. of hrs. 11]

UNIT-IV

Network Cryptography:

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues,

Policies Network Security: Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunnelling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

[T1, T2][No. of hrs. 10]

Text Books:

[T1] Godbole," Information Systems Security", Wiley
[T2] Merkov, Breithaupt," Information Security", Pearson Education

References:

[R1] Yadav, "Foundations of Information Technology", New Age, Delhi
[R2] Schou, Shoemaker, “Information Assurance for the Enterprise", Tata McGraw Hill
[R3] Furnell, "Computer Insecurity", Springer
[R4] http://www.iiitd.edu.in/~gauravg/

SOFTWARE TESTING AND QUALITY ASSURANCE

Paper Code: ETCS-403	**L**	**T/P**	**C**
Paper: Software Testing and Quality Assurance	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To check the productivity of software alongwith its quality comparison with other software and core components of quality.

UNIT I

Introduction

Software testing:

Testing as an Engineering Activity, Role of Process in Software Quality, Testing as a Process, Software Testing Principles, Tester Role in Software Development, Artifacts of testing (Faults, Errors, and Failures), Limitations of Testing, Challenges in Software Testing, Testing and debugging, Verification, Validation, Test levels.

Software Quality:

Software Quality, Software Control, Quality Assurance, Quality Assurance Analyst, Quality Factor, Quality Management, Methods of Quality Management, Core components of Quality, Cost Aspect of Quality.

[T1][T2][R3][No. of hrs. 10]

UNIT II

White Box and Black Box Testing

Different Testing Techniques, Differences between testing techniques

***Black Box Testing*:** Requirements based testing techniques, Boundary value analysis, Equivalence partitioning, Decision table, State/Graph based testing

***White Box Testing*:** Static testing techniques, Static analysis tools, Unit/Code functional testing, Control flow testing, Code complexity testing, Data flow testing

Integration, System and Acceptance Testing: Integration testing approaches, System testing, Scenario Testing, Deployment testing, Non-functional testing techniques,

Acceptance Testing: Acceptance criteria, types, test cases selection and execution.

[T1][T2][R2][No. of hrs. 10]

UNIT III

Quality Assurance: Quality Planning, Quality plan objectives, Planning process overview, Business Plan and Quality Plan, TQM (Total Quality Management), TQM concepts, Zero defect movement

Quality Standards: Quality Models/Standards, Standards and guidelines, Types of Models, ISO Standards, CMM and CMMI, Six Sigma concepts, Quality Challenge, National Quality Awards.

[T2][R1][R3] [No. of hrs. 10]

UNIT IV

Test Selection & Minimization for Regression Testing

Regression testing, Regression test process, Selection of regression tests, Dynamic Slicing, Test Minimization, Tools for regression testing.

Test Management and Automation

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Testing tools, Object Oriented Testing.

[T1][R1][R2][No. of hrs. 10]

Text Books:

[T1] Yogesh Singh,"Software Testing", Cambridge University Press, 2011
[T2] Sagar Naik, Piyu Tripathy," Software Testing and Quality Assurance", Wiley

REFERENCE BOOKS:

[R1] Effective methods for Software Testing William Perry, Wiley
[R2] Aditya P. Mathur, "Foundation of Software Testing", Pearson Education.
[R3] Milind Limaye,"Software Quality Assurance, McGraw-Hill publication
[R4] Paul C. Jorgensen, "Software Testing: A Craftsman's Approach", Auerbach Publications, 2008

WIRELESS COMMUNICATION

Paper Code: ETEC-405	**L**	**T/P**	**C**
Paper: Wireless Communication	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the course is to introduce various wireless networks, mobile networks and their basic architecture starting from 2G through to 3G and 4G.

UNIT – I

Introduction To Wireless Communication Systems: Evolution of mobile radio communications; examples of wireless comm. systems; paging systems; Cordless telephone systems; overview of generations of cellular systems, comparison of various wireless systems.

Introduction to Personal Communication Services (PCS): PCS architecture, Mobility management, Networks signaling. A basic cellular system, multiple access techniques: FDMA, TDMA, CDMA.

Introduction to Wireless Channels and Diversity: Fast Fading Wireless Channel Modeling, Rayleigh/Ricean Fading Channels, BER Performance in Fading Channels, Introduction to Diversity modeling for Wireless Communications

[T1,T2][No. of Hrs. 11]

UNIT - II

2G Networks: Second generation, digital, wireless systems: GSM, IS_136 (D-AMPS), IS-95 CDMA. Global system for Mobile Communication (GSM) system overview: GSM Architecture, Mobility Management, Network signaling, mobile management, voice signal processing and coding. **Spread Spectrum Systems-** Cellular code Division Access Systems-Principle, Power Control, effects of multipath propagation on code division multiple access.

[T1,T2][No. of Hrs. 11]

UNIT - III

2.5G Mobile Data Networks: Introduction to Mobile Data Networks, General Packet Radio Services (GPRS): GPRS architecture, GPRS Network nodes, EDGE, Wireless LANs, (IEEE 802.11), Mobile IP.

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G, Introduction to 4G.

[T1,T2][No. of Hrs. 11]

UNIT – IV

Wireless Local Loop (WLL): Introduction to WLL architecture, WLL technologies. Wireless personal area networks (WPAN): Blue tooth, IEEE 802.15, architecture, protocol stack. Wi-Max, introduction to Mobile Adhoc Networks.

Global Mobile Satellite Systems, Case studies of IRIDIUM and GLOBALSTAR systems.

[T1,T2][No. of Hrs. 11]

Text Books:

[T1] Raj Pandya, "Mobile & Personnel communication Systems and Services", Prentice Hall India, 2001.
[T2] Theodore S. Rappaport, "Wireless Communication- Principles and practices," 2nd Ed., Pearson Education Pvt. Ltd, 5th Edition, 2008.

Reference Books:

[R1] T.L.Singhal "Wireless Communication", Tata McGraw Hill Publication.
[R2] Jochen Schiller, "Mobile communications," Pearson Education Pvt. Ltd., 2002.
[R3] Yi –Bing Lin & Imrich Chlamatac, "Wireless and Mobile Networks Architecture," John Wiley & Sons, 2001.
[R4] Lee, W.C.Y., "Mobile Cellular Telecommunication", 2nd Edition, McGraw Hill,1998.
[R5] Smith & Collins, "3G Wireless Networks," TMH, 2007
[R6] Schiller, Jochen, "Mobile Communications", 2nd Edition, Addison Wesley

COMPLEXITY THEORY

Paper Code: ETCS-407	**L**	**T/P**	**C**
Paper: Complexity Theory	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: This subject focuses on the key tools and combines ideas from economics, political science, biology, physics, and computer science to illuminate topics in organization, adaptation, decentralization, and robustness

UNIT I

Complexity, properties common to complex systems, introduction to Net logo, Dynamics and Chaos, Fractals, Information, Order, and Randomness, Maxwell's Demon, Shannon Information.

[T1][R2][T2][No. of hrs. 12]

UNIT II

Cellular Automata, Game of life, Cellular Automata as Dynamical Systems, Models of Biological Self-Organization, Ant Foraging and Task Allocation, Information Processing in Biological Systems, Models of Cooperation in Social Systems, The Prisoner's Dilemma**.**

[T1][R1][No. of hrs. 11]

UNIT III

Small-World Networks, Scale-Free and Long-Tailed Degree Distributions, Scaling in Cities, Metabolic Scaling.

[T1][T2][R1][No. of hrs. 10]

Unit IV

Evolving Automata, Agent Behavior, Adaptation, Taxonomy of 2 x 2 Games, Game Theory, One Agent, Many Games

[T2][R1][No. of hrs. 11]

Text Books:

[T1] Mitchell, Melanie. Complexity: A guided tour. Oxford University Press, 2009.

[T2] Miller, John H., and Scott E. Page. Complex Adaptive Systems: An Introduction to Computational Models of Social Life: An Introduction to Computational Models of Social Life. Princeton University Press, 2009.

Reference Books:

[R1] Wolfram, Stephen. A New Kind of Science. Vol. 5. Champaign: Wolfram media, 2002.

[R2] Johnson, Neil. Simply Complexity: A clear guide to complexity theory. One world Publications, 2009.

INTELLECTUAL PROPERTY RIGHTS

Paper Code: ETCS-409	**L**	**T/P**	**C**
Paper: Intellectual Property Rights	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To understand the basic concept of legal rights of an individual.

UNIT- I

Intellectual Property Rights (IPR): Introduction, need of IPR, Origin of IPR, Importance of IPR, Intellectual Property Rights in India.

Patents: introduction; granting; infringement; searching & filing; Introduction of Utility Models

[T1][R2][T2][No. of hrs. 12]

UNIT- II

Copyrights: Introduction, granting, infringement, searching & filing, Copy related rights-Explanation, comparison of copy rights and related rights

Industrial Designs ; Design Patents; scope; protection; filing infringement; difference between Designs & Patents

[T1][R2][T2][No. of hrs. 11]

UNIT- III

Trademarks: role in commerce, importance, protection, registration; domain name International protection; Plant varieties; breeder's rights, protection.

[T1][R2][T2][No. of hrs. 11]

UNIT-IV

Biotechnology& research and rights managements; licensing, commercialisation; ; legal issues, enforcement; Case studies in IPR.

[T1][R2][T2][No. of hrs. 11]

Text Books:

[T1] T. M Murray and M.J. Mehlman, Encyclopedia of Ethical, Legal and Policy issues in Biotechnology, John Wiley & Sons 2000

[T2] Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd, 2006

References Books:

[R1] P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Biotechnology Applications and Research, Technomic Publishing Co., Inc. USA, 1985

[R2] D. Balasubramaniam, C.F.A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman, Concepts in Biotechnology, University Press (Orient Longman Ltd.), 2002

[R3] Bourgagaize, Jewell and Buiser, Biotechnology: Demystifying the Concepts, Wesley Longman, USA, 2000.

[R4] B.L.Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000

[R5] P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi , 2010

EMBEDDED SYSTEMS

Paper Code: ETEC-401	**L**	**T/P**	**C**
Paper: Embedded Systems	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The objective of the paper is to enable a student to design an embedded system for specific tasks.

UNIT- I

Overview of Embedded Systems: Characteristics of Embedded Systems. Comparison of Embedded Systems with general purpose processors. General architecture and functioning of micro controllers. 8051 micro controllers.

PIC Microcontrollers: Architecture, Registers, memory interfacing, interrupts, instructions, programming and peripherals.

[T1][No. of hrs. 12]

UNIT- II

ARM Processors: Comparison of ARM architecture with PIC micro controller, ARM 7 Data Path, Registers, Memory Organization, Instruction set, Programming, Exception programming, Interrupt Handling, Thumb mode Architecture.

Bus structure: Time multiplexing, serial, parallel communication bus structure. Bus arbitration, DMA, PCI, AMBA, I2C and SPI Buses.

[T2][No. of hrs. 12]

UNIT- III

Embedded Software, Concept of Real Time Systems, Software Quality Measurement, Compilers for Embedded System.

[T3][No. of hrs. 10]

UNIT-IV

RTOS: Embedded Operating Systems, Multi Tasking, Multi Threading, Real-time Operating Systems, RT-Linux introduction, RTOS kernel, Real-Time Scheduling.

[T3][No. of hrs. 10]

Text Book:

[T1] Design with PIC Microcontrollers, John B. Peatman, Pearson Education Asia, 2002

[T2] ARM System Developer's Guide: Designing and Optimizing System Software, Andrew N. Sloss, Dominic Symes, Chris Wright, Morgan Kaufman Publication, 2004.

[T3] Computers as components: Principles of Embedded Computing System Design, Wayne Wolf, Morgan Kaufman Publication, 2000

References Books:

[R1] The Design of Small-Scale embedded systems, Tim Wilmshurst, Palgrave2003

[R2] Embedded System Design, Marwedel, Peter, Kluwer Publishers, 2004.

DATA MINING AND BUSINESS INTELLIGENCE

Paper Code: ETCS-413	**L**	**T/P**	**C**
Paper: Data Mining and Business Intelligence	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The objective of the paper is to facilitate the student with the basics of Data Warehouse and Data Mining, to study algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data.

UNIT – I

Introduction to Data Warehousing: Overview, Difference between Database System and Data Warehouse, The Compelling Need for data warehousing, Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, Three tier architecture, Metadata in the data warehouse.
Data pre-processing: Data cleaning, Data transformation ETL Process. ETL tools.
Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope and content.

[T1][No. of Hrs: 12]

UNIT – II

Principles of Dimensional Modeling: Objectives, From Requirements to data design, Multi Dimensional Data Model, Schemas: the STAR schema, the Snowflake schema, fact constellation schema.
OLAP in the Data Warehouse: Demand for Online Analytical Processing, limitations of other analysis methods-OLAP is the answer, OLAP definitions and rules, OLAP characteristics, major features and functions, hyper cubes.
OLAP Operations: Drill-down and roll-up, slice-and-dice , pivot or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, the DOLAP model, ROLAP versus MOLAP, OLAP implementation considerations. Query and Reporting, Executive Information Systems (EIS), Data Warehouse and Business Strategy.

[T1, R4][No. of Hrs. 11]

UNIT – III

Data Mining Basics: What is Data Mining, Data Mining Defined, The knowledge discovery process (KDD Process), Data Mining Applications- The Business Context of Data Mining, Data Mining for Process Improvement, Data Mining as a Research Tool, Data Mining for Marketing, Benefits of data mining,
Major Data Mining Techniques: Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, KNN Algorithm.

[T2, R4][No. of Hrs: 11]

UNIT – IV

Cluster detection, K- means Algorithm, Outlier Analysis, memory-based reasoning, link analysis, Mining Association Rules in Large Databases: Association Rule Mining, genetic algorithms, neural networks.
Data mining tools.

[T2, R3][No. of Hrs: 10]

Text Books:

[T1] Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2004.
[T2] Kamber and Han, "Data Mining Concepts and Techniques", Hart Court India P. Ltd. Elsevier Publications Second Edition, 2001

Reference Books:

[R1] W. H. Inmon, "Building the operational data store", 2nd Ed., John Wiley, 1999.
[R2] "Data Warehousing", BPB Publications, 2004.
[R3] Pang- Ning Tan, Michael Steinbach, Viach, Vipin Kumar, Introduction to Data Mining, Pearson
[R4] Shmueli, "Data Mining for Business Intelligence : Concepts, Techniques and Applications in Microsoft Excel with XLMiner",Wiley Publications

ADVANCED COMPUTER ARCHITECTURE

Paper Code: ETCS-415	**L**	**T/P**	**C**
Paper: Advanced Computer Architecture	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To understand different program and network properties, concepts of pipelining and architectures of computers.

UNIT-I

Parallel Computer Models:

The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Program and Network Properties:

Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

[T1, R4][No. of Hrs: 10]

UNIT-II

Pipelining:

Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

[T1, R2][No. of Hrs: 10]

UNIT-III

Arithmetic for Computers:

Signed and unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point.
CPU Performance and Its factors, Evaluating performance of CPU.

[T2, R3][No. of Hrs: 10]

UNIT-IV

Memory Hierarchy:

Introduction, The basics of Cache, Measuring and Improving of Cache Performance, Virtual Memory, Common framework for memory hierarchies
Case study of PIV and AMD opteron memory hierarchies

[T2, T1][No. of Hrs: 10]

Text Books:

[T1] Kai Hwang, "Advanced computer architecture"; TMH. 2000
[T2] D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002

Reference Books:

[R1] J.P.Hayes, "computer Architecture and organization"; MGH. 1998
[R2] Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication. 1998
[R3] V.Rajaranam & C.S.R.Murthy, "Parallel computer"; PHI. 2002
[R4] R.K.Ghose, Rajan Moona & Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
[R5] Kai Hwang and Zu, "Scalable Parallel Computers Architecture", MGH. 2001
[R6] Stalling W, "Computer Organisation & Architecture", PHI. 2000
[R7] D.Sima, T.Fountain, P.Kasuk, "Advanced Computer Architecture-A Design space Approach,"Addison Wesley, 1997.
[R8] M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing. 1998
[R9] D.A.Patterson, J.L.Hennessy, "Computer Architecture :A quantitative approach"; Morgan Kauffmann feb, 2002.
[R10] Hwan and Briggs, "Computer Architecture and Parallel Processing"; MGH. 1999

NATURAL LANGUAGE PROCESSING

Paper Code: ETCS-410	**L**	**T/P**	**C**
Paper: Natural Language Processing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To understand semantics and machine translation for any compiler.

UNIT-I

Introduction to NLP

Achievement and brief history, open problems, major goal, characteristic of Language, Language structure, Language analyzer

[T1, T2][No. of Hrs: 12]

UNIT-II

Study of Grammar and Semantics

Morphology, word formation, theory of semantics, componential theory of meaning, truth conditional theory of meaning, pragmatics and discourse

[T1, T2][No. of Hrs: 12]

UNIT-III

Machine Translation

Introduction, problems of machine translation. Approaches, language Accesor, Structure of Anusaraka system.

[T1, T2][No. of Hrs: 10]

UNIT-IV

Lexical: Functional Grammar (LFG) and Indian Languages

Overview of LGF, LFG formalism, well formedness conditions, computational aspects, CFG and Indian languages, functional specification, tree adjoining grammar.

[T1, T2][No. of Hrs: 10]

Text Books:

[T1] Natural language processing by Akshar Bhartati, Sangal and Chaitanya, Eastern Economy Edition

[T2] An introduction to Linguistics, language grammar and semantics by P.Syal and D.V.Jindal, Eastern Economy Edition

References:

[R1] Natural Language Processing with Python 1st Edition, Steven Bird

[R2] Foundations of Statistical Natural Language Processing, Christopher Manning

DIGITAL SIGNAL PROCESSING

	L	T/P	C
Paper Code: ETIT-415			
Paper: Digital Signal Processing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: *The aim of this course is to provide in depth knowledge of various digital signal processing techniques and design of digital filters, learn the concept of DFT FFT algorithms, and design of digital filters using different approximations, DSP processor and architecture. The prerequisites of this subject are basic knowledge of signal and systems.*

UNIT–I :

Frequency Domain Sampling: The Discrete Fourier Transform, Properties of the DFT, Linear filtering methods based of the DFT.

Efficient computation of the DFT: Principal of FFT, Fast Fourier Transform Algorithms, Applications of FFT Algorithms, A linear filtering approach to computation of the DFT.

Application of DFT, Design of Notch filter

[T2, T1][No. of Hours: 11]

UNIT–II:

Design & Structure of IIR filters from analog filters: Impulse Invariance; Bilinear transformation and its use in design of Butterworth and Chebyshev IIR Filters; Frequency transformation in Digital Domain, Direct, Cascade, Parallel & transposed structure

Design & structure of FIR filters: Symmetric and anti-symmetric FIR filters; Design of Linear Phase FIR filters using windows, Frequency Sampling Method of FIR design, Direct, Cascade, Frequency Sampling, transposed structure

[T1, T2] [No. of Hours: 11]

UNIT–III:

Implementation of Discrete Time Systems:

Lattice structures, Lattice and Lattice-Ladder Structures, Schur - Cohn stability Test for IIR filters; Discrete Hilbert Transform.

Linear predictive Coding:

Lattice filter design, Levension Darwin Technique, Schur Algorithm

[T1, T2] [No. of Hours: 10]

UNIT–IV:

Quantization Errors in Digital Signal Processing: Representation of numbers, Quantization of filter coefficients, Round-off Effects in digital filters.

Multirate Digital Signal Processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Frequency domain characterization of Interpolator and Decimator; Poly phase decomposition.

[T1, T2][No. of Hours: 10]

Text Books:

[T1] Oppenheim & Schafer, Digital Signal Processing, PHI-latest edition.
[T2] Proakis and Manolakis, Digital Signal Processing, PHI Publication

Reference Books:

[R1] S. K. Mitra, Digital Signal Processing, TMH edition 2006
[R2] Johny. R. Johnson, Introduction to Digital Signal Processing, PHI-latest edition
[R3] R.Babu, Digital Signal Processing, SciTech Publication.

SIMULATION AND MODELLING

Paper Code: ETCS-421	**L**	**T/P**	**C**
Paper: Simulation and Modelling	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objectives: The objective of this course is to teach students methods for modelling of systems using discrete event simulation. Emphasis of the course will be on modelling and on the use of simulation software. The students are expected to understand the importance of simulation in IT sector, manufacturing, telecommunication, and service industries etc. By the end of the course students will be able to formulate simulation model for a given problem, implement the model in software and perform simulation analysis of the system.

UNIT-I:

Introduction to Simulation and Modelling:

Appropriateness, Advantages and disadvantage, application areas, history of simulation software, an evaluation and selection technique for simulation software, general – purpose simulation packages. System and system environment, components of system, type of systems, model of a system, types of models and steps in simulation study.

[T1, T2][No. of Hrs: 12]

UNIT-II:

Manual Simulation of Systems: Simulation of Queuing Systems such as single channel and multi channel queue, lead time demand, inventory system, reliability problem, time-shared computer model, job-shop model.

Discrete Event Formalisms: Concepts of discrete event simulation, model components, a discrete event system simulation, simulation world views or formalisms, simulation of single channel queue, multi channel queue, inventory system and dump truck problem using event scheduling approach.

Statistical Models in Simulation: Overview of probability and statistics, useful statistical model, discrete distribution, continuous distribution, empirical distribution, Poisson process.

Queuing Models: Characteristics of queuing systems, queuing notations, long run measures of performance of queuing systems, Steady state behaviour of Markovian models (M/G/1, M/M/1, M/M/c) overview of finite capacity and finite calling population models, Network of Queues.

[T1, T3][No. of Hrs: 10]

UNIT-III:

Random Number Generation: Properties of random numbers, generation of true and pseudo random numbers, techniques for generating random numbers, hypothesis testing, various tests for uniformity, Kolmogorov-Smirnov and Chi-Square) and independence(runs, autocorrelation, gap, poker).

Random Variate Generation: Introduction, different techniques to generate random variate: - inverse transform technique, direct transformation technique, convolution method and acceptance rejection techniques.

Input Modeling: Introduction, steps to build a useful model of input data, data collection, identifying the distribution with data, parameter estimation, suggested estimators, goodness of fit tests, selection input model without data, covariance and correlation, multivariate and time series input models.

[T1, T3][No. of Hrs: 12]

UNIT- IV:

Verification and Validation of Simulation Model: Introduction, model building, verification of simulation models, calibration and validation of models:- validation process, face validity, validation of model, validating input-output transformation, test, power of test, input output validation using historical data and Turing test.

Output Analysis: Types of simulations with respect to output analysis, stochastic nature of output data, measure of performance and their estimation, output analysis of terminating simulators, output analysis for steady state simulation.

Case Studies: Simulation of manufacturing systems, Simulation of Material Handling system, Simulation of computer systems, Simulation of super market, Cobweb model, and any service sectors.

[T1, T2, T3][No. of Hrs: 10]

Text Books:

[T1] Banks J., Carson J. S., Nelson B. L., and Nicol D. M., "Discrete Event System Simulation", 3rd edition, Pearson Education, 2001.
[T2] Edward A. Bender.. An Introduction to Mathematical Modeling.
[T3] A.M. Law and W.D. Kelton., Simulation Modeling and Analysis, T.M.H. Edition.

References Books:

[R1] A. C. Fowler, "Mathematical Models in Applied Sciences", Cambridge University Press.
[R2] J. N. Kapoor, "Mathematical Modeling", Wiley Eastern Limited.
[R3] S.M. Ross, "Simulation", India Elsevier Publication.
[R4] A. M. Law and W. D. Kelton, Simulation Modeling and Techniques. 2nd ed. New York: McGraw-Hill, 1990.
[R5] M. H. MacDougall, Simulating Computer Systems: Techniques and Tools. Cambridge, MA: MIT Press, 1987.

ADVANCED DBMS

Paper Code: ETCS-423	**L**	**T/P**	**C**
Paper: Advanced DBMS	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To understand different storage techniques and database techniques.

UNIT-I

Concept of advanced database techniques, Impact of emerging database standards, Study of DDBMS architecture, New developments in database technology, Introduction of PL/SQL, PL/SQL Database Objects , Procedures, Functions, Packages, Triggers, Programmatic SQL, Embedded SQL, Dynamic SQL, and ODBC Standard. Parallel Database Architecture, Data base System Structure, Storage Manager, Query Processor.

[T1, T3][No of Hours 10]

UNIT-II

Introduction to the Relational Model ,Advanced SQL programming, Advanced Transaction Processing, Relational model conformity and Integrity, Data Replication, Security considerations, Relational Model of Data and RDBMS Implementation Techniques , Query optimization, Integrity Constraint Over relations, Querying relational data and relational Algebra.

[**T1, T3] [No of Hours 10]**

UNIT-III

Object Relational database concepts, Temporal database concepts, Mobile Databases, Object based databases Complex data types, structured types and inheritance in SQL, object identity and reference types in SQL, Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

[T2][No. of Hours 10]

UNIT-IV

Postgre SQL, Oracle, IBM DB2 Universal Database, SQL standards, SQL1999, SQL: 2003, Standards for interoperability and integration, XML related specifications, X-Query, X-Path, Web Services, SOAP.

[T3, R3] [No of Hours 10]

Text Books:

[T1] Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.
[T2] Elmasri, Navathe, Fundamentals of Database Systems, 5th Edition, Pearson Education, India.

Reference Books:

[R1] Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, McGraw- Hill
[R2] Fundamentals of Database Systems, Elmasri Navrate Pearson Education
[R3] S.R. Prabhu, "Object-Oriented Database Systems: Approaches and Architectures", Prentice-Hall of India, Pvt. Ltd., Second edition, 2005.
[R4] SQL/ PL/SQL, The programming language of Oracle, Ivan Bayross, 4th Edition BPB Publications.
[R5] Rajesh Narang, "Object Oriented Interfaces and Databases", Prentice-Hall of India, Pvt. Ltd., 2004.

PARALLEL COMPUTING

Paper Code: ETCS-427	**L**	**T/P**	**C**
Paper: Parallel Computing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The perquisites are Computer Architecture, OS. The student is introduced to the concepts of parallelism which enhances the speed of operations of an OS. Further, various architectures of multiprocessor is taught.

UNIT I

Theory of Parallelism: Parallelism, Reason of parallel processing, Concepts and challenges, applications of parallel processing.

Parallel computer models: The state of computing, Classification of parallel computers, Flynn and Feng's classification, SIMD and MIMD operations, Shared Memory vs. message passing multiprocessors, Distributed shared memory, Hybrid multiprocessors, multiprocessors and multicomputers, Multivector and SIMD computers, PRAM and VLSI Models.

Program and Network Properties: Conditions of parallelism, program partitioning and scheduling, program flow mechanism, system interconnection architecture.

[T1, T2][No. of Hrs. 10]

UNIT II

Memory Hierarchy Design: Memory technologies and optimization, inclusion, coherence and locality, cache memory organization and cache performance optimization, shared memory organization, memory protection, virtual memory technology and introduction to buses, crossbar and multi-stage switches.

Pipelining and ILP: Instruction level parallelism and its exploitation- concepts and challenges, overcoming data hazards with dynamic scheduling. Pipelining, instruction and arithmetic pipelining designs, branch handling techniques, linear and non-linear pipeline processors, superscalar and super pipeline design.

[T1, T2][No. of Hrs. 10]

UNIT III

Parallel architectures: multi-processor system interconnects, cache coherence and synchronization mechanism, message passing mechanism, vector processing principles, multivector multiprocessors, compound vector processing, principles of multithreading, latency hiding techniques- shared virtual memory, prefetching techniques, distributed coherent cache, scalable and multithread architectures, dataflow and hybrid architecture.

[T1, T2][No. of Hrs. 10]

UNIT IV

Parallel Programming Platforms: Implicit Parallelism: Trends in Microprocessor Architectures, limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks.

Parallel Programming Models: Shared variable models, message passing models, parallel languages and complier, code optimization and scheduling, Introduction of shared-memory MIMD machines and message-passing MIMD machines.

[T1, T2][No. of Hrs. 10]

Text Books:

[T1] Introduction to Parallel Computing by Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar in Pearson Publication.
[T2] Advance computer Architecture by Kai Hwang under Tata McGraw Hill publications.
[T3] Introduction to Parallel Processing: Algorithms & Architectures, Behrooz Parhami in Springer Shop.

Reference Books:

[R1] Introduction to Parallel Processing by P. Ravi Prakash, M. Sasikumar, Dinesh Shikhare By PHI Publications.
[R2] Fundamentals of Parallel Processing by Jordan Harry, Alaghband Gita, PHI Publication
[R3] Introduction to Parallel Programming by Steven Brawer.
[R4] Parallel Computers – Architecture and Programming by V. Rajaraman And C. Siva Ram Murthy.

ADVANCED COMPUTER NETWORKS

Paper Code: ETIT-401	**L**	**T/P**	**C**
Paper: Advanced Computer Networks	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To understand different network protocols with emphasis on TCP/IP protocol suite.

UNIT-I

Network Layer:

ARP,RARP,ICMP,IPv4 Routing Principles, Routing and overview, DVR and LSR, the IGRP and EIGRP, BGP, Routing Information Protocol (RIP), OSPF (IPv4 / IPv6).

Multicasting in IP Environments-Broadcasting, Multicasting, IGMP and Multicast Listener Discovery (MLD). The Distance Vector Multicast Routing Protocol (DVMRP), Multicast OSPF (MOSPF), Protocol Independent Multicast (PIM).

[T1][No. of Hours 10]

UNIT-II

Transport Layer: Transport layer overview, UDP, TCP (Flow Control, Error Control, and Connection Establishment), TCP Protocol: TCP Tahoe, TCP Reno.

[R1, R3][No. of Hours 10]

UNIT-III

Optical Networking:

Introduction to Optical networking, its benefits and drawbacks, SONET layered architecture, frame format, SONET network configuration, its advantages and benefits. **Quality of Service:** Introducing QoS, Queue Analysis, QoS Mechanisms, Queue Management algorithms, Resource Reservation, Diffserv and Intserv.

[T2] [No. of Hours 10]

UNIT-IV

Overview of latest concepts:

TCP/IP Applications: VoIP, NFS, Telnet ,FTP,SMTP, SNMP, Finger, Whois and WWW, IP v6 and Next Generation Networks, xAAS(PAAS,SAAS,HAAS) and Cloud Computing, Big data, Elements of Social Network.

[R2][No. of Hours 12]

Text Books:

[T1] Douglas E. Comer, "Internet networking with TCP/IP", Pearson. TCP/IP, Vol. 2
[T2] B. A. Forouzan, "TCP/IP Protocol Suite", TMH, 2nd Ed., 2004.

Reference Books:

[R1] TCP/IP Illustrated, Volume 1 (The Protocols) by W. Richard Stevens, Pearson Education.
[R2] U. Black, "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
[R3] W. Stallings, "Computer Communication Networks", PHI, 1999.

CONTROL SYSTEMS

Paper Code: ETEE-429	**L**	**T/P**	**C**
Paper: Control Systems	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objective**: To teach the fundamental concepts of Control systems and mathematical modeling of the system. To study the concept of time response and frequency response of the system. To teach the basics of stability analysis of the system*

UNIT I : Control Systems - - Basics & Components

Introduction to basic terms, classifications & types of Control Systems, block diagrams & signal flow graphs. Transfer function, determination of transfer function using block diagram reduction techniques and Mason's Gain formula. Control system components: Electrical/ Mechanical/Electronic/A.C./D.C. Servo Motors, Stepper Motors, Tacho Generators, Synchros, Magnetic Amplifiers, Servo Amplifiers,

[T1,T2][No. of Hrs. : 11]

UNIT II : Time – Domain Analysis

Time domain performance specifications, transient response of first & second order systems, steady state errors and static error constants in unity feedback control systems, response with P, PI and PID controllers, limitations of time domain analysis.

[T1,T2][No. of Hrs. : 10]

UNIT III : Frequency Domain Analysis

Polar and inverse polar plots, frequency domain specifications and performance of LTI systems, Logarithmic plots (Bode plots), gain and phase margins, relative stability. Correlation with time domain performance closes loop frequency responses from open loop response. Limitations of frequency domain analysis, minimum/non-minimum phase systems.

[T1,T2][No. of Hrs. : 10]

UNIT IV : Stability & Compensation Techniques

Concepts, absolute, asymptotic, conditional and marginal stability, Routh–Hurwitz and Nyquist stability criterion, Root locus technique and its application.

Concepts of compensation, series/parallel/ series-parallel/feedback compensation, Lag/Lead/Lag-Lead networks for compensation, compensation using P, PI, PID controllers.

[T1,T2][No. of Hrs. : 11]

Text Books:

[T1] B. C. Kuo, "Automatic control system", Prentice Hall of India, 7th edition 2001.
[T2] Nagraath Gopal "Control Systems Engineering -Principles and Design" New Age Publishers

Reference Books:

[R1] Norman S. Nise, "Control systems engineering" John Wiley & Sons (Asia) Singapore.
[R2] Raymond T. Stefani, Design of Feedback Control System, Oxford University Press.
[R3] K. Ogata, "Modern control engineering", Pearson 2002.
[R4] S. P.Eugene Xavier, "Modern control systems", S. Chand & Company.
[R5] M. Gopal "Control Systems-Principles and Design" TMH 4th Edition 2012

SOCIOLOGY AND ELEMENTS OF INDIAN HISTORY FOR ENGINEERS

	L	T/P	C
Paper Code: ETHS-419			
Paper: Sociology and Elements of Indian History for Engineers	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of this course is to familiarize the prospective engineers with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society. The course would enable them to analyze critically the social processes of globalization, modernization and social change. All of this is a part of the quest to help the students imbibe such skills that will enhance them to be better citizens and human beings at their work place or in the family or in other social institutions.

UNIT I

Module 1A: Introduction to Elements of Indian History: What is History? History Sources-Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography.

[*3 Lectures*]

Module 1B: Introduction to sociological concepts-structure, system, organization, social institution, Culture social stratification (caste, class, gender, power). State & civil society.

[*7 Lectures*]

[T1][No. of Hrs. 10]

UNIT II

Module 2A: Indian history & periodization; evolution of urbanization process: first, second & third phase of urbanization; Evolution of polity; early states of empires; Understanding social structures-feudalism debate.

[*3 Lectures]*

Module 2B: Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim.

[*7 Lectures*]

[T1][No. of Hrs. 10]

UNIT III

Module 3A: From Feudalism to colonialism-the coming of British; Modernity & struggle for independence.

[3 Lectures]

Module 3B: Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim.

[9 *Lectures*]

[T1][No. of Hrs. 12]

UNIT IV

Module 4A: Issues & concerns in post-colonial India (upto 1991); Issues & concerns in post-colonial India 2nd phase (LPG decade post 1991).

[*3 Lectures*]

Module 4B: Social change in contemporary India: Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization.

[*10 Lectures*]

[T1][No. of Hrs. 13]

Text Books:

[T1] Desai, A.R. (2005), Social Background of Indian Nationalism, Popular Prakashan.
[T2] Giddens, A (2009), Sociology, Polity, 6th Edition

Reference Books:

[R1] Guha, Ramachandra (2007), India After Gandhi, Pan Macmillan
[R2] Haralambos M, RM Heald, M Holborn, (2000), Sociology, Collins

SOFTWARE TESTING AND QUALITY ASSURANCE LAB

Paper Code: ETCS-453	**L**	**T/P**	**C**
Paper: Software Testing and Quality Assurance Lab	**0**	**2**	**1**

List of Experiments:

Tool Required: Smartbear QA Complete

1. 1.To determine the nature of roots of a quadratic equations, its input is triple of +ve integers (say x,y,z) and values may be from interval[1,100] the program output may have one of the following:-
   [Not a Quadratic equations, Real roots, Imaginary roots, Equal roots] Perform BVA.
2. To determine the type of triangle. Its input is triple of +ve integers (say x,y,z) and the values may be from interval[1,100].The program output may be one of the following [Scalene, Isosceles, Equilateral, Not a Triangle].Perform BVA
3. Perform robust case testing on Problem No. 1.
4. Perform robust case testing on Problem No. 2.
5. Create a test plan document for any application (e.g. Library Management System)
6. Experiment: Study of Any Testing Tool (Win Runner)
7. Experiment: Study of Any Test Management Tool (QA Complete)
8. Experiment: Automate the Test cases using Test Automation tool(using QA Complete)
9. Experiment: Learn how to raise and report Bugs using Bug tracking tool (Bugzilla,Jira using QA Complete)
10. Experiment: Study of any open source testing tool (Web Performance Analyzer/O STA)

NOTE: At least 8 Experiments out of the list must be done in the semester.

INFORMATION SECURITY LAB

Paper Code: ETCS-451	**L**	**T/P**	**C**
Paper: Information Security Lab	**0**	**2**	**1**

List of Experiments:

1. Make an experiment to implement WEP/WPA2 PSK, 802.1x EAP security protocol.
2. Implement firewall through App to login into bank-site,; to implement E-commerce, debit card transaction through payment gateway
3. Implement bio-metric system to have physical security through different access control permissions.
4. Implement RSA algorithm.
5. Implement DES algorithm
6. Implement Diffie-Hellman algorithm
7. Make a study of anyone simulation tool based on parameters of information security
8. Implement VPN through Packet-Tracer or any other network simulator tool.

NOTE: At least 8 Experiments from the syllabus must be done in the semester.

WIRELESS COMMUNICATION LAB

Paper Code: ETEC-463	**L**	**T/P**	**C**
Paper: Wireless Communication Lab	**0**	**2**	**1**

List of Experiments:

1. Eight experiments suggested on kits for GSM, CDMA and any possible experiments covering the subjects.
2. Setting up wireless network with and without infrastructure support.
3. Configuring Access Point with bridging mode (Point to Point and Point to Multi Point).
4. Configuring Routing between wired and wireless Networks.
5. Configuring Security in wireless network with and without infrastructure support.

NOTE: At least 8 Experiments from the syllabus must be done in the semester.

EMBEDDED SYSTEMS LAB

Paper Code: ETCS-457(ELECTIVE)	**L**	**T/P**	**C**
Paper: Embedded Systems Lab	**0**	**2**	**1**

List of Experiments:

1. Introduction to microcontroller and interfacing modules.
2. To interface the seven segment display with microcontroller 8051
3. To create a series of moving lights using PIC on LEDs.
4. To interface the stepper motor with microcontroller.
5. To display character 'A' on 8*8 LED Matrix.
6. Write an ALP to add 16 bits using ARM 7 Processor
7. Write an ALP for multiplying two 32 bit numbers using ARM Processor
8. Write an ALP to multiply two matrices using ARM processor

NOTE:- At least 8 Experiments out of the list must be done in the semester.

DATA MINING AND BUSINESS INTELLIGENCE LAB

Paper Code: ETCS-457(ELECTIVE)	**L**	**T/P**	**C**
Paper: Data Mining and Business Intelligence Lab	**0**	**2**	**1**

List of Experiments:

1. Study of ETL process and its tools.
2. Program of Data warehouse cleansing to input names from users (inconsistent) and format them.
3. Program of Data warehouse cleansing to remove redundancy in data.
4. Introduction to WEKA tool.
5. Implementation of Classification technique on ARFF files using WEKA.
6. Implementation of Clustering technique on ARFF files using WEKA.
7. Implementation of Association Rule technique on ARFF files using WEKA.
8. Implementation of Visualization technique on ARFF files using WEKA.
9. Study of DBMINER tool
10. Study of ARMINER tool.

NOTE: At least 8 Experiments out of the list must be done in the semester.

ADVANCED COMPUTER NETWORKS LAB

	L	T/P	C
Paper Code: ETCS-457(ELECTIVE)			
Paper: Advanced Computer Network Lab	**0**	**2**	**1**

List of Experiments:

1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands.
2. Configuration of IP addressing for a given scenario for a given set of topologies.
3. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address.
4. Configure, implement and debug the following: Use open source tools for debugging and diagnostics.
    a. ARP/RARP protocols
    b. RIP routing protocols
    c. BGP routing
    d. OSPF routing protocols
    e. Static routes (check using netstat)
5. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down.
6. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.
7. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails.
8. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS).

Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark.

NOTE: At least 8 Experiments out of the list must be done in the semester.

NATURAL LANGUAGE PROCESSING LAB

Paper Code: ETCS-457(ELECTIVE)	**L**	**T/P**	**C**
Paper: Natural Language Processing Lab	**0**	**2**	**1**

List of Experiments:

1. Write a Program for Word Analysis.
2. Write a Program for Word Generation.
3. Write a program to implement Morphology.
4. Write a Program to implement N-Grams.
5. Write a Program to implement N-Grams Smoothing.
6. Write a Program to implement POS Tagging: Hidden Markov Model.
7. Write a Program to implement POS Tagging: Viterbi Decoding.

NOTE: At least 8 Experiments from the syllabus must be done in the semester

DIGITAL SIGNAL PROCESSING LAB

Paper Code: ETCS-457(ELECTIVE)	**L**	**T/P**	**C**
Paper: Digital Signal Processing Lab	**0**	**2**	**1**

List of Experiments:

Software Experiments:

1. Generation of basic signals sine, cosine, ramp, step, impulse and exponential in continuous and discrete domains using user defined functions.
2. Write a MATLAB program to find convolution (linear/circular) and correlation of two discrete signals.
3. Perform linear convolution using circular convolution and vice versa.
4. Write a MATLAB program to
   i. Find 8 point DFT, its magnitude and phase plot and inverse DFT.
   ii. Find 16 point DFT, its magnitude and phase plot and inverse DFT.
5. Perform the following properties of DFT-
   i. Circular shift of a sequence.
   ii. Circular fold of a sequence.
6. Write a MATLAB Program to design FIR Low pass filter using
   i. Rectangular window
   ii. Hanning window
   iii. Hamming window
   iv. Bartlett window
7. Write a MATLAB program to
   i. Implement a Low pass / High pass / Band pass / Band stop IIR Filter using Butterworth Approximation.
   ii. Implement a Low pass / High pass / Band pass / Band stop IIR Filter using Chebyshev Approximation.

Hardware Experiments using Texas Instruments Kits-DSK 6713:

8. Introduction to Code composer Studio.
9. Write a program to generate a sine wave and see the output on CRO
10. Write a Program to Generate ECHO to give audio file.
11. Write a program to demonstrate Band Stop filter by FIR.

Additional Experiments:

12. Write a program to generate a cos wave and see the output on CRO
13. Write a program to blink the LED
14. Write a program to display a string on LCD.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

SIMULATION AND MODELLING LAB

Paper Code: ETCS-457(ELECTIVE)	**L**	**T/P**	**C**
Paper: Simulation and Modelling Lab	**0**	**2**	**1**

List of Experiments:

1. Design finite State, and complex model Simulations.
2. Design Graph or Network Transitions Based Simulations.
3. Design actor Based Simulations, Mesh Based Simulation, Hybrid Simulations.
4. Convert to Parallel and Distributed Simulations , first Partition data, Algorithms
5. Design Probability and Statistics for Simulations and Analysis , Queues and Random Noise ,Random Variates Generation and Sensitivity Analysis.
6. Simulations Results Analysis and Viewing Tools.
7. Display Forms: Tables, Graphs, and Multidimensional Visualization Terminals, X and MS Windows, and Web Interfaces, Validation of Model Results,.

Programming skills in one or more of the following programming languages:

- Java,
- C, or C++

NOTE:- At least 8 Experiments from the syllabus must be done in the semester.

ADVANCED DBMS LAB

Paper Code: ETCS-457(ELECTIVE)	**L**	**T/P**	**C**
Paper: Advanced DBMS Lab	**0**	**2**	**1**

Lab based on Advanced DBMS

Lab includes implementation of Triggers, Procedures, Functions i.e PL\SQL.
SQL implementation in PostgreSQL

Text Books:

[T1] PostgreSQL: A Comprehensive Guide to Building, Korry Douglas, Susan Douglas, 2nd edition, Sams Publications.

CONTROL SYSTEMS LAB

Paper Code: ETCS-457(ELECTIVE)	**L**	**T/P**	**C**
Paper: Control Systems Lab	**0**	**2**	**1**

List of Experiments:

1. Comparison of open loop & closed loop control in speed control of D.C. motor & to find the transfer function.
2. To study the characteristics of positional error detector by angular displacement of two servo potentiometers
    a. excited with dc
    b. excited with ac
3. To study synchro transmitter in terms of position v/s phase and voltage magnitude with respect to rotor voltage magnitude /phase.
4. To study remote position indicator systems using synchro transmitter/receiver.
5. To plot speed- torque curves for ac servomotor for different voltages.
6. To study ac motor position control system & to plot the dynamic response & calculate peak time, settling time, peak overshoot, damping frequency, steady state error etc.
7. To study the time response of simulated linear systems.
8. To study the performance of PID Controller.
9. Plot impulse response, unit step response, unit ramp response of any 2^{nd} order transfer function on same graph using MATLAB.
10. To draw the magnetization (Volt Amps) characteristics of the saturable core reactor used in the magnetic amplifier circuits.
11. Plot root locus for any 2^{nd} order system (with complex poles). For Mp=30%, find the value of K using MATLAB.
12. To design lead-lag compensator for the given process using Bode plots in MATLAB.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

MOBILE COMPUTING

Paper Code: ETIT-402	**L**	**T/P**	**C**
Paper: Mobile Computing	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: Should have studied papers such as Communication systems, Data communications and networking and wireless networks. To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture. To have an exposure about wireless protocols –Wireless LAN, Bluetooth, WAP, Zig Bee issues. To Know the Network, Transport Functionalities of Mobile communication. To understand the concepts of Adhoc and wireless sensor networks. Introduce Mobile Application Development environment.

UNIT-I

Mobile Physical Layer: Review of generation of mobile services, overview of wireless telephony, cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Mobile Computing Architecture: Issues in mobile computing, three tier architecture for mobile computing, design considerations, Mobile file systems, Mobile databases. WAP: Architecture, protocol stack, Data gram protocol, Wireless transport layer security, Wireless transaction protocol, wireless session protocol, application environment, and applications.

[T1] [T2][T3] [No. of Hrs. 12]

UNIT-II

Mobile Data Link Layer: Wireless LAN over view, IEEE 802.11, Motivation for a specialized MAC, Near & far terminals, Multiple access techniques for wireless LANs such as collision avoidance, polling, Inhibit sense, spread spectrum, CDMA , LAN system architecture, protocol architecture, physical layer MAC layer and management, Hiper LAN.

Blue Tooth: IEEE 802.15 Blue tooth User scenarios, physical, MAC layer and link management.

Local Area Wireless systems: WPABX, IrDA, ZigBee, RFID, WiMax.

[T1] [T2][T3] [No. of Hrs. 11]

UNIT-III

MOBILE IP Network Layer: IP and Mobile IP Network Layer- Packet delivery and Handover Management- Location Management- Registration- Tunnelling and Encapsulation-Route Optimization- Dynamic Host Configuration Protocol, Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), VoIP –IPSec.

Mobile Transport Layer: Traditional TCP/IP, Transport Layer Protocols-Indirect, Snooping, Mobile TCP.

[T1] [T2][T3] [No. of Hrs. 11]

UNIT-IV

Support for Mobility: Data bases, data hoarding, Data dissemination, UA Prof and Caching, Service discovery, Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, Mobile devices and File systems, Data Synchronization, Sync ML.

Introduction to Wireless Devices and Operating systems: Palm OS, Windows CE, Symbion OS, Android, Mobile Agents. Introduction to Mobile application languages and tool kits.

[T1] [T2][T3] [No. of Hrs. 11]

Course Outcomes:

1. Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks. 2. Understand the architectures, the challenges and the Solutions of Wireless Communication.
3. Realize the role of Wireless Protocols in shaping the future Internet.
4. Able to develop simple Mobile Applications Using Toll kit.

Text Books:

[T1] J. Schiller, "Mobile Communications", 2nd edition, Pearson, 2011.
[T2] Raj Kamal "Mobile Computing" Oxford Higher Education, Second Edition, 2012.
[T3] Dharam prakash Agrawal and Qing-An Zeng, "Introduction to Wireless and Mobile Systems" 3rd edition, Cengage learning 2013.

Reference Books:

[R1] Asoke K Talukder, Hasan Ahmed,Roopa R Yavagal "Mobile Computing", Tata McGraw Hill Pub ,Aug – 2010
[R2] Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell "Wireless Networking Complete" Morgan Kaufmann Series in Networking , 2009 (introduction, WLAN MAC)
[R3] Vijay K Garg "Wireless Communications & Networking" Morgan Kaufmann Series, 2010
[R4] M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
[R5] Charles Perkins, Mobile IP, Addison Wesley.
[R6] Charles Perkins, Ad hoc Networks, Addison Wesley.
[R7] Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober, "Principles of Mobile Computing", Springer.
[R8] Evaggelia Pitoura and George Samarus, "Data Management for Mobile Computing", Kluwer Academic Press, 1998

Laboratory session: The student is advised to learn any of the following languages and use any one tool kit for generating mobile applications, such as game, Clock, calendar, Convertor, phone book, Text Editor etc.,
Language support: XHTML-MP, WML, WML Script.
Mobile application languages- XML, Voice XML, Java, J2ME, Java Card
TooL Kits: WAP Developer tool kit and application environment, Android Mobile Applications Development Tool kit.

[R1] Donn Felker , "Android Application Development For Dummies", Wiley, 2010
[R2] Reto Meier, " Professional Android 2 Application Development", Wrox's Prog. to Programmer Series.
[R3] Ed Burnette, 'Hello, Android: Introducing Google's Mobile Development Platform' third edition' Pragmatic Programmers,2012
[R4] Jerome(J.F) DiMarzio "Android A programmer's Guide" Tata McGraw-Hill 2010 Edition.
[R5] Reza B'Far, "Mobile computing principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University press, 2005.
[R6] R.Riggs, A. Taivalsaari, M.VandenBrink, "Programming Wireless Devices with Java2 Platform, Micro Edition", ISBN: 0-201-74627-1, Addision Wesley,, 2001.

MACHINE LEARNING

Paper Code: ETCS-402	**L**	**T/P**	**C**
Paper: Machine Learning	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To introduce the students about the knowledge of basic concepts of machine learning systems, types of learning etc.

UNIT-I

Introduction:

Basic concepts: Definition of learning systems, Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation.

Types of Learning: Supervised learning and unsupervised learning. Overview of classification: setup, training, test, validation dataset, over fitting.

Classification Families: linear discriminative, non-linear discriminative, decision trees, probabilistic (conditional and generative), nearest neighbor.

[T1, T2][No. of Hrs: 12]

UNIT-II

Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines: Optimal hyper plane, Kernels. Model selection and feature selection. Combining classifiers: Bagging, boosting (The Ada boost algorithm), Evaluating and debugging learning algorithms, Classification errors.

[T1, T2][No. of Hrs: 11]

UNIT-III

Unsupervised learning: Clustering. K-means. EM Algorithm. Mixture of Gaussians. Factor analysis. PCA (Principal components analysis), ICA (Independent components analysis), latent semantic indexing. Spectral clustering, Markov models Hidden Markov models (HMMs).

[T1, T2][No. of Hrs: 11]

UNIT-IV

Reinforcement Learning and Control: MDPs. Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR). LQG. Q-learning. Value function approximation, Policy search. Reinforce. POMDPs.

[T1, T2][No. of Hrs: 10]

Text Books:

[T1] Tom M Mitchell, Machine Learning, McGraw Hill Education

[T2] Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

[T3] Duda, Richard, Peter Hart, and David Stork. Pattern Classification. 2nd ed. New York, NY: Wiley-Interscience, 2000. ISBN: 9780471056690.

[T4] Tom M. Mitchell, Machine Learning .ISBN – 9781259096952, McGraw-Hill Series, Edition – First

Reference Books:

[R1] Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646.

[R2] Introduction to Machine Learning - Ethem Alpaydin, MIT Press, Prentice hall of India.

HUMAN VALUES & PROFESSIONAL ETHICS – II

Paper Code: ETHS-402	**L**	**T/P**	**C**
Paper : Human Values & Professional Ethics-II	**1**	**0**	**1**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.
3. Two internal sessional test of 10 marks each and one project report* carrying 5 marks.

Objectives:

1. *The main object of this paper is to inculcate the skills of ethical decision making and then to apply these skills to the real and current challenges of the engineering profession.*
2. *To enable student to understand the need and importance of value-education and education for Human Rights.*
3. *To acquaint students to the National and International values for Global development*

UNIT I - Appraisal of Human Values and Professional Ethics:

Review of Universal Human Values: Truth, Love, Peace, Right conduct, Non violence, Justice and Responsibility. Living in harmony with 'SELF', Family, Society and Nature. Indian pluralism - the way of life of Islam, Buddhism, Christianity, Jainism, Sikhism and Hinduism, Greek - Roman and Chinese cultural values.

Sensitization of Impact of Modern Education and Media on Values:

a) Impact of Science and Technology
b) Effects of Printed Media and Television on Values
c) Effects of computer aided media on Values (Internet, e-mail, Chat etc.)
d) Role of teacher in the preservation of tradition and culture.
e) Role of family, tradition & community prayers in value development.

Review of Professional Ethics: Accountability, Collegiality, Royalty, Responsibility and Ethics Living. Engineer as a role model for civil society, Living in harmony with 'NATURE', Four orders of living, their inter-correctness, Holistic technology (eco-friendly and sustainable technology).

[T1] [T2] [R1] [R5] [R4][No. of Hrs. 03]

UNIT II – Engineers responsibility for safety:

Safety and Risks, Risk and Cost, Risk benefit analysis, testing methods for safety. Engineer's Responsibility for Safety Social and Value dimensions of Technology - Technology Pessimism – The Perils of Technological Optimism – The

Promise of Technology – Computer Technology Privacy

Some Case Studies: Case Studies, BHOPAL Gas Tragedy, Nuclear Power Plant Disasters, Space Shuttle Challenger , Three Mile Island Accident, etc.

[T1] [T2] [R4] [R2][No. of Hrs. 03]

UNIT III – Global Issues:

Globalization and MNCs: International Trade, Issues,

Case Studies: Kelleg's, Satyam, Infosys Foundation, TATA Group of Companies

Business Ethics: Corporate Governance, Finance and Accounting, IPR.

Corporate Social Responsibility (CSR): Definition, Concept, ISO, CSR.

Environmental Ethics: Sustainable Development, Eco-System, Ozone depletion, Pollution.

Computer Ethics: Cyber Crimes, Data Stealing, Hacking, Embezzlement.

[T1] [T2] [R4][No. of Hrs. 05]

UNIT IV - Engineers Responsibilities and Rights and Ethical Codes:

Collegiality and loyalty, Conflict of interests, confidentiality, occupational crimes, professional rights, responsibilities. To boost industrial production with excellent quality and efficiency, To enhance national economy, To boost team spirit, Work Culture and feeling of job satisfaction, National integration, Examples of some illustrious professionals.

Need for Ethical Codes, Study of some sample codes such as institution of Electrical and Electronics Engineers, Computer Society of India etc., Ethical Audit.

Development and implementation of Codes: Oath to be taken by Engineering graduates and its importance**,

[T1] [T2] [R4][R2][No. of Hrs. 05]

Text Books:

[T1] Professional Ethics, R. Subramanian, Oxford University Press.
[T2] Professional Ethics & Human Values: Prof. D.R. Kiran, TATA Mc Graw Hill Education.

References Books:

[R1] Human Values and Professional Ethics: R. R. Gaur, R. Sangal and G. P. Bagaria, Eecel Books (2010, New Delhi). Also, the Teachers‟ Manual by the same author
[R2] Fundamentals of Ethics, Edmond G. Seebauer & Robert L. Barry, Oxford University Press
[R3] Values Education: The paradigm shift, by Sri Satya Sai International Center for Human Values, New Delhi.
[R4] Professional Ethics and Human Values – M.Govindrajan, S.Natarajan and V.S. Senthil Kumar, PHI Learning Pvt. Ltd. Delhi
[R5] A Textbook on Professional Ethics and Human Values – R.S. Naagarazan – New Age International (P) Limited, Publishers New Delhi.
[R6] Human Values & Professional Ethics- S B Gogate- Vikas publishing house PVT LTD New Delhi.
[R7] Mike Martin and Roland Schinzinger, “Ethics in Engineering” McGraw Hill
[R8] Charles E Harris, Micheal J Rabins, “Engineering Ethics, Cengage Learning
[R9] PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
[R10] Caroline Whitback< Ethics in Engineering Practice and Research, Cambridgs University Press
[R11] Charles D Fleddermann, “Engineering Ethics”, Prentice Hall.
[R12] George Reynolds, “Ethics in Information Technology”, Cengage Learning
[R13] C, Sheshadri; The Source book of Value Education, NCERT
[R14] M. Shery; Bhartiya Sanskriti, Agra (Dayalbagh)

*Any topic related to the experience of the B.Tech student in the assimilation and implementation of human values and professional ethics during the past three years of his/her studies in the institute OR A rigorous ethical analysis of a recent case of violation of professional ethics particularly related to engineering profession.

**All students are required to take OATH in writing prior to submission of major project and the record of the same is to be maintained at the college level and/or, this oath may be administered by the head of the institutions during the graduation ceremonies. The draft for the same is available alongwith the scheme and syllabus.

DIGITAL IMAGE PROCESSING

	L	T/P	C
Paper Code: ETIT-418			
Paper: Digital Image Processing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: The aim of this course is to provide digital image processing fundamentals, hardware and software, digitization, encoding, segmentation, feature extraction etc. It will enhance the ability of students to apply tools in image restoration, enhancement and compression and to apply the techniques in both the spatial and frequency domains. It will enhance the ability of students to identify the quality characteristics of medical images, differences between computer vision and image processing and help in studying the remote sensing images of the environmental studies.

UNIT- I :

Introduction and Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods**.**

[T1, T2][No. of Hrs: 10]

UNIT- II:

Filtering in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters.

Image Restoration: A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

[T1, T2][No. of Hrs. 12]

UNIT- III:

Image Compression: fundamentals of compression, coding redundancy, Lossy and lossless compression, Spatial and temporal redundancy, Image compression models. Some basic compression methods

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Region Oriented Segmentation, Motion based segmentation.

[T1, T2][No. of Hrs. 12]

UNIT- IV:

Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

Object Recognition: Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

[T1, T2][No. of Hrs: 10]

Text Books:

[T1] Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 3Rd edition, Pearson, 2002.
[T2] A.K. Jain, "Fundamental of Digital Image Processing", PHI, 1989.

Reference Books:

[R1] Bernd Jahne, "Digital Image Processing", 5th Ed., Springer, 2002.
[R2] William K Pratt, "Digital Image Processing: Piks Inside", John Wiley & Sons, 2001.

MICROELECTRONICS

Paper Code: ETCS-408	**L**	**T/P**	**C**
Paper: Microelectronics	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The aim is to provide the student with experience of the use of industry standard commercial software packages for design and simulation of semiconductor devices, processes and circuits

UNIT I

Semiconductor, VLSI device technology, VLSI design flow, MOS Capacitance fundamentals, MOSFET principles and characteristics, MOS transistor theory, MOS structure, enhancement & depletion transistor, CMOS & NMOS process technology, explanation of different stages in fabrication, Threshold voltage, MOS device design equations

[T1, R1, R2][No. of Hrs.11]

UNIT II

MOSFET Operation and modelling, Short and narrow channel effects, Radiation and hot-carrier effects, Breakdown, LDD, CMOS latch-up, CMOS Device design considerations & performance factors, Brief overview of MOSFET CAD SPICE model- different levels.

[T1, R1][No. of Hrs. 10]

UNIT III

CMOS inverter, DC characteristics, static load MOS inverter, pull up/pull down ratio, Static & Dynamic power dissipation, switching characteristics & inter connection effects, Rise time, fall time delays, Noise margin, power consumption in CMOS.

[T1, R1, R2, R3][No. of Hrs. 11]

UNIT IV

Basic I.C. processing step, Clean room concept, wafer cleaning, oxidation, diffusion. Ficks laws, Ion implantation. Epitaxy, Basics of vacuum deposition, Chemical vapour deposition, high and low temperature/pressure depositions. Etching techniques, integrated circuit packaging.

[T2][No. of Hrs. 10]

Text Books:

[T1] Sedra and Smith, "Microelectronic Circuits", Oxford University Press, 6th Edition, 2013
[T2] S. M. Sze, "VLSI Technology", McGraw-Hill, 1983

Reference Books:

[R1] S. M. Kang, Y. Lebiebici, "CMOS digital integrated circuits analysis & design" TMH, 3rd Edition.
[R2] Donald A. Neaman, Semiconductor Physics and Devices, Tata McGraw-Hill, 2003
[R3] J. P. Uyemura, "Introduction to VLSI Circuits and Systems" John Wiley, 1st Edition
[R4] J. M. Rabaey, "Digital Integrated Circuits" PHI – 2nd Edition
[R5] R. T. Howe and C. G. Sodini, "Microelectronics: An Integrated Approach", PHI.

ADHOC AND SENSOR NETWORKS

Paper Code: ETEC-406	**L**	**T/P**	**C**
Paper: Ad Hoc and Sensor Networks	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTER: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Q. No. 1 rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The prerequisites are data communication networks, wireless communication and networks. The objective of the paper is to introduce infrastructure less wireless networking.

UNIT I

Ad Hoc Wireless Networks:

Introduction. Issues in Ad Hoc Wireless Networks. Ad Hoc Wireless Internet.

MAC Protocols for Ad Hoc Wireless Networks:

Introduction, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks. Design Goals of a MAC Protocol for Ad Hoc Wireless Networks. Classifications of MAC Protocols. Contention-Based Protocols. Contention-Based Protocols with Reservation Mechanisms. Contention-Based MAC Protocols with Scheduling Mechanisms. MAC Protocols in Directional Antennas. Other MAC Protocols

[T1, T2][No. of Hrs. 11]

UNIT II

Routing Protocols for Ad Hoc Wireless Networks:

Introduction to Routing algorithm, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks. Classifications of Routing Protocols. Table-Driven Routing Protocols. On-Demand Routing Protocols. Hybrid Routing Protocols. Routing Protocols with Efficient Flooding Mechanisms. Hierarchical Routing Protocols. Power-Aware Routing Protocols.

Transport Layer and Security Protocols for Ad Hoc Wireless Networks:

Introduction. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks. Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks. Classification of Transport Layer Solutions. TCP Over Ad Hoc Wireless Networks. Other Transport Layer Protocols for Ad Hoc Wireless Networks. Security in Ad Hoc Wireless Networks. Network Security Requirements. Issues and Challenges in Security Provisioning. Network Security Attacks. Key Management. Secure Routing in Ad Hoc Wireless Networks.

[T1, T2][No. of Hrs. 12]

UNIT III

Wireless Sensor Networks:

Introduction. Sensor Network Architecture. Data Dissemination. Data Gathering. MAC Protocols for Sensor Networks. Location Discovery. Quality of a Sensor Network. Evolving Standards. Other Issues.

Hybrid wireless Networks:

Introduction. Next-Generation Hybrid Wireless Architectures. Routing in Hybrid Wireless Networks. Pricing in Multi-Hop Wireless Networks. Power Control Schemes in Hybrid Wireless Networks. Load Balancing in Hybrid Wireless Networks.

[T1, T2][No. of Hrs. 11]

UNIT IV

Wireless Geolocation Systems:

Introduction. What is wireless Geolocation? Wireless Geolocation System Architecture. Technologies for Wireless Geolocation. Geolocation Standards for E-911 Services. Performance Measures for Geolocation Systems. Questions. Problems.

Recent Advances in Wireless Networks:

Introduction. Ultra-Wide-Band Radio Communication. Wireless Fidelity Systems. Optical Wireless Networks. The Multimode 802.11 -IEEE 802.11a/b/g. The Meghadoot Architecture, introduction to vehicular sensor networks.

[T1, T2] [No. of Hrs. 11]

Text Books:

[T1] Siva Ram Murthy, C. and Manoj,B. S., Adhoc Wireless Networks Architectures and Protocols, Prentice Hall, PTR, (2004) 2nd ed.

[T2] Perkins, Charles E., Ad hoc Networking, Addison Wesley, (2000) 3rd ed.

Reference Books

[R1] Toh, C. K., Ad hoc Mobile Wireless Networks Protocols and Systems, Prentice Hall, PTR, (2001) 3rd Edition.

[R2] Pahlavan, Kaveh., Krishnamoorthy, Prashant., Principles of Wireless Networks, - A united approach - Pearson Education, (2002) 2nd ed.

[R3] Wang X. and Poor H.V., Wireless Communication Systems, Pearson education, (2004) 3rd ed.

[R4] Schiller Jochen., Mobile Communications, Person Education – 2003, 2nd ed.

[R5] Carlos De Morais Cordeiro and Dharam P Agrawal, "Adhoc and Sensor Networks- Theory & Applications", 2nd Ed, Cambridge Univ Press India Ltd

SOFT COMPUTING

Paper Code: ETIT-410	**L**	**T/P**	**C**
Paper: Soft Computing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To understand the various concepts of neural networks and fuzzy logic.

UNIT-I

Neural Networks:

History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

[T1, T2][No. of Hrs. 11]

UNIT-II

Fuzzy Logic:

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation, Operations.

[T1, T2][No. of Hrs. 11]

UNIT-III

Fuzzy Arithmetic:

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic:

Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers,

Uncertainty based Information:

Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

[T1, T2][No. of Hrs. 11]

UNIT-IV

Introduction of Neuro-Fuzzy Systems:

Architecture of Neuro Fuzzy Networks.

Application of Fuzzy Logic:

Medicine, Economics etc.

Genetic Algorithm:

An Overview, GA in problem solving, Implementation of GA.

[T1, T2][No of Hrs 11]

Text Books:

[T1] Hertz J. Krogh, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.

[T2] G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.

[T3] Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.

[T4] F. O. Karray and C. de Silva, "Soft computing and Intelligent System Design", Pearson, 2009.

Reference Books:

[R1] "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.

[R2] Freeman J.A. & D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison Wesley, Reading, Mass, (1992).

VLSI DESIGN

Paper Code: ETIC-414	**L**	**T/P**	**C**
Paper: VLSI Design	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The prerequisite are analog devices, STLD, Digital system design and micro-electronics. The students are introducing to MOS technology, design rules and some applications.

UNIT I

Evolution of VLSI, MOS transistor theory, MOS structure, enhancement & depletion transistor, threshold voltage, MOS device design equations, MOSFET scaling and small geometry effects, MOSFET capacitances.

NMOS inverter, CMOS inverter, DC characteristics, static load MOS inverter, pull up/pull down ratio, static & dynamic power dissipation, CMOS & NMOS process technology – explanation of different stages in fabrication, body effect, latch up in CMOS.

[T1,T2][No. of Hours: 11]

UNIT II

Stick diagram and design rules, lambda based design rules, switching characteristics & inter connection effects: rise time, fall time delays, noise margin.

CMOS logic gate design: NAND, NOR, XOR and XNOR gates, Transistor sizing, combinational MOS logic circuits: pass transistor and transmission gate designs, Pseudo NMOS logic.

[T1,T2][No. of Hours: 11]

UNIT III

Sequential MOS logic circuits: SR latch, clocked latch and flip flop circuits, CMOS D latch and edge triggered flip flop, dynamic logic circuits; basic principle, non ideal effects, domino CMOS logic, high performance dynamic CMOS circuits, clocking issues, clock distribution.

[T1,T2][No. of Hours: 11]

UNIT IV

VLSI designing methodology, design flow, design Hierarchy, concept of regularity, modularity & locality, VLSI design style, Design quality, computer aided design technology, adder design and multiplier design examples. Low power design concepts using CMOS Technology.

[T1,T2][No. of Hours: 11]

Text Books:

[T1] Basic VLSI Design - Pucknell Douglas A., Eshraghian Kamran, PHI Learning Pvt Limited, 2013.
[T2] N. Weste and D. Harris, "CMOS VLSI Design: A Circuits and Systems Perspective - 4th Edition", Pearson Education, India.

Reference Book:

[R1] S. M. Kang, Y. Lebiebici, “CMOS digital integrated circuits analysis & design” Tata McGraw Hill, 3rd Edition.
[R2] Digital Integrated Circuit Design- Ken Martin, Oxford University Press
[R3] The MOS Transistor- Yaniiis Tsividis and Colin Mcandrew, Oxford University Press, 2013
[R4] J. M. Rabaey, “Digital Integrated Circuits” PHI Learning Pvt Limited, India
[R5] J. P. Uyemura, “Introduction to VLSI Circuits and Systems”, John Wiley & Sons, Inc., New York, NY
[R6] Neelam Sharma, "Digital Logic Design", Ashirwad Publication 2013-14

DISTRIBUTED SYSTEMS

	L	T/P	C
Paper Code: ETIT-430			
Paper: Distributed Systems	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To understand networking, operating systems and various issues.

UNIT-I

Fundamentals of Distributed Computing:

Architectural models for distributed and mobile computing systems, Basic concepts in distributed computing.

Distributed Operating Systems:

Overview, network operating systems, Distributed file systems, Middleware, client/server model for computing.

[T1, T2][No. of Hours 12]

UNIT-II

Communication:

Layered protocols, RPC, RMI, Remote objects. Basic Algorithms in Message Passing Systems, Leader Election in Rings, and Mutual Exclusion in Shared Memory, Message Passing, PVM and MPI.

Process Concepts:

Threads, Clients and Servers, Code migration, Agent based systems, Distributed objects, CORBA, Distributed COM.

[T1 [No. of Hours 10]

UNIT-III

Synchronization:

Clock synchronization, Logical clocks, Election algorithms, Mutual exclusion, Distributed transactions, Naming concepts, Security in distributed systems

Distributed Databases:

Distributed Data Storage, Fragmentation & Replication, Transparency, Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols.

[T2][No. of Hours 11]

UNIT-IV

Processing:

Basic Concepts: Introduction to processing, processing terminology, Design of algorithms, Design of Parallel Databases, Parallel Query Evaluation.

[T1, T2][No. of Hours 11]

Text Books:

[T1] Tannenbaum, A, Maarten Van Steen. Distributed Systems, Principles and Paradigm, Prentice Hall India, 2002

[T2] Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007

Reference Books:

[R1] Tanenbaum, A, "Modern Operating Systems", 2nd Edition, Prentice Hall India, 2001.

[R2] Singhal and Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill, 1994

[R3] Attiya, Welch, "Distributed Computing", Wiley India, 2006

[R4] Coulouris, Dollimore and Kindberg, "Distributed Systems", Pearson, 2009.

OBJECT ORIENTED SOFTWARE ENGINEERING

Paper Code: ETCS-412	**L**	**T/P**	**C**
Paper: Object Oriented Software Engineering	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To make the students well versed with current s/w developments in the industry.

UNIT I:

Introduction – Overview of Object-Orientation; Basic Concepts of Object-Orientation: Data abstraction, Encapsulation, Inheritance, Aggregation, classes, objects, messages, inheritance, polymorphism. Importance of modeling, principles of modeling, Object oriented modeling.

OO Life cycle – Object Oriented analysis, modeling and design; Requirement Elicitation. Introduction to Object Oriented Methodologies, Overview of Requirements Elicitation, Requirements Model-Action & Use cases.

[T1][R1][R2][No. of Hours: 10]

UNIT II:

Architecture: Introduction, System development is model building, model architecture, requirement model, analysis model, design model, implementation model.

Analysis: Introduction, System development based on user requirement, Use case model, interface descriptions, Problem domain objects, interface objects, entity objects, control objects.

Code Design Improvement: Refactoring, Anti patterns, Visitor Patterns.

[T1][R3][No. of Hours: 10]

UNIT III:

Construction: Introduction, the design model, design model dimensions, block design, working with construction.

Testing: Introduction, Object Oriented testing process, testing of analysis and design model, testing of classes.

[T1][R1][No. of Hours: 10]

UNIT IV:

Modelling with UML: Basic Building Blocks of UML, A Conceptual Model of UML.

Basic structural modelling: Classes, interfaces, Dependency , generalization and association relationship, comparison of E-R diagram and UML class Diagram, forward and reverse engineering.

Basic Behavioral Modeling- Use case diagram-relationships between use cases- extend, include, and generalize. Activity diagram-Action state, Activity state, Transition (Fork, Merge, Join), State diagram-events, State Diagram states, transitions, Interaction diagrams: Sequence diagram, Collaboration diagram (iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links.)

Architectural modelling:

Deployment: Common Modelling technique; Modelling processors and devices, modelling distribution of artifacts.

Collaboration: Modeling roles, modelling the realization of a Use Case, modelling the realization of an operation, modelling a mechanism.

[T1][R3][No. of Hours: 10]

Text Books:

[T1] Ivar Jacobson, "Object Oriented Software Engineering", Pearson.
[T2] Grady Booch, James Runbaugh, Ivar Jacobson, "The UML User Guide", Pearson.

Reference Books:

[R1] Rumbaugh et. al, "Object Oriented Modeling and Design", Pearson.
[R2] Booch, Maksimchuk, Engle, Young, Conallen and Houstan, "Object Oriented Analysis and Design with Applications", Pearson Education.
[R3] Object-Oriented Analysis and Design: using UML Mike O'Docherty Wiley Publication.
[R4] Edwards Yourdon. Carl Argila,"Case Studies in object oriented analysis and design" Prentice Hall.

COMPUTER VISION

Paper Code: ETCS-414	**L**	**T/P**	**C**
Paper: Computer Vision	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To understand geometric, analytical features, edge detection and texture etc.

UNIT I

Geometric Image Features

Elements of Differential Geometry, Contour Geometry,

Analytical Image Features

Elements of Analytical Euclidean Geometry, Geometric Camera Parameters, Calibration Methods.

[T1, T2][No. of Hrs. 11]

UNIT II

Linear Filters

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

Edge Detection

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

[T1, R1][No. of Hrs. 10]

UNIT III

Texture

Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesizing Textures for Rendering, Shape from Texture: Planes and Isotropy

Shape from Shading

Introduction to the concept of Shading From Shading (SFS), Application of SFS (Texture Shop, Image-Based Material Emitting, Optimization Based SFS), Photometric stereo, Spherical Illumination, Displacement Mapping, Feature Mapping.

[T1, T2][No. of Hrs. 10]

UNIT IV

Affine Structure from Motion

Elements of Affine Geometry, Affine Structure from Two Images, Affine Structure from Multiple Images, From Affine to Euclidean Images, Affine Motion Segmentation

Projective Structure from Motion

Elements of Projective Geometry.

[T1, T2][No. of Hrs. 11]

Text Books:

[T1] Computer Vision- A modern Approach, by D. Forsyth and J. Ponce, Prentice Hall
[T2] Robot Vision, by B.K.P. Horn, McGraw-Hill.

Reference Books:

[R1] Introductory Techniques for 3D Computer Vision by E Trucco and A. Verri, Prentice Hall

SOFTWARE PROJECT MANAGEMENT

Paper Code: ETCS-416	**L**	**T/P**	**C**
Paper: Software Project Management	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To introduce the students about the knowledge of software project management, project estimation and evaluation alongwith risk analysis and management.

UNIT-I

Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control.

Software Project scheduling and planning: Basic concepts, project scheduling, defining a task set and task network, scheduling, earned value analysis indicators, Project elements, WBS [Work Breakdown Structure] . Selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities.

[T1, T2][No. of Hrs. 11]

UNIT-II

Project Estimation and Evaluation: software project estimation, decomposition techniques, empirical estimation models, estimation for object oriented projects, estimation for Agile development and Web engineering projects.

Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; choice of process model, structured methods, rapid application development, water fall, spiral models, Prototyping delivery, Albrecht function point analysis.

[T1, T2][No. of Hrs. 11]

UNIT-III

Activity planning: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, Network planning model; Network Diagrams : CPM, Bar Charts, Gantt Chart , PERT [Activity-on-arrow network; Activity on Node network] Precedence network; Forward pass; Backward pass; Critical path.

Risk Analysis and Management: Risk and risk types, Risk Break down Structure, Risk management process, Evaluating schedule risk using PERT.

[T1, T2][No. of Hrs. 10]

UNIT-IV

Resource allocation &Monitoring the control: Introduction, the nature of resources, identifying resource requirements, visualizing progress, Project Tracking, Status Reports, Milestone Analysis, Actual Versus Estimated Analysis of Effort and Schedule.

Software quality and project closure: Defining software quality attributes, ISO 9126, Software quality measures, Project Closure Analysis, The Role of Closure Analysis, Performing Closure Analysis.

[T1, T2][No. of Hrs. 10]

Text Books:

[T1] Software Project Management (2nd Edition), by Bob Hughes and Mike Cottrell, 1999, TMH
[T2] Software Project Management, Walker Royce, 1998, Addison Wesley.

Reference Books:

[R1] R. S. Pressman, Software Engineering, TMH, 7th ed.
[R2] Pankaj Jalote, Software project management in practice, Addison-Wesley
[R3] Robert T. Futrell, Donald F. Shafer, and Linda I. Shafer, "Quality Software Project Management", 2002, Pearson Education Asia.
[R4] Ramesh Gopalaswamy, "Managing Global Software Projects", 2003, Tata McGraw-Hill
[R5] S. A. Kelkar, "Software Project Management"

HUMAN COMPUTER INTERACTION

Paper Code: ETCS-404	**L**	**T/P**	**C**
Paper: Human Computer Interaction	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To introduce the students about the interaction between and computer and human being.

UNIT I

Introduction: The Human, The Computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles and Theories.

Design Process: Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User Support.

[T1, T2][No. of Hrs. 10]

UNIT II

Models and Theories: Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design, Models of the system, Modelling rich interaction.

[T1, T2][No. of Hrs. 11]

UNIT III

Interaction Styles: Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation.

[T1, T2][No. of Hrs. 10]

UNIT IV

Design Issues: Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization.

Outside the Box: Group ware, Ubiquitous computing and augmented realities, Hypertext, Multimedia and the World Wide Web.

[T1, T2][No. of Hrs. 11]

Text Books:

[T1] Alan Dix, Janet Finlay, "Human Computer Interaction", ISBN: 9788131717035 Pearson Education, 2004.

[T2] Ben Shneiderman, "Designing the User Interface-Strategies for Effective Human Computer Interaction", ISBN:9788131732557, Pearson Education , 2010

Reference Books:

[R1] Usability Engineering: Scenario-Based Development of Human-Computer Interaction, by Rosson, M. and Carroll, J. (2002)

[R2] The Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007)

[R3] Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993. ISBN 0-12-518406-9

[R4] The Resonant Interface: HCI Foundations for Interaction Design , by Heim, S. , Addison-Wesley. (2007)

[R5] Usability engineering: scenario-based development of human-computer interaction, By Rosson, M.B & Carroll, J.M. , Morgan Kaufman.(2002)

INFORMATION THEORY AND CODING

Paper Code: ETIT-416	**L**	**T/P**	**C**
Paper: Information Theory and Coding	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: In this course the students will study a number of efficient encoding/decoding strategies which have proven important in practice with a categorization on the notion of decoding.

UNIT-I

Review of Probability Theory, Random Variables and Random Process. Information Theory Introduction, Uncertainty, Information, and Entropy, Information Rate, Conditional and Joint Entropies. Source Coding Theorem, Data Compaction, Prefix Coding, Kraft McMillan Inequality, Huffman Coding, Lempel Ziv Coding, Discrete Memoryless Channels, Mutual Information, Markov Sources, Channel Capacity.

[T1, T2][No. of hrs. 12]

UNIT-II

Channel Coding Theorem, Differential Entropy and Mutual Information for Continuous Ensembles, Information Capacity Theorem and its implications, Information Capacity of a colored noise channel. Discrete Memoryless Channels and Channel Coding Theorem revisited.

[T1, T2, R1, R5][No. of Hrs. 10]

UNIT-III

Linear Block codes, Repetition Codes, Syndrome Decoding, Hamming Codes, Dual Code, Cyclic Codes, Maximal Length Codes, CRC Codes, BCH Codes, Reed-Solomon Codes, Golay Codes, Convolutional Codes: Code Tree, Trellis and State Diagram.

[T1, R2, R4][No. of Hrs. 11]

UNIT-IV

Decoding of Convoltutional Codes: Maximum Likelihood decoding, Viterbi's algorithm, free distance of a convolutional code. Turbo Codes: Turbo Encoder and Decoder, Puncturing, Performance of Turbo Codes. Introduction to Cryptography.

[T1, R2, R3, R5] [**No. of Hrs. 11**]

Text Books:

[T1] Simon Haykins, "Communication Systems", 4th Edition Wiley, 2001.
[T2] J G Proakis, "Digital Communications", Mc Graw Hill, 2001.

Reference Books:

[R1] T M Gover, J M Thomos, "Elements of Information Theory", Wiley, 1999.
[R2] Arijit Saha, Nilotpal Manna, Surajit Mandal, "Information Theory, Coding and Cryptography", Pearson Education, 2013.
[R3] Schaum's Outlines, Analog and Digital Communications, Second Edition.
[R4] Amitabha Bhattacharya, "Digital Communication", TMH 2006.
[R5] J. H. van Lint.. Introduction to Coding Theory, Springer -Verlag.

WEB INTELLIGENCE AND BIG DATA

Paper Code: ETCS-418	**L**	**T/P**	**C**
Paper: Web Intelligence and Big Data	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of this paper is to build web-intelligence applications exploiting big data sources arising social media using new big-data platforms based on the 'map-reduce' parallel programming paradigm.

UNIT-I

Introduction: Web Scale AI and Big Data, Web Intelligence, Big Data

Look: Indexing- Index creation, Ranking, Page Rank Searching- Enterprise search, Searching structured data, Object Search, Locality Sensitive Hashing and Memory.

[T1, R2][No. of Hours: 10]

UNIT-II

Listen: Streams, Information and Language, Analyzing Sentiment and Intent

Load: Databases and their Evolution, Big data Technology and Trends.

Programming: Map-Reduce, Map-Reduce applications and its efficiency, Big-Table and HBase

[T1, R1][No. of Hours: 12]

UNIT-III

Learn: Classification, Clustering, and Mining, Information Extraction

Connect: Reasoning: Logic and its Limits, Dealing with Uncertainty.

[T1, R1][No. of Hours: 12]

UNIT-IV

Predict: Forecasting, Neural Models, Deep Learning, and Research Topics.

Data Analysis: Regression and Feature Selection

[T1, R1][No. of Hours: 10]

Text Book:

[T1] The Intelligent Web: Search, Smart Algorithms and Big Data published by Oxford University Press, UK, in November 2013, authored by Dr. Gautam Shroff.

References Books:

[R1] Mining Massive Datasets by J.D. Ullman and A. Rajaraman (Cambridge University Press, UK 2012)

[R2] Introduction to Information Retrieval by Christopher Manning, Prabhakar Raghavan and Hinrich Schutze (Cambridge University Press, UK 2008).

SERVICE ORIENTED ARCHITECTURE

Paper Code: ETCS-420	**L**	**T/P**	**C**
Paper: Service Oriented Architecture	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the fundamentals of Service oriented architecture, enterprise architecture, architectural and design considerations with various SOA Analysis, Design technologies and applications.

UNIT-I

Service Oriented Architecture (SOA): Introduction, Evolution, Fundamental SOA, Common Characteristics of contemporary SOA, Benefits of SOA, Common misperceptions about SOA, Promise and Challenges of SOA, Drivers, Dimensions, Key components, Perspectives.

SO Architectures: Architectures like Enterprise architecture, software architecture, SOA Reference architecture overview, The roots of SOA (comparing SOA to Past architectures)

Enterprise-wide SOA: Services-orientation and the enterprise, Considerations, Layers, Strawman architecture and other architectures, Application Development process, SOA methodology for Enterprise, Enterprise Applications.

[T1][No. of Hours: 10]

UNIT-II

Service-Oriented Enterprise Applications: Considerations, Patterns for SOA, SOA Programming Models.

SOA Analysis and Design: Principles and best practices of Service Design, Designing - Activity Services, Data Services, Client Services, Business process services.

Designing SOA: Business architecture, Business Process Models (Creating, Management & Modeling).

Service Context and common Semantics: Importance of Semantics in SOA, Core information modeling, defining types, Beyond the basics, structuring information models, documents and XML, XML: Schema and Patterns, Best practices for SOA Architect.

[T2][No. of Hours: 12]

UNIT-III

Designing Service interfaces: Services, Design Guidelines, Interface Design, Solution model.

Designing Service implementations: Basic Service architecture, Implementing: interface layer, business layer, Resource layer.

Composing Services: Understanding, Architectural models, implementation, business rules and Transactions.

Designing and Using Integration in SOA Solutions: Challenges of Integration in SOA, Special Considerations for implementing Integration.

[T1, T2][No. of Hours: 12]

UNIT-IV

SOA Security: Goals and fundamentals, Web service security Standards and specifications, SOA Security blueprints.

SOA Governance: Management and governance defined, Case for SOA governance, service life cycle, Developing and Registering Run Time policies, Run time policy enforcement and adaptation. Approach for Enterprise-wide SOA Implementation. SOA Applications and various Case Studies.

[T1, T2][No. of Hours: 10]

Text Books:

[T1] Michael Rosen, Boris Lublinsky, Kevin T Smith, Marc J Balcer, "Applied SOA: Service Oriented Architectures and Design Strategies", Wiley Reprint 2014.

[T2] Shankar Kambhampaly, "Service –Oriented Architecture for Enterprise and Cloud Applications", Wiley

Reference Books:

[R1] Thomas Erl, "SOA Principles of Service Design" by Prentice Hall

[R2] Roshen, "SOA based Enterprise Integration" by TMH publications

[R3] Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services" by Pearson Education.

MULTIAGENT SYSTEMS

Paper Code: ETCS-422	**L**	**T/P**	**C**
Paper: Multiagent Systems	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: *The objective of the paper is to facilitate the student with the basics of Multi-Agent Systems that are helpful for a Computer Engineering student who would like his carrier in Artificial Intelligence and Robotics.*

UNIT- I

Introduction: What Are Agents, Intelligent Agents, Agents and Objects, Agents and Expert Systems? Abstract Architectures for Intelligent Agents, Concrete Architectures for Intelligent Agents.

Agent Programming Languages: Agent-Oriented Programming, Concurrent MetateM.

Multiagent Systems and Societies of Agents: Introduction, Agent Communications, Agent Interaction Protocols, Societies of Agents.

[T1, T2] [No. of hrs. 10]

UNIT- II

Distributed Problem Solving and Planning, Introduction, Example Problems, Task Sharing, Result Sharing, Distributed Planning, Distributed Plan Representations, Distributed Planning and Execution,

Search Algorithms for Agents, Introduction, Constraint Satisfaction, Path-Finding Problem, Two-Player Games.

Distributed Rational Decision Making: Introduction, Evaluation Criteria, Voting, Auctions, Bargaining, General Equilibrium Market Mechanisms, Contract Nets, Coalition Formation.

[T1, T2][No. of hrs. 10]

UNIT- III

Methodologies: When is an Agent-Based Solution Appropriate?, Agent-Oriented Analysis and Design, Pitfalls of Agent Development, Mobile Agents, Applications, Agents for Workflow and Business Process Management, Agents for Distributed Sensing, Agents for Information Retrieval and Management, Agents for Electronic Commerce, Agents for Human-Computer Interfaces, Agents for Virtual Environments, Agents for Social Simulation, Agents for X.

Multiagent Decision Making: Multiagent Interactions, Utilities and Preferences, Setting the Scene, Solution Concepts and Solution Properties, Competitive and Zero-Sum Interactions, The Prisoner's Dilemma, Other Symmetric 2 x 2 Interactions, Representing Multiagent Scenarios, Dependence Relations in Multiagent Systems.

[T1, T2][No. of hrs. 12]

UNIT-IV

Groupware and Computer Supported Cooperative Work- Introduction, Basic Definitions, Aspects of Groupware, Multi-Aspect Groupware, Social and Group Issues in Designing Groupware Systems, Supporting Technologies and Theories, Other Taxonomies of Groupware, Groupware and Internet.

Distributed Models for Decision Support: Introduction, Decision Support Systems, An Agent Architecture for Distributed Decision Support Systems, Application Case Studies.

[T1, T2][No. of hrs. 11]

Text Books:

[T1] Wooldridge, Michael, "An Introduction to MultiAgent Systems", John Wiley & Sons.

[T2] Gerhard Weiss," Multiagent systems: a modern approach to distributed artificial intelligence", The MIT Press

Reference Books:

[R1] Yoav Shoham, Kevin Leyton-Brown**,"** MULTIAGENT SYSTEMS: Algorithmic, Game-Theoretic, and Logical Foundations", Cambridge University Press

[R2] Adelinde M. Uhrmacher, Danny Weyns," Multi-Agent Systems: Simulation and Applications", CRC Press

PRINCIPLES OF PROGRAMMING LANGUAGES

Paper Code: ETCS-424	**L**	**T**	**C**
Paper: Principles of Programming Languages	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The objective of the paper is to facilitate the student with the principles of programming languages that are required for an engineering student.

UNIT-I

Introduction: Syntax, semantics and pragmatics; Formal translation models, Variables, Expressions & Statements, Binding time spectrum; Variables and expressions; Assignment; I-values and r-values; Environments and stores; Storage allocation; Constants and initialization; Statement-level control structure.

[T1, T2][No. of hrs. 12]

UNIT-II

Primitive Types: Pointers; Structured types; Coercion; Notion of type equivalence;

Polymorphism: overloading, inheritance, type parameterization, Abstract data types; Information hiding and abstraction; Visibility, Procedures, Modules, Classes, Packages, Objects and Object-Oriented Programming.

[T1, T2][No. of hrs. 10]

UNIT-III

Storage Management: Static and dynamic, stack-based, and heap-based storage management.

Sequence Control: Implicit and explicit sequencing with arithmetic and non-arithmetic expressions; Sequence control between statements.

Subprogram Control: Subprogram sequence control, data control and referencing environments; parameter passing; static and dynamic scope; block structure.

[T1, T2] [No. of hrs. 12]

UNIT-IV

Concurrent Programming: Concepts, Communication, Deadlocks, Semaphores, Monitors, Threads, Synchronization.

Logic programming: Introduction; Rules, Structured Data and Scope of the variables; Operators and Functions; Recursion and recursive rules; Lists, Input and Output; Program control; Logic Program design.

[T1, T2][No. of hrs. 10]

Text Books:

[T1] Programming Languages – Pratt T.V. (Pearson Ed).
[T2] Introduction to Programming Languages: Programming in C, C++, Scheme, Prolog, C# and SOA – Chen Y., Tsai W-T. (Kendall).
[T3] Programming Languages: Design & Implementation – Pratt T.W., Zelkowski M.V. (PHI).
[T4] Programming Languages, Adesh K Pandey, Narosa Publishing House

References:

[R1] Programming Languages: Principles and Practice – Louden K.C. (Addision-Wesley).
[R2] Programming languages – Grover P.S. (S. Chand).
[R3] Programming Languages: Principles and Paradigms - Tucker A., Noonan R. (TMH).

TELECOMMUNICATION NETWORKS

Paper Code: ETCS-426	**L**	**T/P**	**C**
Paper: Telecommunication Networks	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To understand the basics of telecommunication transport and signalling protocols.

UNIT I

Introduction to Telecommunication networks: Overview of Network Structure and Services, PSTN Network, Overview of Regulatory Bodies and Standards. Introduction to Access Networks -Analog, PSTN Access Loops, WiLL, xDSL, Wireless Access Loops:-RF(Point to Point, GSM, CDMA(Radio Access Layer), Free Space Optical Access), Signalling,(CAS,CCS-SS7), ISDN ,Signalling:- CAS/CCS, with LAPB, LAPD, Robbed-Bit Signalling Protocols.

[T1][No. of Hours 10]

UNIT II

Data Transport, Aggregation, grooming, Quality of Service: Carrier Networks:- asynchronous carrier networks - Carrier Ethernet; synchronous carrier networks-TDM hierarchies(E1 to E3, T1 to T3), STS to STMx hierarchies under SDH, Cell Switched Networks(ATM, Burst Switched Networks).

[T1][No. of Hours 10]

UNIT III

Overview of SS6 and SS7 signalling systems. Fundamentals of UNI and NNI Signalling, Packet Based Signalling (SIGTRAN,SS7-IP Gateways) Core Networks-Optical Lambda Networks(with Wavelength assignment algorithms) Backhaul Networks for GSM/CDMA. Voice Transport: VoIP: Real Time Interactive Protocols: Rationale for new protocols, RTP, RTCP, Session Initialization Protocol (SIP), H.323.

[T1][T2][R2][No. of Hours 10]

UNIT IV

Wireless Networks: GSM (2G,3G,4G,5G), CDMA , and UMTS with emphasis on Reference point interfaces, Basics of IP Multimedia systems(IMS, ePC) and NGN.

[T1, T2][No. of Hours 12]

Text Books:

[T1] Behrouz A.Forouzan, 'Data Communication and Networking', 5E, Tata McGraw Hill, 2013.
[T2] Telecommunication System Engineering by Roger L. Freeman, 4th Edition, Wiley India.

Reference Books:

[R1] Telecommunication Switching, Traffic & networks by J.E.Flood, Pearson Education Asia
[R2] Optical Networks- A Practical Perpective by Rajiv Ramaswamy and Kumar Sivarajan, Morgan Kaufman.

SELECTED TOPICS OF RECENT TRENDS IN COMPUTER SCICENE AND ENGINEERING

Paper Code: ETCS-428	**L**	**T/P**	**C**
Paper: Selected Topics of Recent Trends in CSE	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The objective of the paper is to facilitate the student with the recent trends in CSE and IT fields that are required for an engineering student.

UNIT I

Trends in Information Retrieval:

Recent Trends in IR: Parallel and distributed IR , multimedia IR, data modeling Web Searching, Characterizing the Web, Search Engines ,Browsing , Meta searchers ,Searching using hyperlinks.

Cluster Analysis: Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, hierarchical methods, density based methods, grid based methods.

[T1][R2][No. of hrs. 10]

UNIT II

High Performance Computing

Introduction: Need of high speed computing – increase the speed of computers – history of parallel computers and recent parallel computers; solving problems in parallel – temporal parallelism – data parallelism – comparison of temporal and data parallel processing – data parallel processing with specialized processors – inter-task dependency. The need for parallel computers - models of computation - analyzing algorithms – expressing algorithms.

[T2][No. of hrs. 12]

UNIT III

Grid Computing

IT Infrastructure Evolution: Introduction, Technologies, Global Internet Infrastructure,- World Wide Web and Web Services, Open-Source Movement. Productivity Paradox and Information Technology: Productivity Paradox, Return on Technology Investment, Information Technology Straightjacket, Consolidation - Outsourcing - Toward a Real-Time Enterprise - Operational Excellence. Business Value of Grid Computing: Grid Computing Business Value Analysis, Risk Analysis, Grid Marketplace.

[R1][No. of hrs. 10]

UNIT IV

BIG DATA Analysis using Hadoop:

Database evolution, Big data and Hadoop overview, Hadoop Distributed File System (HDFS), Map Reduce, Hadoop Streaming and Compression.

[R3][R4][No. of hrs. 10]

Text Books:

[T1] Ricardo Baeza-Yates, Berthier Ribeiro-Neto, "Modern Information Retrieval", Addison Wesley, 1999.
[T2] V. Rajaraman and C. Siva Ram Murthy, "Parallel Computers – Architecture and Programming", Prentice-Hall of India, 2003.

Reference Books:

[R1] Joshy Joseph and Craig Fellenstein, "Grid Computing", Pearson Education, 2003.
[R2] Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2008.
[R3] Hadoop in Practice, Holmes Wiley
[R4] Chuck Lam "Hadoop in Action" **Wiley India** Selim G. Akl, "The Design and Analysis of Parallel Algorithms", Prentice-Hall of India, 1999

MOBILE COMPUTING LAB

Paper Code: ETIT-452	**L**	**T/P**	**C**
Paper: Mobile Computing Lab	**0**	**2**	**1**

List of Experiments:

The student is advised to learn any of the following languages and use any one tool kit for generating mobile applications, such as game, Clock, calendar, Convertor, phone book, Text Editor etc.,
Language support: XHTML-MP, WML, WML Script.
Mobile application languages- XML, Voice XML, Java, J2ME, Java Card
Tool Kits: WAP Developer tool kit and application environment, Android Mobile Applications Development Tool kit.
For MANETS, use of NS2/NS3 is recommended for two experiments.

Reference Books:

[R1] Donn Felker, "Android Application Development for Dummies", Wiley, 2010
[R2] Reto Meier, "Professional Android 2 Application Development", Wrox's Prog. To Programmer Series.
[R3] Ed Burnette, 'Hello, Android: Introducing Google's Mobile Development Platform' third edition' Pragmatic Programmers, 2012
[R4] Jerome (J.F) DiMarzio "Android A programmer's Guide" Tata McGraw-Hill 2010 Edition.
[R5] Reza B'Far, "Mobile computing principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University press, 2005.
[R6] R.Riggs, A. Taivalsaari, M.VandenBrink, "Programming Wireless Devices with Java2 Platform, Micro Edition", ISBN: 0-201-74627-1, Addison Wesley,, 2001.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

MACHINE LEARNING LAB

	L	T/P	C
Paper Code: ETCS-454			
Paper: Machine Learning Lab	**0**	**2**	**1**

List of Experiments:

1. Study and Implement the Naive Bayes learner using WEKA. (The datasets taken can be: Breast Cancer data file or Reuters data set).
2. Study and Implement the Decision Tree learners using WEKA. (The datasets taken can be: Breast Cancer data file or Reuter's data set).
3. Estimate the accuracy of decision classifier on breast cancer dataset using 5-fold cross-validation. (You need to choose the appropriate options for missing values).
4. Estimate the precision, recall, accuracy, and F-measure of the decision tree classifier on the text classification task for each of the 10 categories using 10-fold cross-validation.
5. Develop a machine learning method to classifying your incoming mail.
6. Develop a machine learning method to Predict stock prices based on past price variation.
7. Develop a machine learning method to predict how people would rate movies, books, etc.
8. Develop a machine learning method to Cluster gene expression data, how to modify existing methods to solve the problem better
9. Select two datasets. Each dataset should contain examples from multiple classes. For training purposes assume that the class label of each example is unknown (if it is known, ignore it). Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameter k.
10. Implement the EM algorithm assuming a Gaussian mixture. Apply the algorithm to your datasets and report the parameters you obtain. Evaluate performance by measuring the sum of Mahalanobis distance of each example from its class center. Test performance as a function of the number of clusters.
11. Suggest and test a method for automatically determining the number of clusters.
12. Using a dataset with known class labels compare the labeling error of the K-means and EM algorithms. Measure the error by assigning a class label to each example. Assume that the number of clusters is known.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

MICROELECTRONICS LAB

Paper Code: ETCS-456(ELECTIVE-I)	**L**	**T/P**	**C**
Paper: Microelectronics Lab	**0**	**2**	**1**

List of Experiments:

1. To study the MOS characteristics and introduction to tanner EDA software tools.
2. To design and study the DC characteristics of PMOS and NMOS.
3. To design and study the DC characteristics of resistive inverter.
4. To design and study the transient and DC characteristics of CMOS inverter.
5. To design and study the characteristics of CMOS NAND gate.
6. To design and study the characteristics of CMOS multiplexer.
7. To design any Boolean function using CMOS gates.
8. To design and study the characteristics of CMOS NOR gate.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

COMPUTER VISION LAB

	L	T/P	C
Paper Code: ETCS-456(ELECTIVE-I)			
Paper: Computer Vision Lab	**0**	**2**	**1**

List of Experiments:

1. WAP for Affine Transformation
2. WAP for representing epipolar geometry
3. WAP for implementing shapes from shading
4. WAP for finding depth from motion
5. WAP to find the structure by solving the motion equation (Motion equation: rotation and translation)
6. WAP for segmentation by edge Detection
7. WAP for object detection using color, texture and motion cues.

NOTE:- At least 8 Experiments from the syllabus must be done in the semester.

SOFTWARE PROJECT MANAGEMENT LAB

Paper Code: ETCS-456(ELECTIVE-I) **L** **T/P** **C**
Paper: Software Project Management Lab **0** **2** **1**

List of Experiments:

1. Consider the following information that you have compiled regarding the steps needed to complete a project. You have identified all relevant steps and have made some determination regarding predecessor/successor relationships. Using MS project , develop a simple network diagram for this project , showing the links among the project activities.

Activity	Predecessors
A- Survey Site	----------
B- Install sewer and storm drainage	A
C- Install gas and electric power lines	A
D- Exacavate site for spec house	B,C
E- Pour Foundation	D

2. Suppose that we add some duration estimates to each of the activities from question 1. A portion of the revised table is shown here. Recreate the network diagram for this project and note how MS project uses nodes to identify activity durations, start and finish dates, and predecessors. What is the critical path for this diagram? How do we know?

Activity	Predecessors	Duration
A- Survey Site	----------	5 Days
B- Install sewer and storm drainage	A	9 Days
C- Install gas and electric power lines	A	4 Days
D- Exacavate site for spec house	B,C	2 Days
E- Pour Foundation	D	2 Days
		2 Days

3. Draw the PERT diagram for the question no 2 using Activity on Arrow (AOA) convention and Activity on Node (AON) Convention.
4. Refer to the activity network shown here in the table. Suppose that we have modified the original table slightly to show the following predecessor relationship between tasks and resources assigned to perform these activities. Enter the information using MS project to produce a Gantt chart. Assume that each resource has been assigned to the project activity on full time basis.

Activity	Predecessors	Duration	Resource Assigned
A- User Survey	----------	5 Days	Gail Wilkins
B- Coding	A	12 Days	Tom Hodges
C- Debug	A	5 Days	Tom Hodges
D- Design Interface	B,C	6 Days	Sue Ryan
E- Develop Training	D	5 Days	Reed Taylor

A. Using the resource usage view, can you determine any warning signs that some member of the project team has been over assigned?
B. Click on the Task Usage view to determine the specific days when there is conflict in the resource assignment schedule.

5. Using the keywords "Cases on project risk management "search the Internet to identify and generate the report on any recent example of a project facing significant risks. What steps did the project organization take to fist identify and then mitigate the risk factors in this case.

6. Go to the site http:/www. Dof.ca.gov/HTML/IT/PMM/OPT and reproduce the summary project budget worksheet. How would you adjust this worksheet if you were estimating the costs for a new software project? What items would you retain? Which would you remove or modify? Use MS Project to create project summary report.

7. Using the data shown in the network precedence table below, enter various tasks in MS Project. Then select a data approximately halfway through the overall project duration and update all tasks in the network to show current status. You may assume that all tasks in the first half of the project are now 100% completed. What does the tracing Gantt chart look like?

Activity		Predecessors	Duration
A-	Conduct Competitive analysis	----------	3
B-	Review field sales reports	----------	2
C-	Conduct tech capabilities assessment	----------	5
D-	Develop focus group data	A,B,C	2
E-	Conduct telephone surveys	D	3
F-	Identify relevant specification	E	3
G-	Interface with marketing staff	F	1
H-	Develop engineering specifications	G	5
I-	Check and debug designs	H	4
J-	Develop testing protocols	G	3
K-	Identify Critical Performance levels	J	2
L-	Assess and modify product components	I,K	6
M-	Conduct capabilities assessments	L	12
N-	Identify selection criteria	M	3
O-	Develop RFQ	M	4
P-	Develop production master schedule	N,O	5
Q-	Liaison with sales staff	P	1
R-	Prepare product Launch	Q	3

8. Draw the PERT diagram for the question no 7 using Activity on Arrow (AOA) convention and Activity on Node (AON) Convention.
9. Go to a search engine and enter the term "Project failure" or "Project disaster" .Select one example and develop and analysis of the project using MS Project was it terminated or not? If not why in your opinion was it allowed to continue?
10. Do the case study of the following :
    A. The IT department at Kimble college
    B. The Tacoma Narrows suspension bridge
    C. Project Libra to terminate or not to terminate
    D. Johnson and Rogers Software Engineering Inc. (Ref.:- Jeffrey K. Pinto, Pearson publications)
11. What are the company's top risks? How severe Is their impact and how likely are they about to occur. Prepare RMMN plan for same. [Hint. Table should have following columns : Risk, Category, Problem , Impact , RMMN]
12. Explain Software Management Tools, CASE Tools, Planning and Scheduling Tools.
13. What is the Software Project Quality measures related to any projects?

PRINCIPLES OF PROGRAMMING LANGUAGES LAB

Paper Code: ETCS-458(ELECTIVE-II)	**L**	**T/P**	**C**
Paper: Principles of Programming Languages Lab	**0**	**2**	**1**

List of Experiments:-

1. Implement all major functions of string.h in single C program using switch case to select specific function from user choice (like strlen, strcat, strcpy, strcmp, strrev)
2. Write a program (WAP) in C to reverse a linked list iterative and recursive.
3. WAP in C to implement iterative Towers of Hanoi.
4. WAP in C++ to count the no.s of object of a class with the help of static data member, funtion and constructor.
5. WAP in C++ & Java to declare a class Time with data members mm for minutes, ss for seconds and hh for hours. Define a parameterize constructor to assign time to its objects. Add two time objects using member function and assign to third objects. Implement all possible cases of time.
6. WAP in C++ to define a class Complex to represents set of all complex numbers. Overload '+' operator to add two complex numbers using member function of the class and overload '*' operator to multiply two complex numbers using friend function of the class complex.
7. Implement simple multi-threaded server to perform all mathematics operation parallel in Java.
8. Write a program in to prepare a list of 50 questions and their answers.
9. Write a program to display 10 questions at random out of exp.8-50 questions (do not display the answer of these questions to the user now).
10. Implement producer-consumer problem using threads.

NOTE:- At least 8 Experiments out of the list must be done in the semester.

TELECOMMUNICATION NETWORKS LAB

Paper Code: ETCS-458(ELECTIVE-II)	**L**	**T/P**	**C**
Paper: Telecommunication Networks Lab	**0**	**2**	**1**

List of Experiments:

1. Experiments: Access Networks (on Telephone Trainer kit)
2. Measurement of tip and ring voltages, (verify the BORSCHT functions).
3. Check how the Caller ID is transmitted, design a circuit to read the Caller ID
4. Check the DTMF dialling function, displaying the freq pairs for DTMF, design a circuit for DTMF and Pulse dial-out using a microcontroller
5. To study dial tone, busy tone and ring back tone waveforms and generations.
6. To study speech circuit and ring generator using EPABX.
7. To study the working of sound section or speech section.
8. Study of working of Voltage Dropper Circuit in Telephone.
9. Study of the working of Key Matrix Section.
10. To study working of dialer section and DTMF signals using High Pass and Low Pass Filters.
11. DSL- Using a DSLAM simulator, checks the functioning of a any ADSL modem.
12. Ethernet- Using Wireshark checks the Ethernet packet format across a live LAN.
13. Using OpenNMS, check the status of a Network Element such as a Linux node running SNMPD

NOTE:- At least 8 Experiments out of the list must be done in the semester.