K.R. MANGALAM UNIVERSITY

THE COMPLETE WORLD OF EDUCATION

SCHOOL OF ENGINEERING

AND

TECHNOLOGY

Bachelor of Technology- Computer Science & Engineering

B.Tech (CSE)

Program Code: 01

2018-22

Approved in the 17th Meeting of Academic

Council held on 29 June 2018

Academic Council
Member Secretary
K.R. Mangalam University

Registrar
K.R. Mangalam University
Sohna Road, Gurugram, (Haryana)

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Content	Page No.
About K.R Mangalam University	3
About School of Engineering and Technology	4
School Vision	4
School Mission	4
Programs offered by School	5
Career Options	5
Class Timings	5
Program Duration- B.Tech Civil Engineering	5
Scheme of Studies and Syllabi- B.Tech Civil Engineering	5

About K.R Mangalam University

The K.R. Mangalam Group has made a name for itself in the field of education. The K.R. Mangalam story goes back to the chain of schools that offered an alternative option of world-class education, pitching itself against the established elite schools, which had enjoyed a position of monopoly till then. Having blazed a new trail in school education, the focus of the group was aimed at higher education.

K.R. Mangalam University is the fastest-growing higher education institute in Gurugram, India. K. R. Mangalam University was established under the Haryana Private University Act 2006, received the approval of Haryana Legislature vide Amendment Act # 36 of 2013 and consent of the Hon'ble Governor of Haryana on 11th April 2013, which was published in the Gazette notification vide Leg. No.10/2013, dated 3rd May 2013.

Since its inception in 2013, the University has been striving to fulfil its prime objective of transforming young lives through ground-breaking pedagogy, global collaborations, and world-class infrastructure. Resources at K.R Mangalam University have been continuously upgraded to optimize opportunities for the students. Our students are groomed in a truly interdisciplinary environment where they grow up with integrative skills through interaction with students from engineering, social sciences, management and other study streams.

K.R Mangalam University is unique because of its:

1. Enduring legacy of providing education to high achievers who demonstrate leadership in diverse fields.
2. Protective and nurturing environment for teaching, research, creativity, scholarship, social and economic justice.

Objectives

i. To impart undergraduate, post graduate and doctoral education in identified areas of higher education.
ii. To undertake research programmes with industrial interface.
iii. To integrate its growth with the global needs and expectations of the major stake holders through teaching, research, exchange & collaborative programmes with foreign, Indian Universities/Institutions and MNCs.
iv. To act as a nodal center for transfer of technology to the industry.
v. To provide job oriented professional education to the Indian student community with particular focus on Haryana.

About School of Engineering & Technology (SOET)

School of Engineering and Technology (SOET), K.R. Mangalam University is dedicated to fostering innovation, excellence, and advancement in engineering and technology. Empowering the new generation of change-makers by imparting exceptional understanding and intellect to facilitate the creation of highly sophisticated futuristic solutions. Our well-qualified academicians, accomplished researchers and industry insiders are focused on imparting their extensive knowledge and expertise to students through various lectures, workshops, industrial visits, projects, and competitions throughout the year ensuring that students receive a comprehensive education that blends theory with practical application.

These programs offered at SOET have the distinct objective of equipping the students with knowledge, skills and attitudes in engineering and technology, to make them capable of successfully meeting the present requirements and future challenges in the engineering profession. SOET brings together outstanding academics, industry professionals, and experienced researchers to deliver a unique hands-on and multi-disciplinary learning experience.

The curriculum of programmes has been designed to cater to the ever changing needs and demands of the industry. The curriculum is regularly updated. The school has best infrastructure including domain-specific labs. SOET aims to provide exposure to the principles and practices of Design /Developments and Projects in the area of engineering. SOET is offering Ph.D programs also.

School Vision

To create, disseminate, and apply knowledge in science and technology to meet the higher education needs of India and the global society, To serve as an institutional model of excellence in scientific and technical education characterized by integration of teaching, research and innovation.

School Mission

M1: To create an environment where teaching and learning are prioritized, with all support activities being held accountable for their success.

M2: To strengthen the institution's position as the school of choice for students across the State & Nation.

M3: To promote creative, immersive, and lifelong learning skills while addressing societal concerns.

M4: To promote co- and extra-curricular activities for overall personality development of the students.

M5: To promote and undertake all-inclusive research and development activities.

M6: To instill in learners an entrepreneurial mindset and principles.

M7: Enhance industrial, institutional, national, and international partnerships for symbiotic relationships.

M8: To help students acquire and develop knowledge, skills and leadership qualities of the 21st Century and beyond.

Programs offered by the School

B.Tech. in Computer Science & Engineering

This program is designed to provide a sound knowledge of computing principles and applications in scientific and engineering domains. It develops the ability to analyze problems and generate solutions in the areas of computing. It also aims to provide exposure to the principles and practices of design and development of computing system. An initiative to make the teaching-learning framework better and enhance the student learning outcomes,

Program Duration: 4 Years (8 Semesters)

Eligibility Criteria: - The student should have passed the 10+2 examination conducted by the Central Board of Secondary Education or equivalent examination from a recognized Board in Science with mathematics as one of the subjects and with an overall aggregate of 50% or more.

Class Timings
The classes will be held from Monday to Friday from 9.10 am to 4.10 pm.

Scheme of Studies and Syllabi

For B.Tech CSE programme scheme is attached in Annexure A1.The syllabi is given in the following pages. These are arranged as: (a) common course (b) degree specific course, in numeric order of the last three digits of the course code.

For each course, the first line contains; Course Code, Tittle and Credits (C) of the course. This is followed by the course objectives, syllabus (Unit I to IV), Textbook and Reference books.

Four Years B.Tech (CSE) Programme at a Glance

	Sem I	**Sem II**	**Sem III**	**Sem IV**	**Sem V**	**Sem VI**	**Sem VII**	**Sem VIII**	**Total**
Course	11	11	10	9	12	9	8	3	**73**
Credit	28	28	28	26	28	24	26	19	**205**

Scheme of Studies

SEMESTER I							
SNo		**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	SE	ETMA 105	Applied Mathematics-I	3	1	-	4
2	SE	ETPH 109	Applied Physics-I	3	1	-	4
3	SE	ETEC 119	Electrical Science	3	1	-	4
4	SE	ETME 106	Engineering Mechanics	3	-	-	3
5	SE	ETCS103	Introduction to Computer System and Programming	3	1	-	4
6	SE	ETEL 101	Communication Skills	4	-	-	4
7	SE	ETPH 151	Applied Physics-I Lab	-	-	2	1
8	SE	ETEL171	Communication Skills Lab	-	-	2	1
9	SE	ETEC 161	Electrical Science Lab	-	-	2	1
10	SE	ETCS153	Programming Lab	-	-	2	1
11	SE	ETME 154	Engineering Mechanics Lab	-	-	2	1
TOTAL				**19**	**4**	**10**	**28**

SEMESTER II							
SNo		**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	SE	ETMA 104	Applied Mathematics-II	3	1	-	4
2	SE	ETPH 108	Applied Physics-II	3	1	-	4
3	SE	ETCH 119	Engineering Chemistry	3	1	-	4
4	SE	ETME 107	Manufacturing Process	3	-	-	3
5	CC	ETCS 112	Object Oriented Programming	3	1	-	4
6	SE	ETCH 125	Enviormental Studies	3	-	-	3
7	SE	ETPH 152	Applied Physics-II Lab	-	-	2	1
8	SE	ETCH159	Engineering Chemistry Lab	-	-	2	1
9	CC	ETCS 166	Object Oriented Programming Lab	-	-	2	1
10	SE	ETME 158	Engineering Graphics Lab	-	-	3	1.5
11	SE	ETME 157	Workshop Practice	-	-	3	1.5
TOTAL				**18**	**4**	**12**	**28**

SEMESTER III							
1	SE	ETMA 201	Applied Mathematics–III	3	1	-	4
2	SE	ETEC 233	Analog Electronics	3	1	-	4
3	SE	ETEC 210	Digital Electronics	3	1	-	4
4	CC	ETCS 219	Foundation of Computer Systems	3	1	-	4
5	CC	ETCS 211	Operating Systems	3	1	-	4
6	CC	ETCS 217	Data Structures	3	1	-	4
7	SE	ETEC 263	Analog Electronics Lab	-	-	2	1
8	SE	ETEC 256	Digital Electronics Lab	-	-	2	1
9	CC	ETCS 255	Operating Systems Lab	-	-	2	1
10	CC	ETCS 257	Data Structures Lab	-	-	2	1
TOTAL				**18**	**6**	**8**	**28**

SEMESTER IV							
1	CC	ETCS 202	Software Engineering	3	1	-	4
2	SE	ETMA 208	Numerical Analysis	3	1	-	4
3	CC	ETCS 307	Database Management Systems	3	1	-	4
4	CC	ETCS 220	Analysis and Design of Algorithm	3	1	-	4
5	SE	ETEC 235	Communication Engineering	3	1	-	4
6	CC	ETMC 226	Fundamentals of Management	3	-	-	3
7	CC	ETCS 252	Software Engineering Lab	-	-	2	1
8	SE	ETEC 276	Communication Engineering Lab	-	-	2	1
9	CC	ETCS 355	Database Management Systems Lab	-	-	2	1
TOTAL				**18**	**5**	**6**	**26**

SEMESTER V							
1	CC	ETCS 323	Java Programming	3	1	-	4
2	CC	ETCS 304	Computer Networks	3	1	-	4
3	CC	ETCS 206	Computer Graphics	3	1	-	4
4	SE	ETCS 214	Theory of Computation	3	1	-	4
5	CC	ETEC 311	Microprocessor Systems	3	1	-	4
6	CC	ETCS315	Fundamentals of iOS Development	1	-	-	1
7	CC	ETCS361	Java Programming Lab	-	-	2	1
8	CC	ETCS365	Computer Networks Lab	-	-	2	1
9	CC	ETCS363	Fundamentals of iOS development Lab	-	-	2	1
10	CC	ETCS258	Computer Graphics Lab	-	-	2	1
11	SE	ETEC353	Microprocessor Systems Lab	-	-	2	1
12	SE	ETCS381	Practical Training I	-	-	-	2
TOTAL				**16**	**5**	**10**	**28**

SEMESTER VI							
1	CC	ETCS412	Compiler Design	3	1	-	4
2	CC	ETCS312	Information and Network Security	3	1	-	4
3	CC	ETCS314	Mobile Computing	3	1	-	4
4	CC	ETCS324	Advanced iOS Development	1	-	-	1
5	CC	ETCS222	Computer Systems Organization	3	1	-	4
6	CC	ETCS454	Compiler Design Lab	-	-	2	1
7	CC	ETCS366	Mobile Computing Lab	-	-	2	1
8	CC	ETCS374	Advanced iOS Development Lab	-	-	2	1
9		**Elective**					
(i)	CC	ETCS318	Principles of Programming Languages	3	1	-	4
(ii)	SE	ETCS320	Distributed Computing Systems	3	1	-	4
(iii)	SE	ETCS322	E-Commerce and ERP	3	1	-	4
TOTAL				**16**	**5**	**6**	**24**

SEMESTER VII							
1	CC	ETCS401	Artificial Intelligence	3	1	-	4
2	CC	ETCS316	WebTechnologies	3	1	-	4
3	SE	ETMC421	Entrepreneurship Development	3	-	-	3
4	CC	ETCS368	Web Technologies Lab	-	-	2	1
5	CC	ETCS451	Artificial Intelligence Lab	-	-	2	1
6	SE	ETCS462	Minor Project	-	-	-	2
7	SE	ETCS481	Practical Training II	-	-	-	2
8		**Elective (without Lab)**					
(i)		ETCS403	Distributed Algorithms	3	1	-	4
(ii)		ETCS421	Storage Systems	3	1	-	4
(iii)		ETCS423	Robotics	3	1	-	4
(iv)		ETCS415	Advanced Computer Architecture	3	1	-	4
(v)		ETCS420	Graph Theory	3	1	-	4
(vi)		ETCS422	Cloud Computing	3	1	-	4
9		**Elective (with Lab)**					
(i)		ETCS425	Machine Learning	3	1	-	4
		ETCS471	Machine Learning Lab	-	-	2	1
(ii)		ETCS427	Mobile and Wireless Communication	3	1	-	4
		ETCS473	Mobile and Wireless Communication Lab	-	-	2	1
(iii)		ETCS306	Data Warehousing and Data Mining	3	1	-	4
		ETCS362	Data Warehousing and Data Mining Lab	-	-	2	1
TOTAL				**15**	**4**	**6**	**26**

SEMESTER VIII							
1	CC	ETCS414	Neural Network	3	1	-	4
2	CC	ETCS464	Major Project	-	-	-	6
3		**Open Elective (without Lab)**					
			(As specified by other schools)	4	-	-	4
4		**Elective (with Lab)**					
(i)		ETCS405	Digital Image Processing	3	1	-	4
		ETCS455	Digital Image Processing Lab	-	-	2	1
(ii)		ETCS413	Advanced Computer Networks	3	1	-	4
		ETCS459	Advanced Computer Networks Lab	-	-	2	1
(iii)		ETCS428	Natural Language Processing	3	1	-	4
		ETCS458	Natural Language Processing Lab	-	-	2	1
(iv)		ETCS430	Advanced Database Management Systems	3	1	-	4
		ETCS460	Advanced Database Management Systems Lab	-	-	2	1
TOTAL				**9**	**3**	**2**	**19**

SEMESTER – I

ETMA105	APPLIED MATHEMATICS- I	L	T	P	C
		3	1	-	4

Course Objective: Knowledge of Mathematics is essential for proper understanding of all the Engineering and Science subjects. Through this course it is intended to make the students in various disciplines get acquainted with basic concepts of different topics from Mathematics, which is needed to pursue their engineering degree in different disciplines.

UNIT I

Complex Numbers and Infinite Series: De Moivre's theorem and roots of complex numbers. Euler's theorem, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses. Convergence and Divergence of Infinite series, Comparison test d'Alembert's ratio test. Higher ratio test, Cauchy's root test. Alternating series, Lebnitz test, Absolute and conditional convergence.

UNIT II

Calculus of One Variable: Successive differentiation, Leibnitz theorem (without proof), Mean value theorems, Taylor's theorem and expansion of functions, errors and approximation. Asymptotes of Cartesian curves. Curvature of curves in Cartesian, parametric and polar coordinates, Tracing of curves in Cartesian, parametric and polar coordinates (like conics, astroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardiode, Lemniscate of Bernoulli, equiangular spiral), Tangents and normal's, Maxima, Differentiation under integral sign. Reduction Formulae for evaluating Finding area under the curves, Length of the curves, volume and surface of solids of revolution.

UNIT III

Linear Algebra – Matrices: Rank of matrix, Linear transformations, Hermitian and skeew - Hermitian forms, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Diagonalisation of a matrix, Eigen values and Eigen vectors. Caley - Hamilton theorem (without proof).

UNIT IV

Ordinary Differential Equations: First order differential equations - exact and reducible to exact form. Linear differential equations of higher order with constant coefficients. Solution of simultaneous differential equations. Variation of parameters, Solution of homogeneous differential equations -Cauchy and Legendre forms.

TEXT BOOKS:

1. Kresyzig, E., "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).
2. Jain, R. K. and Iyengar, S. R. K. "Advanced Engineering Mathematics", Narosa (2nd Ed.).

3. Shanti Narain – Differential Calculus
4. Shanti Narain – Integral Calculus
5. "Advanced Engineering Mathematics", Dr. A. B. Mathur, V. P. Jaggi (Khanna publications)

REFERENCES
BOOKS:

1. Mitin, V. V. Polis, M. P. & Romanov, D. A., "Modern Advanced Mathematics for Engineers", John Wiley and Sons
2. Wylie, R., "Advanced Engineering Mathematics", McGraw-Hill.

ETPH109	APPLIED PHYSICS - I	L	T	P	C
		3	1	-	4

Course Objective: To objective of the course is to acquaint students with fundamental of graduate level physics which is the very basics of applied Science and Engineering

UNIT I

Interference of Light: Wave theory, Huygen wave theory, Superposition theorem, Interference, types of interference, Young`s double slit experiment, Fresnel Biprism, Interference due to thin films, Wedge shaped film, Newton`s ring, Michelson Interferometer.

Diffraction: Diffraction, Types of diffraction, Fraunhoffer diffraction due to single slit, Diffraction due to N slits, absent spectra, Dispersive power, resolving power, Rayleigh criterion.

UNIT II

Polarization: Polarization, Brewster and Malus law, phenomenon of double refraction, Nicol`s prism, production and detection of polarised light, Specific rotation, Laurent half shade polarimeter, biquartz-polarimeter.

UNIT III

Laser: Spontaneous and stimulated emission, population inversion, principle of LASER action, properties of LASER-coherence, intensity, monochromacity, He-Ne LASER, semiconductor LASER, applications.

Fiber Optics: Introduction, numerical aperture and acceptance angle, types of optical fibre, V-number, attenuation and dispersion (Qualitative only), applications

UNIT IV

Special Theory Of Relativity: Inertial and non-inertial frames of references, Michelson-Morley experiment, postulates of special theory of relativity, Lorentz transformation, length contraction, time dilation, addition of velocities, mass energy equivalence.

REFERENCE BOOKS:

1. Optics by A. Ghatak
2. Optics by N. Subramanyam and Brij Lal
3. Fundamentals of Optics by Jenkins and White
4. Mechanics: Berkeley Physics Course, vol.1 by C. Kittle
5. Mechanics by D.S. Mathur

ETEC119	ELECTRICAL SCIENCE	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to provide a brief knowledge of Electrical Engineering technology to students of various engineering disciplines. The course module includes basic theorems, basic knowledge of current flow and voltages as well as basic knowledge of electrical network and sources of electrical energy.

UNIT I

Circuit Analysis: Ohm's Law, KCL, KVL Mesh and Nodal Analysis, Circuit parameters, energy storage aspects, Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer Theorem, Millman's Theorem, Star-Delta Transformation. Application of theorem to the Analysis of D.C. circuits.

UNIT II

A.C. Circuits: R-L, R-C, R-L-C circuits (series and parallel), Time Constant, Phasor representation,
Response of R-L, R-C and R-L-C circuit to sinusoidal input Resonance-series and parallel R-L-C Circuits, Q-factor, Bandwidth.

UNIT III

Measuring Instruments: Principles, Construction and application of moving coil, moving iron, dynamometer type, induction type instruments, extension of range of ammeter, voltmeter (shunt and multiplier), Two-wattmeter method, for the measurement of power, Cathode-ray
Oscilloscope and Applications.

UNIT IV

Transformers: Construction and Working principles and phasor diagrams of Single-phase Transformer, E.M.F equation, Equivalent circuit, Regulation and efficiency, and Auto transformer.

Electrical Machines & Power Supply Systems: Construction and working, principles of dc motor and generator and its characteristics. Applications of DC machines, Power

transmission through overhead lines and underground cables Construction and working principles of 3-cp-Induction motor, Torque-speed characteristics, and Industrial applications.

TEXT BOOKS:

1. P.C. Sen "Principles of Electric Machines and Power Electronics", Wiley Eastern.
2. Vincent DEL TORO "Electrical Engineering Fundamental's Prentice Hall India"
3. B L Thareja – A text book of Electrical Technology.

REFERENCE BOOKS:

1. Electrical Engineering Fundamentals, V. Del Toro
2. Problems in Electrical Engineering – Parker Smith. S.

ETME106	ENGINEERING MECHANICS	L	T	P	C
		3	-	-	3

Course Objective: Engineering Mechanics is one of the core subjects that introduces the student to analysis of forces and motion and prepares the student for further studies and better understanding of engineering subjects like strength of materials and theory of machines.

UNIT I

Force system: Free body diagram, Equilibrium equations and applications.
Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrust bearings, Belt drive- derivation of equation. $T1/T_2=e\mu^{\theta}$ and its application

UNIT II

Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Distributed Force: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia.

UNIT III

Kinematics of Particles: Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.

Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.

UNIT IV

Kinematics of Rigid Bodies: Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism.

Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.

TEXT BOOKS:

1. Engineering Mechanics by A.K.Tayal (Umesh Publications).
2. Engineering Mechanics by Sadhu Singh (Khanna Publishers).
3. Engineering Mechanics by Merriam, J L by John Wiley & Sons.

REFERENCE BOOKS:

1. Engineering Mechanics by Irving H. Shames (PHI publications).
2. EngineeringMechanics by U.C.Jindal (Galgotia Publications).
3. Engineering Mechanics by Beer & Johnston, TMH

ETCS103	INTRODUCTION TO COMPUTER SYSTEMS AND PROGRAMMING	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course module is to introduce basics of Computers and its architecture. The course also covers Programming using C.

UNIT I

Introduction to Computer and Programming: Overview of Computer organization and historical perspective computer applications in various fields of science and management. Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions, ASCII, EBCDIC, Gray code Binary arithmetic, Floating-point arithmetic, signed and unsigned numbers. Concept of algorithms, Flow Charts, Data Flow diagrams etc.,
Introduction to the Editing tools such as vi or MS-VC editors, Concepts of the finite storage, bits bytes, kilo, mega and gigabytes. Concepts of character representation.

UNIT II

Programming using C: Example of some simple C program. Concept of variables, program statements and function calls from the library (printf for example) C data types, int, char, float etc., C expressions, arithmetic operation, relational and logic operations, C assignment statements, extension of assignment of the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions, C Statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.

UNIT III

Iterations and Subprograms: Concept of loops, example of loops in C using for, while and do-while. Optionally continue may be mentioned, One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations. Concept of Sub-programming, functions Example of functions. Argument passing mainly for the simple variables.

UNIT IV

Pointers, Strings and Structures: Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Unions. Defining C structures, passing strings as arguments Programming examples.

TEXT BOOKS:

1. Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition.
2. Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th EditionV Raje Raman : "Computer Programming in C"
3. Rajaraman, "Fundamentals of Computers", Prentice Hall of India, 3rd Edition.

REFERENCE BOOKS:

1. Kernighan & Ritchie, "C Programming Language", the (ANSI C Version), PHI, 2nd Edition.
2. "Fundamental of Computers and Programming in C" by J B Dix.

ETEL101	COMMUNICATION SKILLS	L	T	P	C
		4	-	-	4

Course Objective: The purpose of this course is to

- Understand the basics of Grammar to improve communication and speak correct form of English
- Improve students' personality and enhance their self-confidence

UNIT I

Introduction to Communication: Meaning, Forms & Types of Communication; Process of Communication; Principles of Effective Communication/7Cs, Barriers in Communication

UNIT II

Essentials of Grammar: Parts of Speech: Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection; Using tenses; Articles; Reported Speech; Punctuation

UNIT III

Building Vocabulary: Word Formation (by adding suffixes and prefixes); Common Errors; Words Often Confused; Homonyms and Homophones; Antonyms/Synonyms, Phrasal Verbs

UNIT IV

Personality Development: Public Speaking; Body Language: Posture, Gesture, Eye Contact, Facial Expressions; Presentation Skills/ Techniques

TEXT BOOK:

Sanjay Kumar and Pushp Lata, Communication Skills, Oxford University Press.

REFERENCES:

1. M.L.Tickoo, A. E. Subramanian and P.R. Subramaniam, Intermediate Grammar, Usage and Composition, Orient Blackswan.
2. Barun K Mitra, Personality Development and Soft Skills, Oxford University Press.

ETPH151	APPLIED PHYSICS- I LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. To plot a graph between the distance of the knife edge from the center of gravity and the time period of the bar pendulum. From the graph, find
   i. The acceleration due to gravity.
   ii. the radius of gyration and the moment of inertia of the bar about an axis
2. To determine the moment of inertia of a flywheel about its own axis of motion.
3. To determine the value of acceleration due to gravity using Kater`s pendulum.
4. To determine the frequency of A.C. mains with sonometer using non-magnetic wire.
5. To determine the frequency of electrically maintained turning fork by Melde`s method.
6. To determine the wavelength of sodium light using Newton`s ring apparatus.
7. To determine the wavelength of prominent lines of mercury by plane diffraction grating.
8. To determine the refractive index of the material of the prism for the given colours (wavelengths) of mercury light with the help of spectrometer.
9. To determine the specific rotation of cane sugar solution with the help of half shade polarimeter.
10. To determine the wavelength of He -Ne LASER using transmission diffraction grating.

ETEC161	ELECTRICAL SCIENCE LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. To Verify the Thevenin' s theorem
2. To Verify the Superposition theorem
3. To measure voltage, current and power in an A.C. circuit by LCR impedance method
4. To study the frequency response curve in series R-L-C circuit
5. To study the frequency response curve in parallel R-L-C circuit
6. Measurement of power in three phase circuit by two wattmeter method
7. To determine the parameters and losses in single phase transformer by open and short circuit test
8. Speed control of D.C. shunt motor by armature and field control method
9. Speed control of three phase induction motor by applying voltage variation
10. Measurement of power and power factor in single phase circuit
11. Speed control of DC shunt motor by voltage control method
12. Calibration of energy meter/wattmeter/voltmeter/ammeter

NOTE: At least 10 experiments must be done.

ETCS153	PROGRAMMING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Write a C program to reverse a given number, find the sum of digits of the number.
2. Write a C program to find the largest of five numbers.
3. Write a program to find the largest number out of five numbers (ternary operator)
4. Write a program to find roots of quadratic equation using functions.
5. Write a C program to check whether a given year is leap year or not.
6. Write a C program to check whether a given number is prime or not, also check whether it is divisible by a number k or not.
7. Write a C program to take marks of a student as input and print the his/her grade bases on following criteria using if – else statements
   Marks <40 FAIL
   40<= Marks <59 GOOD
   59 <= Marks < 80 Excellent
   80 <= Marks Outstanding
8. Perform experiment 7 using switch case statement.

9. Write a C program to concatenate two strings.
10. Write a program using arrays to find the largest and second largest number out of given 10 numbers using bubble sort.
11. Write a program to multiply two matrices
12. Write a program to reverse a string.
13. Write a program to concatenate two strings
14. Write a program to calculate the length of the string.
15. Write a program to find factorial of a number using function.
16. Write a program to check that the input string is a palindrome or not.
17. Write a program using structure to enter a list of books, their prices and number of pages.
18. Write a program to add, subtract, multiply and divide two numbers using menu driven program.
19. Write a C program to compute the length of a string using while loop.
20. Write a C program to convert all the lowercase letter to uppercase letter and all uppercase letters to lower case letter given a string as input.
21. Write a C program to take two matrixes as input and print the sum of two matrixes.
22. Write a C program to display the address of a variable using pointer.
23. Write a C program to compute the length of a string using pointer.
24. Create a structure called STUDENT having name, registration number, class, session as its field. Compute the size of structure STUDENT.

ETME154	ENGINEERING MECHANICS LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the Wheel and Axle
7. To determine the MA, VR, ηof Worm Wheel (2-start)
8. Verification of force transmitted by members of given truss.
9. To verify the law of moments using Bell crank lever
10. To find CG and moment of Inertia of an irregular body using Computation

method.

ETEL171	COMMUNICATION SKILLS LAB	L	T	P	C
		-	-	2	1

Course Objective: 'English in Practice I' focuses on communication activities in functional and situational contexts. It encourages students to speak with fluency and accuracy as well as develop the four skills of reading, writing, listening and speaking.

UNIT I

Situational Conversations : Selling a product, Getting a book published, In a government office ,buying a computer, railway enquiry , Introductions, hiring a taxi , Meetings and Greetings , Making an appointment, Making complaints , Agreeing and disagreeing , Congratulations and good wishes, Expressing ability and certainty

UNIT II

Personality Development: Handling telephonic calls, Career planning, Appearing for personal interview, Public speaking, Presentation skills, Group discussion, Dining etiquettes

UNIT III

Business Writing: Making a CV, Letter writing, Report Writing, Errors in spoken English

UNIT IV

Business Communication: Job Interviews, Teleconferencing, Meetings, Marketing, Sales, Customer Service Negotiations, Human Resource

Suggested Readings:

O. Scot, Contemporary Business Communication, Biztantra, New Delhi.

SEMESTER - II

ETMA104	APPLIED MATHEMATICS- II	L	T	P	C
		3	1	-	4

Course Objective: Mathematics being mother of all sciences, knowledge of Mathematics is essential for a better understanding of almost all Engineering and Science subjects. Through this course module it is intended to make students well versed with the concept of basic

topics from Mathematics to enable them pursue their Engineering degree in different disciplines.

UNIT I

Calculus of several Variable: Partial differentiation, ordinary derivatives of first and second order in terms of partial derivatives, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables and its application to approximate errors. Maxima and Minima of two variables, Langranges method of undermined multipliers and Jacobians.

UNIT II

Functions of Complex Variables: Derivatives of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic Conjugates, Conformal mapping, Standard mappings - linear, square, inverse and bilinear. Complex line integral, Cauchy's integral theorem, Cauchy's integralformula, Zeros and Singularities / Taylor series, Laurent's series, Calculation of residues.Residue theorem, Evaluation and real integrals.

UNIT III

Vector Calculus: Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical physical interpretations, Directional: derivatives, Properties. Line integrals and application to work done, Green's Lemma, Surface integrals and Volume integrals, Stokes theorem and Gauss divergence theorem (both without proof).

UNIT IV

Laplace Transformation: Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution and convolution theorem. Solving linear differential equations using Laplace transform. UNIT step function, Impulse function and Periodic function and their transforms.

Statistics & Probability: Moments, Skewness, Kurtosis, Random variables and probability distribution, Mean and variance of a probability distribution, binomial distribution, Normal Comp Poisson distribution, Markov Process.

TEXT BOOKS:

1. Kresyzig, E., "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).
2. Jain, R. K. and Iyengar, S. R. K. Advanced Engineering Mathematics, Narosa.
3. Advanced Engineering Mathematics", Dr. A. B. Mathur, V. P. Jaggi (Khanna Publishers)
4. Engineering Mathematics by R.K. Jain and S.R.K. Iyengar

REFERENCE BOOKS:

1. Mitin, V. V.; Polis, M. P. and Romanov, D. A. "Modern Advanced Mathematics for Engineers", John Wiley and Sons.
2. Wylie, R., "Advanced Engineering Mathematics", McGraw-Hill.

ETPH108	APPLIED PHYSICS -II	L	T	P	C
		3	1	-	4

Course Objective: Objective of this course to acquaint engineering students with advanced mathematical concepts applicable to Electromagnetic wave propagation, solid state physics and quantum mechanics, which is very relevant for students pursuing various engineering disciplines.

UNIT I

Crystal structure: Bravais lattice, inter planer distance, Miller indices, packing in solids, Point defects in crystal-Frankel and Schottky defects, chemical bonding in solids.Experimental X-ray diffraction methods: production and properties of X-rays, X-ray diffraction, Bragg`s law, determination of crystal structure- powder method and rotating crystal method

UNIT II

Quantum Mechanics & Statistical Physics: De-Broglie Hypothesis, Davisson Germer experiment, wave function and its properties, Wave Packet, group and phase velocity, Uncertainty principle. Time Dependent and independent Schrodinger Equation, Particle in a box (1-D), Qualitative Features of Maxwell Boltzmann, Bose-Einstein and Fermi-Dirac statistics distribution, functions & their comparison (no derivation)

UNIT III

Electromagnetic theory: Maxwell`s equations in integral and differential form, simple plane wave equation, Maxwell`s equations in different media, Poynting theorem and Poynting vector, physical significance of Maxwell`s equations.

Magnetism: Atomic magnetic moments, types of magnetism, Classical theory of diamagnetism, Classical theory of para magnetism, ferromagnetism, hysteresis, domain theory

UNIT IV

Free electron theory: Classical free electron theory, Drude Model for electrical conduction, Weidman- Franz law, drawbacks of classical free electron theory and quantum free electron theory, Fermi level, density of states, thermionic emission, Richardson`s equation

Superconductivity: Meissen Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's equation, properties of superconductors & applications.

TEXT BOOKS:

1. Materials Science and Engineering: An Introduction, VII Ed by William D. Callister, Jr.
2. Solid State Physics: S.O. Pallai.

3. Introduction to Quantum Physics: David J. Griffith
4. Modern Quantum Physics: J.J Sakurai
5. Atomic Physics : Raj am
6. Introduction to Electrodynamics: David J. Griffith
7. Greiner : Quantum Physics

REFERENCE BOOKS:

1. Electromagnetic waves and Radiating Systems :Jordan & Bal main
2. Concept of Modern Physics : A. BEISER
3. Solid State Physics : Kittle

ETCH119	ENGINEERING CHEMISTRY	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce basics of engineering chemistry and the thermo chemistry and their application in engineering science.

UNIT I

Water Technology: Introduction and characteristics of water; Hardness and its determination (EDTA method only); Alkalinity and its determination; Boiler feed water; Boiler problems - scale, sludge, priming & foaming, their causes & prevention; Caustic embrittlement& corrosion -Causes & prevention; Removal of silica & dissolved gases; Water softening processes : Lime - soda process, Ion exchange method, carbonate & phosphate conditioning, colloidal conditioning & calgon treatment; Water for domestic use.

UNIT II

Fuels: Classification; Calorific value of fuel and its determination; Bomb calorimeter; Boy's Gas calorimeter; Solid fuels- Proximate and ultimate analysis, High & Low temperature carbonization, manufacture of coke (Otto-Hoffmann oven); Liquid Fuels - Petroleum-Chemical composition, fractional distillation, Thermal & catalytic cracking, Octane & Cetane No. and its significance; Power alcohol, Analysis of flue gases (Orsat's apparatus).

UNIT III

Gaseous state and thermo chemistry: Gas laws and kinetic theory of gases; Distribution of molecular velocities; Mean free path; Real gases-non ideal behavior; Causes of deviation from ideal behavior; Vander Waal's equation; liquefaction of gases.
Hess's Law; Heat of Reaction; Heat of dilution; Heat of Hydration; Heat of neutralization and Heat of Combustion; Effect of temperature on heat of reaction at constant pressure (Kirchhoff s equation); Flame Temperature

UNIT IV

The phase rule and polymers: Definition of various terms, Gibb's Phase rule, Application of phase rule to one component system- The water system and carbon dioxide system, Two component system:Lead-silver,Na2SO4-water.
Polymers and its classification; Mechanism of addition and condensation polymers; Coordination polymerization; Synthesis, properties and uses of urea formaldehyde, phenol formaldehyde, poly vinyl acetate and polythene; Conducting and bio-polymers.**)**

REFERENCE BOOKS:

1. Chemistry in Engineering & Technology (Vol I & II) (Latest ed.), By J.C. Kuriacose & J. Rajaram
2. Principles of Physical Chemistry, (Latest ed.), Puri B.R., Sharma L.R. and Pathania, M.S.
3. Text book of Engg. Chemistry, S. Chand & Co., (Latest ed.), S.S. Dara

ETME107	MANUFACTURING PROCESS	L	T	P	C
		3	-	-	3

Course Objective: The course module is designed to acquaint the engineering student perusing various disciplines, with basic manufacturing process like casting, forging, metal joining and sheet metal used in industries.

UNIT I

Introduction: Manufacturing process, common Engineering materials, their properties and application.

Casting Processes: Principles of metal casting, Pattern materials, types and allowance, composition and properties of molding sand, foundry tools, concept of cores and core print, elements of gating system, description and operation of cupola, special casting processes e.g. die-casting; permanent mould casting; centrifugal casting; investment casting; casting defects.

UNIT II

Smithy and Forging: Forging tool, Basic operations e.g. upsetting; fullering; flattening; drawing; swaging; drop forging; press forging.

Bench Work and Fitting: Fitting shop tools, operation: Fitting; sawing; chipping; thread cutting (with taps and dies); Marking and marking tools

UNIT III

Metal joining: Welding principles, classification of welding techniques, Oxyacetylene Gas welding, equipment And field of application, Arc-welding, metal arc, Carbon arc welding, submerged arc welding and Atomic hydrogen welding, TIG and MIG welding, electric

resistance welding: spot; seam; flash; Butt and percussion welding, Flux: composition; properties and function, Electrodes, Types of Joints and edge preparation, Brazing and soldering, welding defects.

UNIT IV

Sheet Metal Work: Tools and equipment's, metals used for sheets, standard specification for sheets, Common
Processes: blanking, punching, drawing, rolling; spinning; bending; embossing and coining.

TEXT BOOKS:

1. Manufacturing Process by Raghuvanshi.
2. Manufacturing Technology by P.N.Rao (TMH publications)

REFERENCE BOOKS:

1. Workshop Technology by Hazra-Chowdhary
2. Production Engineering by R.K.Jain
3. Workshop Technology by Chapman

ETCS112	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course module is to acquaint students with object-oriented programming using Programming C++.

UNIT I

Introduction: Introducing Object-Oriented Approach related to other paradigms (functional, data decomposition), Characteristics of Object-Oriented Languages.

Basic terms and ideas: Abstraction, Encapsulation, Information hiding, Inheritance, Polymorphism, Review of C, Difference between C and C++, Cin, Cout, new, delete operators.

UNIT II

Classes and Objects: 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, Copy Constructor, Static Class Data, Constant Classes, C++ garbage collection, dynamic memory allocation.

UNIT III

Inheritance and Polymorphism: Inheritance, Types of Inheritance, Class hierarchy, derivation – public, private & protected, Agrégations, composition vs classification hiérarchies, Polymorphism, Type of Polymorphism – Compile time and runtime, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric polymorphism, Generic function – template function, function name overloading, Overriding inheritance methods

UNIT IV

Files and Exception Handling: Persistent objects, Streams and files, Namespaces, Exception handling, Generic Classes

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

TEXT BOOKS:

1. A.R. Venugopal, Rajjkumar, T. Ravishanker "Mastering C++", TMH
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications
3. Schildt Herbert, "C++ Programming", 2nd Edition, Wiley DreamTech.

REFERENCE BOOKS:

1. D. Parasons, "Object Oriented Programming with C++", BPB Publication
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB

ETCH125	ENVIRONMENTAL STUDIES	L	T	P	C
		3	-	-	3

Course Objectives: This course in environmental studies will develop the:

- Basic understanding about the concept related to environment such as eco system and biodiversity.
- Understanding about pollution and its control.
- Insight about the various concerns regarding environment such as population and social issues.

UNIT I

Introduction of Environmental Studies: Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.

Natural Resources: Renewable and Non-renewable Resources

Land resources: land use change; Land degradation, soil erosion and desertification.

Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.

Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).

Energy resources: Renewable and non- renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

UNIT II

Ecosystems: Definition and Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

Case studies of the following ecosystems:

a) Forest ecosystem

b) Grassland ecosystem

c) Desert ecosystem

d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biological Diversity: Levels of biological diversity; genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots ; India as a mega-biodiversity nation; Endangered and endemic species of India; Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity; Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

UNIT III

Environmental Pollution: Types, causes, effects and controls; Air, water, soil and noise pollution. Nuclear hazards and human health risks; Solid waste management: Control measures of urban and industrial waste; Pollution case studies.

Environmental Policies and practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.

Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context. International agreements: Montreal & Koyoto protocol and convention on biological diversity. Nature reserves, tribal population and rights, human wild life conflicts in Indian context.

UNIT IV

Human Communities and the Environment: Human population growth: Impacts on environment, human health and welfare; Resettlement and rehabilitation of project affected persons; case studies; Disaster management: floods, earthquake, cyclones and landslides;

Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan; Environmental ethics: Role of Indian and other religions and cultures in environmental conservation; Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Field work:

Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.

Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.

Study of common plants, insects, birds and basic principles of identification.

Study of simple ecosystems-pond, river, Delhi Ridge, etc.

TEXT BOOKS:

1. Erach Bharucha, Textbook of Environmental Studies, Universities Press (P) Ltd., Hyderabad, India.
2. Anubha Kaushik and C. P. Kaushik, Environmental Studies, New Age International Publishers (P) Ltd. New Delhi.

REFERENCE BOOKS:

1. A.K. De, Environmental Chemistry, New Age International Publishers (P) Ltd. New Delhi.
2. P. H. Raven, D. M. Hassenzahl & L. R. Berg, Environment, John Wiley & Sons, New Delhi.
3. J. S. Singh, S. P. Singh and S. R. Gupta, Ecology, Environmental Science and Conservation, S. Chand Publication, New Delhi.

ETPH152	APPLIED PHYSICS - II LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. To determine the value of e/m of electron by J.J. Thomson method.
2. To determine unknown resistance of a wire by Carey Foster's Bridge.
3. To determine the internal resistance of Leclanche cell using potentiometer.
4. To study the charging and discharging of a capacitor and to find out the time constant.
5. To find the thermal conductivity of a poor conductor by Lee's disk method.
6. To study the thermo EMF using thermocouple and resistance using Pt. Resistance thermometer.
7. To determine the velocity of ultrasound waves using an ultrasonic spectrometer in a given liquid (Kerosene Oil)

8. To measure the frequency of a sine-wave voltage obtains from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave voltages from two signal generators.
9. To determine the temp. Co-efficient of resistance of platinum by Callender&Griffith's Bridge.
10. To study Hall Effect.
11. To determine plank's constant.

ETCH159	ENGINEERING CHEMISTRY LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Determine the percentage composition of sodium hydroxide in the given mixture of sodium hydroxide and sodium chloride.
2. Determine the amount of Oxalic acid and Sulphuric acid in one liter of solution, given standard sodium hydroxide and Potassium Permanganate.
3. Determine the amount of copper in the copper ore solution, provided hypo solution.
4. Argent metric titration one each by Vohlard's method and by Mohr's method.
5. Complex metric titrations.
6. Determine the heat of neutralization of strong acid with strong base.
7. Determine the surface tension of a liquid using drop weight method.
8. Determine viscosity of a given liquid (density to be determined).
9. Determine the reaction rate constant for the Ist order reaction.
10. Determine the cell constant of a conductivity cell.
11. Find out strength of given solution of HClconduct metrically.
12. Preparation of urea formaldehyde and phenol formaldehyde resins.
13. Determination of dissolved oxygen in the given sample of water.
14. Determination of alkalinity in the given sample of water.

ETME157	WORKSHOP PRACTICE	L	T	P	C
		-	-	3	1.5

UNIT I

Materials: Spectrography method for finding composition of materials.

Wood Working Shop: Making of various joints, Pattern making.

UNIT II

Foundary Shop: Bench moulding with single piece pattern and two piece pattern.Floor moulding - Making of bend pipe mould etc. Machine moulding - Making of mould using Match-plate pattern. Core making- Making and baking of dry sand cores for placing in horizontal, vertical and hanging positions in the mould cavity.

Fitting Shop: Learning use of fitting hand tools, marking tools, marking gauge. Exercises: Jobs made out of MS Flats, making saw - cut filling V-cut taper at the corners, circular cut, fitting square in square, triangle in square.

UNIT III

Welding Shop: Electric arc welding, Edge preparations, Exercises making of variousjoints. Bead formation in horizontal, vertical and overhead positions.

Gas Welding: Oxy-Acetylene welding and cutting of ferrous metals.

Soldering: Dip soldering.

Brazing: With Oxy-Acetylene gas.

UNIT IV

Sheet Metal Shop: Learning use of sheet-metal tools, Exercises: Making jobs out of GIsheet metal. Cylindrical, Conical and Prismatic shapes. Project Shop: Extrusion of soft metals, Plastic coating of copper wires, Plastic.

ETCS166	OBJECT ORIENTED PROGRAMMING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIENTS

Q1. Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.

Q2. A point on the two dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates.

Write a program that uses a structure called point to model a point. Define three points, and have

the user input values to two of them. Than set the third point equal to the sum of the other two,

and display the value of the new point. Interaction with the program might look like this:

Enter coordinates for P1: 3 4

Enter coordinates for P2: 5 7

Coordinates of P1 + P2 are : 8, 11

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

Enter first number, operator, second number: 10/ 3

Answer = 3.333333

Do another (Y/ N)? Y

Enter first number, operator, second number 12 + 100

Answer = 112

Do another (Y/ N) ? N

Q4. A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this:

Enter your area code, exchange, and number: 415 555 1212

My number is (212) 767-8900

Your number is (415) 555-1212

Q 5. Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB.

Use a friend function to carry out the addition operation. The object that stores the results maybe

a DM object or DB object, depending on the units in which the results are required.

The display should be in the format of feet and inches or metres and cenitmetres depending on

the object on display.

Q 6. Create a class rational which represents a numerical value by two double values- NUMERATOR & DENOMINATOR. Include the following public member Functions:

• constructor with no arguments (default).

• constructor with two arguments.

• void reduce( ) that reduces the rational number by eliminating the highest common factor between the numerator and denominator.

• Overload + operator to add two rational number.

• Overload >> operator to enable input through cin.

• Overload << operator to enable output through cout.

Write a main ( ) to test all the functions in the class.

Q 7. Consider the following class definition

```
class father {
protected : int age;
public;
father (int x) {age = x;}
virtual void iam ( )
{ cout < < "I AM THE FATHER, my age is : "<< age<< end1:}
};
```

Derive the two classes son and daughter from the above class and for each, define iam ( ) to write

our similar but appropriate messages. You should also define suitable constructors for these classes.

Now, write a main ( ) that creates objects of the three classes and then calls iam ( ) for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam ( ) through the pointer to demonstrate polymorphism in action.

Q 8. Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

Q9. A hospital wants to create a database regarding its indoor patients. The information to store include

a) Name of the patient

b) Date of admission

c) Disease

d) Date of discharge

Create a structure to store the date (year, month and date as its members). Create a base class to

store the above information. The member function should include functions to enter information

and display a list of all the patients in the database. Create a derived class to store the age of the

patients. List the information about all the to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).

Q 10. Make a class **Employee** with a name and salary. Make a class **Manager** inherit from **Employee**. Add an instance variable, named department, of type string. Supply a method to **toString** that prints the manager's name, department and salary. Make a class **Executive** inherit from **Manager**. Supply a method **to String** that prints the string **"Executive"** followed by the information stored in the **Manager** superclass object. Supply a test program that tests these classes and methods.

Q11. Imagine a tollbooth with a class called toll Booth. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ), increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC kay should cause the program to print out the total cars and total cash and then exit.

Q12. Write a function called reversit ( ) that reverses a string (an array of char). Use for loop that swaps the first and last characters, then the second and next to last characters and so on. The string should be passed to reversit ( ) as an argument. Write a program to exercise reversit ( ). The program should get a string from the user, call reversit ( ), and print out the result. Use an input method that allows embedded blanks. Test the program with Napoleon's famous phrase, "Able was I ere I saw Elba)".

Q13. Create some objects of the string class, and put them in a Deque-some at the head of the Deque and some at the tail. Display the contents of the Deque using the forEach ( ) function and a user written display function. Then search the Deque for a particular string, using the first That ( ) function and display any strings that match. Finally remove all the items from the Deque using the getLeft ( ) function and display each item. Notice the order in which the items are displayed: Using getLeft ( ), those inserted on the left (head) of the Deque are removed in "last in first out" order while those put on the right side are removed in "first in first out" order. The opposite would be true if getRight ( ) were used.

Q 14. Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data ( ) to initialize base class data Members and another member function display_area ( ) to compute and display the area of figures. Make display_area ( ) as a virtual function and redefine this function in the derived classes to suit their requirements.

Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area.

Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows:

Area of rectangle = x * y

Area of triangle = ½ * x * y

ETME158	ENGINEERING GRAPHICS LAB	L	T	P	C
		-	-	3	1.5

Course Objective: The Objective of this course is to acquaint engineering students regarding drawings, projections of planes, projection of solid and isometric projection of various objects.

UNIT I

Introduction: Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning line conventions and free hand practicing,

AUTO CAD, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints.

Orthographic Projections:

Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes.

UNIT II

Orthographic Projections of Plane Surfaces (First Angle Projection Only):

Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only.

UNIT III

Projections of Solids (First Angle Projection Only):

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions.

Sections and Development of Lateral Surfaces of Solids:

Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP.

UNIT IV

Isometric Projection (Using Isometric Scale Only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut
spheres.

TEXT BOOKS:

1. Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat.
2. Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006.

REFERENCE BOOKS:

1. Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.
2. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005-Prentice-Hall of India Pvt. Ltd., New Delhi.

SEMESTER - III

ETMA201	APPLIED MATHEMATICS -III	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to provide a brief knowledge of Applied Mathematics to the Engineering students. The students will learn about the Laplace transformation, Fourier series and Partial Differential Equations.

UNIT I

Fourier Series: Fourier Series, Euler's formulae, Even and Odd Functions, Having arbitrary Periods, Half range Expansion, Harmonic Analysis.

UNIT II

Fourier Transforms: Fourier transform, Sine and Cosine transforms, Properties of Fourier transform, Convolution, Fourier transforms of the derivate of a function, Application of Fourier transforms to differential equations.

UNIT III

Special Functions: Beta and Gamma functions, Bessel's functions, Recurrence relations of Bessel's function, orthogonality of Bessel function, Modified Bessel's functions, Ber and Bei functions, Legendre Polynomial, Rodrigue's formula, Recurrence relations of Legendre Polynomial, orthogonality of Legendre polynomials.

UNIT IV

Partial Differential Equation: Formation of first and second order linear equations, Laplace, Wave and Heat conduction equation, Initial and boundary value problems.

TEXT BOOKS:

1. E. Kresyig, "Advanced Engineering Mathematics", 5th Edition, John Wiley & Sons.

REFERENCE BOOKS:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed.
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition.
3. N.P.Bali, "Engineering Mathematics", Laxmi Publication.

ETEC231	ANALOG ELECTRONICS	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course to have a basic understanding of various electronic components and electronic instruments which is needed to pursue their engineering degree.

UNIT I

Semiconductor Physics: Basic concepts, types of semiconductors, diffusion and drift currents.

P-N junction diode : Ideal diode, P-N junction diode, Diode Current Equation, Diode Resistance, Transition and Diffusion Capacitance, Effect of Temperature, Carrier Life Time, Continuity Equation, Zener Diode, Photodiode, Light Emitting Diodes, Tunnel diode.

UNIT II

Applications of Diodes: Half-Wave Diode Rectifier, Full-Wave Rectifier, Clippers and clampers circuits.

Bipolar junction transistor: Introduction, PNP, NPN Transistors, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations Eber-moll's model.

UNIT III

Amplifiers: Introduction of different types of amplifiers and their characteristics, Principle of amplification, Frequency response of RC coupled amplifiers, amplifier bandwidth and

Concept of Cascaded Amplifiers, Feedback amplifiers, Effect of feedback on amplifier gain and bandwidth, Introduction to power amplifiers

Operational Amplifiers: Introduction to Op-amps, its characteristics and applications.

UNIT IV

Field Effect Transistor: Introduction, Classification, FET characteristics, Operating point, Biasing, enhancement & Depletion type MOSFETS.

Oscillators: Introduction and criteria for oscillations

Power Supplies: Switched mode power supplies, Voltage Regulators, Introduction to Inverters, power conditioners, UPS, A.C. Voltage stabilizers

TEXT BOOKS:

1. Boylestad & Nashelsky, "Electronic Devices & Circuits", Pearson Education, 10th Edition.

REFERENCE BOOKS:

1. Sedra A S and Smith K C, "Microelectronic Circuits" 4th Ed., New York, Oxford University Press, New York.
2. Tocci R J and Widmer N S, "Digital Systems – Principles and Applications", 8th Ed., Pearson Education India, New Delhi.
3. A.K. Sawhney, "A course in Electrical & Electronics Measurements & Instrumentation", Dhanpat Rai & Sons.

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ETEC210	DIGITAL ELECTRONICS	L	T	P	C
		3	1	-	4

Course Objective: The purpose of this course is to develop a strong foundation in analysis and design of digital electronics.

UNIT – I

Number Systems and Codes: Review of number systems, BCD codes and arithmetic, Gray code, self-complimenting codes, Error detection and correction.

Digital Circuits: Switching algebra & simplification of Boolean expressions, De Morgan's Theorem, Implementation of Boolean expressions (using logic gates)

UNIT – II

Combinational Logic Design: Combinational circuit designing, Minimization Techniques of Boolean functions such as Karnaugh map and Quine-Mc Cluskey methods, Arithmetic circuits, code convertors, multiplexers, demultiplexers, encoders, decoders & comparators. Parity generators and checkers.

Introduction to Sequential Logic: Need for sequential circuits, Binary cell, Latches and different types of Flip-Flop and their Conversions.

UNIT – III

Synchronous Sequential Circuit : Fundamentals of Synchronous sequential circuits, Analysis of Synchronous Sequential circuits, Design of Synchronous and Asynchronous Counters, Shift registers & Ring counters, Timing issues in synchronous circuits.

Asynchronous Sequential Circuits: Fundamentals of Asynchronous Sequential circuits. Analysis and design of Asynchronous Sequential circuits. Pulse mode and Fundamental-mode Circuits. Cycles, Races and Hazards in asynchronous circuits.

UNIT – IV

Synchronous Machines: Classification of synchronous machines, Analysis and design of Finite State Machines.

Logic Families: Performance metrics of logic gates, Basic Transistor-Transistor Logic and CMOS logic.

Converters: A/D and D/A converters and their types.

TEXT BOOKS:

1. G.K. Kharate -Digital Electronics, Oxford University Press
2. Aanand Kumar -Fundamentals of Digital Circuits, Prentice Hall of India

REFERENCE BOOKS:

1. Morris Mano, ―Digital design, Prentice Hall of India
2. R.P. Jain- Modern Digital Electronics, Tata Mc Graw Publishers
3. Floyd- Digital Fundamentals, Pearson Publication

ETCS219	FOUNDATION OF COMPUTER SYSTEMS	L	T	P	C
		3	1	-	4

Course Objective: The computer science goals of this course are to introduce the fundamental organization and structure of computer systems. A broader set of objectives for this course is to teach critical thinking, how to learn, and how to communicate technical concepts.

UNIT I

Set Theory: Introduction to set theory, Set operations, Algebra of sets, Duality, Finite and Infinite sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Equivalence relations and partitions , Partial ordering relations and lattices Function and its types, Composition of function and relations, Cardinality and inverse relations

U**NIT II**

Graphs And Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eurelian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula, Trees, Spanning trees, Binary trees and its traversals.

UNIT III

Propositional logic: Basic operations: AND(^), OR(v), NOT(~), Truth value of a compound statement, propositions, tautologies, contradictions, Validity of Arguments

Group theory: Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal subgroups, Cyclic groups, Cosets, Lagrange's theorem.

UNIT IV

Recursion And Recurrence Relation : linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

Techniques Of Counting: Permutations with and without repetition, Combination.

TEXT BOOKS:

1. Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH.
2. C.L. Liu, "Elements of Discrete Mathematics", TMH.

REFERENCES BOOKS:

1. Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI.
2. NarsinghDeo, "Graph Theory with Application to Engineering and Computer Science", PHI.
3. J. P. Trembly& P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill.

4. Vinay Kumar, “Discrete Mathematics”, BPB Publications.

ETCS211	OPERATING SYSTEMS	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to cover the classical internal algorithms and structures of operating systems, including CPU scheduling, memory management, and device management.

UNIT I

Introduction: Introduction to Operating System Concepts (including Multitasking, multiprogramming, multi user, Multithreading etc)., Types of Operating Systems: Batch operating system, Time-sharing systems, Distributed OS, Network OS, Real Time OS; Various Operating system services, architecture, System programs and calls.

UNIT II

Process Management: Process concept, process scheduling, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF**),** Priority Scheduling, Round Robin(RR), Multilevel Queue Scheduling.

UNIT – III

Memory Management: Logical & Physical Address Space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging; virtual memory management - Demand Paging & Page-Replacement Algorithms; Demand Segmentation.

File System: Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, Introduction to distributed file system.

UNIT – IV

Process-Synchronization & Deadlocks: Critical Section Problems, semaphores; methods for handling deadlocks-deadlock prevention, avoidance & detection; deadlock recovery.

I/O Systems: I/ O Hardware, Application I/ O Interface, Kernel, Transforming I/ O requests, Performance Issues.

TEXT BOOKS:

1. Silbersachatz and Galvin, “Operating System Concepts”, Pearson

REFERENCES BOOKS:

1. Tannenbaum, “Operating Systems”, PHI, 4th Edition.
2. William Stallings, “Operating Systems Internals and Design Principles”, PHI
3. HallMadnick, J. Donovan, “Operating Systems”, Tata McGraw Hill.
4. W. Tomasi, “Electronic Communication Systems” Pearson Education, 5th Edition

ETCS217	DATA STRUCTURES	L	T	P	C
		3	1	-	4

Course Objective: The main objective of this course is to provide an introduction to basic data structures, and algorithms.

UNIT I

Introduction to Data Structures: Definition of data structures and abstract data types, Static and Dynamic implementations, Examples and real life applications; Arrays**:** ordered lists, representation of arrays, sparse matrices, polynomial arithmetic

Running time: Time Complexity, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Evaluating time Complexity.

UNIT II

The Stacks : Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples : Infix, postfix, prefix representation, Conversions, Applications.

Queues and Lists: Definition, Array based implementation of linear Queues, Circular implementation of Queues, Linked Lists: Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list Linked List implementation of Queues and Stacks Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority Queues, Applications.

UNIT III

Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, Extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees(with and without recursion), AVL trees, Threaded trees

Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees, Shortest path

UNIT IV

Sorting Algorithms : Introduction, Sorting by exchange, selection, insertions : Bubble sort, Straight selection sort, Efficiency of above algorithms,; Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays& Algorithms; Quick sort Algorithm analysis,

Heap sort: Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach;

Searching Algorithms: Straight Sequential Search, Binary Search (recursive & non–recursive Algorithms)

TEXT BOOKS:

1.E. Horowitz and S. Sahani, "Fundamentals of Data Structures", GalgotiaBooksource Pvt. Ltd.

2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI.

REFERENCES BOOKS:

1. Schaum's outline series, "Data Structure", TMH.
2. Y. Langsamet. al., "Data Structures using C and C++", PHI.
3. Yashwant Kanetkar, "Data Structure through C", BPB.

ETEC272	ANALOG ELECTRONICS LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

MINIMUM TEN EXPERIMENTS ARE TO BE PERFORMED:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode I-V characteristics.
3. To study diode based clipping and clamping circuits
4. To study half wave, full wave and bridge rectifier with filters and calculation of ripple factor.
5. To study the input and output characteristics of a transistor in its various configurations (CE and CB).
6. To study the gain and plot the frequency response of a single stage transistor amplifier.
7. To measure gain and plot the frequency response of double stage RC coupled amplifier.
8. To be familiar with IC-741.
9. To study Op amp as summing amplifier.
10. To study Op amp as integrator and differentiator.
11. To study and plot the characteristics of a JFET in its various configurations.
12. To study and plot the characteristics of a MOSFET in its various configurations.

ETEC256	DIGITAL ELECTRONICS LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of V_{cc} and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.
9. Static and Dynamic Characteristic of NAND and Schmitt-NAND gate(both TTL and MOS)
10. Study of Arithmetic Logic Unit.
11. Mini Project.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

ETCS255	OPERATING SYSTEMS LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

Write down and execute the following programs using C/C++

1. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
2. Write C programs to simulate UNIX commands like ls, grep, etc.

3. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2 sessions)
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2 sessions)
5. Developing Application using Inter Process Communication (using shared memory, pipes or message queues)
6. Implement the Producer –Consumer problem using semaphores (using UNIX system calls).
7. Implement some memory management schemes –I.
8. Implement any file allocation technique (Linked, Indexed or Contiguous).
9. Write programs based on shell programming

ETCS257	DATA STRUCTURES LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Write a program for multiplication and transpose of array.
2. Write a program to compute the transpose of a sparse matrix
3. Write a program to implement push and pop operation in Stack.
4. Write a program to convert a Infix notation to post fix notation using stacks
5. Write a program to evaluate postfix notation using stacks
6. Write a program to implement a linear queue
7. Write a program for swapping two numbers using call by value and call by reference strategies.
8. Write a program to insert and delete a node in linked list. The number of nodes to inserted and deleted should be governed by user.
9. Write a program to implement a linear search arrays and linked list.
10. Using iteration and recursion concepts write programs for finding the element in the array using the Binary search method.
11. Write the programs to implement bubble sort.
12. Write a program using iteration and recursion concepts for quick sort.
13. Write a program to implement merge sort.
14. Write a program to simulate various tree traversal techniques.
15. Write a program to simulate various BFS and DFS.

SEMESTER - IV

ETCS202	SOFTWARE ENGINEERING	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to provide a brief knowledge of Software Engineering to the under graduate Engineering students. The students will learn about the Requirement Analysis, Various SDLC Models, Software Design etc.

UNIT I

Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

UNIT II

Software Metrics: Software measurements: What & Why, Token Count, Size Estimation like lines of Code & Function Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics, Cost Estimation Models: COCOMO, COCOMO-II.

System Design: Design Concepts, design models for architecture, component, data and user interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top Down and Bottom Up design approaches; Functional Versus Object Oriented Approach, Design Specification.

Coding: TOP-DOWN and BOTTOM-UP structure programming, Information Hiding, Programming Style, and Internal Documentation, Verification.

UNIT III

Unified Approach and Unified Modeling Language: The Unified Approach: Layered Approach to OO Software Development, UML: UML Diagrams for Structure Modeling, UML Diagrams for Behavior Modeling, UML Diagram for Implementation and deployment modeling.

Software Reliability: Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models, Basic Model, Logarithmic Poisson Model, Software Quality Models, CMM & ISO 9001.

UNIT IV

Software Testing: Testing process, Design of test cases, 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, Alpha & Beta Testing, Testing Tools & Standards.

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

TEXT BOOKS:

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International.
2. R. S. Pressman, "Software Engineering – A practitioner's approach", McGraw Hill Int. Ed.
3. W.S. Jawadekar, "Software Engineering – Principles and Practices", McGraw Hill

REFERENCE BOOKS:

1. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, TMH.
2. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.
3. I. Sommerville, "Software Engineering", Addison Wesley.
4. K. Chandrasehakhar, "Software Engineering & Quality Assurance", BPB.

ETMA208	NUMERICAL ANALYSIS	L	T	P	C
		3	1	-	4

Course objective: The objective of the course is to provide a brief knowledge of numerical methods to students of various engineering disciplines. The course module includes basic numerical techniques and calculus methods.

UNIT I

Numerical Techniques: The solution of Linear and Non-Linear Equations: Direct Iteration Method, Regular-Falsi Method, Newton-Raphson Method. Solution of system of simultaneous equations by Guass Elimination, Gauss-Jacobi and Gauss-Seidal Methods. Finite Differences: Forward, Backward and Central Differences.

UNIT II

Interpolation and Numerical Calculus: Newton's Interpolation for Equi-spaced Values, Divided Differences and Interpolation Formula in terms of Divided Differences, Stirling's Central Difference Interpolation Formula, Lagrange's Interpolation Formula for Unequi-spaced Values, Numerical Differentiation. Numerical Integration: Newton-Cote's Quadrature Formula, Trapezoidal Rule, Simpson's One-third Rule and Simpson's Three-eighth Rule.

UNIT III

Numerical Solution of Ordinary Differential Equations: Picard's Method, Euler's Method, Modified Euler's Method, Runge-Kutta Method of Fouth Order, Milne's Predictor-Corrector Method.

UNIT IV

Computer Programming: Writing Programmes in C/C++ for Solving Numerical Problems. For Example, Programme for Solving Algebraic and Transcendental Equations by Newton-Rapson Method, Solving Simultaneous Equations by Gauss-Seidal Method. Programme for Interpolation by Lagrange's Method. Programme for Estimating the value an Integral by Simpsons's rule. Programme for Solving Differential Equation by Runge-Kutta Method, etc.

TEXT BOOKS:

1. M. K. Jain, S. R. K. Iyengarand R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New age International Publisher, India, 5th edition.
2. Kresyzig, Advanced Engineering Mathematics, John Wiley and Sons(Latest edition).
3. Veerarajan& Ramachandran, Numerical Methods: With Programs In C, Tata McGraw-Hill Education.

ETCS307	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	1	-	4

Course Objective: The computer science goals of this course are to introduce the Database Management System of computer systems. A broader set of objectives for this course is to teach DBMS Architecture, SQL, Normalization etc.

UNIT I

Basic Concepts and Conceptual Database Design: Database administrator & Database Users, Characteristics of the Database, Database Systems, Concepts and Architecture, Data Models, Schemes & Instances, DBMS Architecture & Data Independence, Database Languages & Interfaces, Overview of Hierarchical, Network & Relational Data Base Management Systems, Data Modelling Using The Entity-Relationship Model – Entities, Attributes and Relationships, Cardinality of Relationships, Strong and Weak Entity Sets, Generalization, Specialization, and Aggregation, Translating your ER Model into Relational Model.

UNIT II

Relational Model, Languages & Systems: Relational Data Model & Relational Algebra, Relational Model Concepts, Relational Model Constraints, Relational Algebra, SQL – A

Relational Database Language, Data Definition in SQL, View and Queries in SQL, Specifying Constraints and Indexes in SQL, Practicing SQL commands using ORACLE.

UNIT III

Relational Data Base Design and Oracle Architecture: Functional Dependencies & Normalization for Relational Databases, Functional Dependencies, Normal Forms Based on Primary Keys, (1NF, 2NF, 3NF & BCNF), Lossless Join and Dependency Preserving Decomposition, Oracle 8 Architecture, Database Storage, Oracle Software Structures, Shared Database Access Mechanism, Database Protection.

UNIT IV

Transaction Management: Transaction Concept and State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Concurrency Control Techniques, Lock-Based Protocols, Timestamp-based Protocols, Deadlock Handling, Recovery System, Failure Classification, Storage Structure, Recovery and Atomicity, Log-based Recovery, Shadow Paging, Recovery with Concurrent Transactions, Buffer Management, Indexing, Hashing and Query Processing: Query Processing, Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions, Concepts of Object Oriented Database Management Systems, Distributed Data Base Management Systems.

TEXT BOOKS:

1. Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH.
2. Steve Bobrowski, "Oracle 8 Architecture", TMH.

REFERENCES BOOKS:

1.C. J. Date, "An Introduction to Database Systems", 7th Ed., Narosa Publishing.
2. Elmsari and Navathe, "Fundamentals of Database Systmes", 4th Ed., A. Wesley.
3. J. D. Ullman, "Principles of Database Systems", 2nd Ed., Galgotia Publications.

ETCS220	ANALYSIS AND DESIGN OF ALGORITHM	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to study paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice. It also ensures that students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms, how a number of algorithms for fundamental problems in computer science and engineering work and compare with one another, and how there are still some problems for which it is unknown whether there exist efficient algorithms, and how to design efficient algorithms

UNIT I

Preliminaries: Review of growth of functions, Recurrences: The substitution method, The iteration method, The master method, Data Structures for Disjoint Sets.
Divide and Conquer Approach: Merge Sort, Quick sort, Medians and Order statistics, Strassen's algorithm for Matrix Multiplications.

UNIT II

Dynamic Programming: Elements of Dynamic Programming, Matrix Chain Multiplication, Longest common subsequence and optimal binary search trees problems.
Greedy Algorithms: Elements of Greedy strategy, An activity selection problem, Huffman Codes, A task scheduling problem.

UNIT III

Graph Algorithms: Representation of Graphs, Breadth First Search, Depth First Search, Topological Sort, Strongly Connected Components, Algorithm for Kruskal's and Prim's for finding Minimum cost Spanning Trees, Dijkstra's and Bellman Fort Algorithm for finding Single source shortest paths. All pair shortest paths and matrix multiplication, Floyd – Warshall algorithm for all pair shortest paths.

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-Complete problems.

TEXT BOOKS:

1.T. H. Cormen, C. E. Leiserson, R. L. Rivest, Clifford Stein, "Introduction to Algorithms", 2nd Ed., PHI.

REFERENCES BOOKS:

1.A. V. Aho, J. E. Hopcroft, J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addition Wesley.
2.Ellis Horowitz and SartazSahani, "Computer Algorithms", Galgotia Publications.
3.D. E. Knuth, "The Art of Computer Programming", 2nd Ed., Addison Wesley.

ETEC235	COMMUNICATION ENGINEERING	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to study Communication Systems in detail by understanding the baseband and band pass modulation.

UNIT I

Introduction to Communication systems: Communication system, Frequency spectrum of EM waves, Modulation, Bandwidth and information capacity, Transmission & Reception.
Noise: Internal noise (Thermal, shot, Transit time Miscellaneous); External noise (Atmospheric Industrial, Extra Terrestrial) Noise calculations; Noise Bandwidth, Noise figure; Noise temperature.

UNIT II
Amplitude Modulation: Generation of AM waves Carrier Systems, Modulation Index, Envelope Distortion, Power in AM SSB, SSB full carrier, vestigial sidebands, Single sideband generation methods, AM modulator circuits, AM demodulator circuits, FDM, TDM
Frequency Modulation: Generation of FM waves, Demodulation of FM waves

UNIT III
Pulse Digital Modulation: Sampling Theorem and its reconstruction, Quantization, PAM, PWM and PPM, Generation and detection techniques. PCM, DPCM, DM, ADM and their applications.

UNIT IV
Digital Modulation: Introduction to ASK, FSK, PSK (BPSK, QPSK, M-ary PSK), coherent and non-coherent detection, Error performance degradation in communication system. Nyquist theorem, Inter Symbol Interference (ISI), Eye pattern.
Line coding: properties, NRZ & RZ techniques, signaling format for Unipolar, polar, bipolar, AMI & Manchester coding

TEXT BOOKS

1. B. P. Lathi, "Modern Digital and Analog Communication System" Oxford University Press – 3rd Edition.
2. Taub Schilling, "Principles of Communication Systems" TMH, 2nd Edition.

REFERENCE BOOKS

1. Simon Haykin, "Communication Systems" John Wiley & Sons Inc, 4th Edition.
2. W. Tomasi, "Electronic Communication Systems" Pearson Education, 5th Edition.
3. George Kennedy, "Communication System" TMH – 4th Edition.
4. P. Chakravarti, "Analog Communication Systems" Dhanpatrai& Co.

ETMC226	FUNDAMENTALS OF MANAGEMENT	L	T	P	C
		3	-	-	3

Course Objective: This course covers the basic understanding of management, management vs. administration, production management, marketing management, financial management and their principles and functions.

UNIT I

Meaning of management, Definitions of Management, Characteristics of management, Management vs. Administration. Management-Art, Science and Profession. Importance of Management. Development of Management thoughts. Principles of Management. The Management Functions, Inter-relationship of Managerial functions.Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

UNIT II

Production Management : Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.

UNIT III

Marketing Management - Definition of marketing, marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

UNIT IV

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

TEXT BOOKS:

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

REFERENCE BOOKS:

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2. Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).
4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi

ETCS252	SOFTWARE ENGINEERING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

13. To identify the role of the software in today's world across a few significant domains related to day to day life Create SRS document of admission management for your university
14. To identify the problem related to software crisis for a given scenario
15. To identify the suitable software development model for the given scenario.
16. To identify the various requirement development activities viz. elicitation, analysis, specification and verification for the given scenario
17. To identify the various elicitation techniques and their usage for the Banking case study.
18. Identify the elements in Software Requirements Specification for a given document.
19. Draw E-R Diagram for Hockey League.
20. Draw a context diagram and a level-1 diagram that represent the selling system at the store.
21. Find out all software metrics for a Quadratic Equation program written in 'C'.
22. Identify the design principle that is being violated in relation to the given scenario.
23. To identify the usage of stubs or drivers in the context of an integration testing scenario.
24. Identify the different types of performance testing.
25. Identify the usage of regression testing.
26. Write various white box test cases to test the internal behavior of above program.
27. Write various Black box test cases to test the functionalities of above program.

ETCS276	COMMUNICATION ENGINEERING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

A. Simulation based

1. Introduction to software : MATLAB
2. Introduction to Communication Toolbox:
    a) Generation of sine and cosine wave
    b) Generation of AM signal
3. To generate ASK signal.
4. To generate PSK and FSK signal.

B. Hardware Based

1. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
2. Study of 4 channel Time Division Multiplexing system.
3. Study of Frequency Division Multiplexing.
4. To generate a FM Signal using Varactor & reactance modulation.
5. Study of pulse code modulation and demodulation with parity & Hamming code.
6. Study of ASK modulator and demodulator.
7. Study of FSK modulator and demodulator.
8. Study pulse data coding & decoding techniques for various formats.

ETCS355	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
		-	-	2	1

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

SEMESTER -V

ETCS323	JAVA PROGRAMMING	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to provide a brief knowledge of Java Programming to students. The students will learn how to develop software system using Java programming language. Students will also learn about designing of Website.

UNIT I

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

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

UNIT II

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

Input/output Programming: Basics Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net).

UNIT III

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes.

Swing: Working with windows, Graphics and Text, Java Swing - Lists, Trees, Tables, Styled Text Components, Progress Indicators and Component Organizers.

UNIT IV

Networking: Basics of network programming in Java, networking classes and interfaces, using java.net package, TCP/IP and Data-gram Programming, Connecting to a Server, Implementing Servers, Sending E-Mail, Making URL Connections, Advanced Socket Programming.

TEXT BOOKS:

1. Horstmann, “Computing Concepts with Java 2 Essentials”, John Wiley.

REFERENCES BOOKS:

1. E. Balaguruswamy, “Programming with Java: A Primer”, TMH.
2. Horstmann, “Computing Concepts with Java 2 Essentials”, John Wiley.
3. Decker &Hirshfield, “Programming Java: A introduction to programming using JAVA”, Vikas Publication.

4. TmyGaddies, “Starting out with Java”, Wiley Dreamtech.
5. Holzner, “HTML Blackbook”, Wiley Dreamtech.
6. Rick Dranell, “HTML 4 unleashed”, Techmedia Publication.
7. Shelley Powers, “Dynamic Web Publishing”, 2nd Ed., Techmedia.

ETCS304	COMPUTER NETWORKS	L	T	P	C
		3	1	-	4

Course Objectives: The subject of computer networking is enormously complex, involving many concepts, protocols, and technologies. To cope with the scope and complexity these protocols and technologies are woven together in an intricate manner in what is called the layered protocol stack (or suite).

UNIT I

Introduction of Computer Networks: Network Topologies: Bus, Star, Ring, Hybrid, Tree,Complete, Irregular –Topology; Types of Networks : Local Area Networks, Metropolitan AreaNetworks, Wide Area NetworksNetwork Architecture, Reference Model (ISO-OSI, TCP/IP), Functions of each layer, Services and Protocols of each layer.
The Physical Layer: Theoretical basis for data communication, transmission media- Magnetic Media, Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable, Fibre Cable, Structured Cabling, Cable Mounting, Cable Testing, Wireless transmission, the telephone system, narrowband ISDN, broadband ISDN

UNIT II

The Data Link Layer: Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, Examples of Data Link Protocols- VLANs,.
The Medium Access Sublayer: The channel allocation problem, multiple access protocols, IEEE standard 802 for LANS and MANS, high-speed LANs: DQDB,SDH/SONET, Network devices-repeaters, hubs, switches and bridges.

UNIT III

The Network Layer: Network layer design issues, routing protocols: RIP & OSPF, congestion control algorithm, IPv4 Address Classes, Subneting and Supernetting, Network Address Translation, Internet Control Protocols: ARP, RARP, ICMP and Overview of IPv6

UNIT IV

The Transport Layer: Connection Management, Flow control and multiplexing
Application Layer: Domain Name Registration & Registrars , Email – SMTP, POP,IMAP; FTP, , HTTP , Firewalls, Proxy Servers

TEXT BOOKS:

1. A. S. Tananbaum, "Computer Networks", 3rd Ed, PHI.

REFERENCE BOOKS:

1. U. Black, "Computer Networks-Protocols, Standards and Interfaces", PHI.
2. W. Stallings, "Computer Communication Networks", PHI.
3. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia.
4. Michael A. Miller, "Data & Network Communications", Vikas Publication.
5. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication.

ETCS206	COMPUTER GRAPHICS	L	T	P	C
		3	1	-	4

Course Objective: This course aims at familiarizing the student with basic transformation techniques, Curves, Projections etc. The course contains various Clipping Algorithms.. A focus will be put on knowledge of computer based graphics creation so that at the student at end of the course is well equipped to pursue either an industrial or academic career in the area.

UNIT I

Transformation, Projections, and Clipping Algorithms: Introduction to computer graphics, applications, hardware and software, 2D graphics, Bresenham's Line Drawing Algorithm, Homogeneous Coordinate System for 2D and 3D, Various 2D, 3D Transformation matrices (Translation, Scaling, Rotation, Shear), Rotation about an arbitrary point (2D), Rotation about an arbitrary axis (3D), Computing location of V.P, Clipping Algorithms, Sutherland-Cohen Clipping Algorithm.

UNIT II

Curves and Surfaces: Bresenham's Circle Drawing Algorithm, Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials, Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors, Testing for first and second order continuities

UNIT III

Projection and Solid Modelling: Parallel Projection, Oblique Projection on xy plane, Isometric Projection, Perspective Projection, One Vanishing Point (V.P.) projection from a point on z axis, Generation of 2 V.P. Projection, Isometric Projection, Perspective, Projection, one vanishing Pint (VP), projection from 0 point on z axis, Generation of 2 VP Projector & Projections, Solid Modelling.

UNIT IV

Shading and Hidden Surface Removal: Shading, Illumination Model for diffused Reflection, Effect of ambient lighting, distances, Specular Reflection Model, Computing Reflection Vector, Curved Surfaces, Polygonal Approximations, Gourard Shading, Phong Model, Hidden Surface Removal, Back Face Detection, Depth Buffer (Z-Buffer, A-Buffer) Method, Scan Line Method, Depth Sorting Method, Area Subdivision Method.

TEXT BOOKS:

1.Foley et. al., "Computer Graphics Principles & practice", Addison Wesley.

REFERENCES BOOKS:

1. D. Rogers and J. Adams, "Mathematical Elements for Computer Graphics", MacGraw-Hill International Edition.
2. D. Hearn and P. Baker, "Computer Graphics", Prentice Hall.
3. R. Plastock and G. Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, McGraw Hill.

ETCS214	THEORY OF COMPUTATION	L	T	P	C
		3	1	-	4

Course Objective: The goals of this course are to introduce the fundamental theory of computation to students. A broader set of objectives for this course is to present the basic concepts of formal languages, automata and computability theory to the students with methods to solve problems in these units.

UNIT I

Introduction to formal proof: Additional forms of proof, Inductive proofs, Finite Automata (FA), Deterministic Finite Automata (DFA), Non-deterministic Finite Automata (NFA) , Finite Automata with Epsilon transitions.

UNIT II

Regular Expression: FA and Regular Expressions, Proving languages not to be regular, Closure properties of regular languages, Equivalence and minimization of Automata.

UNIT III

Context-Free Grammar (CFG): Parse Trees, Ambiguity in grammars and languages, Definition of the Pushdown automata, Languages of a Pushdown Automata, Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata. Normal forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, Programming Techniques for TM.

UNIT IV

A language that is not Recursively Enumerable (RE): An undecidable problem that is RE, Undecidable problems about Turing Machine, Post's Correspondence Problem.

TEXT BOOK:

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education.

REFERENCE BOOKS:

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education.
2. Thomas A. Sudkamp," An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education.
3. Raymond Greenlaw an H.James Hoover, "Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers.
4. MichealSipser, "Introduction of the Theory and Computation", Thomson Brokecole.
5. J. Martin, "Introduction to Languages and the Theory of computation" Third Edition, Tata Mc Graw Hill.

ETEC311	MICROPROCESSOR SYSTEMS	L	T	P	C
		3	1	-	4

Course Objective: The purpose of this course is to teach students the fundamentals of microprocessor and microcontroller systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microprocessor/microcontroller implementation.

UNIT I:

Introduction: Evolution of microprocessors, technological trends in microprocessor development. The Intel family tree, CISC Versus RISC, Applications of Microprocessors.

8086 CPU Architecture: Introduction to 8085, 8086 Block diagram; description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU, 8086 Pin diagram descriptions, Generating 8086 CLK and reset signals using 8284, WAIT state generation, Microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module

UNIT II:

8086 Instruction Set: Instruction formats, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions; Assembler directives.
8086 Programming Techniques: Writing assembly Language programs for logical processing, arithmetic processing, timing delays; loops, data conversions. Writing procedures; Data tables, modular programming, Macros

UNIT III:

Main Memory System Design: Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode, Address decoding techniques, Interfacing SRAMS; ROMS/PROMS. Interfacing and refreshing DRAMS, DRAM Controller – TMS4500.

UNITIV:

Basic I/O Interface: Parallel and Serial I/O Port design and address decoding. Memory mapped I/O Vs Isolated I/O Intel's 8255 and 8251- description and interfacing with 8086, ADCs and DACs, types, operation and interfacing with 8086, Interfacing Keyboards, alphanumeric displays, multiplexed displays, and high power devices with 8086.

Interrupts and DMA: Interrupt driven I/O. 8086 Interrupt mechanism; interrupt types and interrupt vector table, Intel's 8259, DMA operation, Intel's 8237, Microcomputer video displays.

TEXT BOOKS:

1. D.V.Hall , Microprocessors and Interfacing , McGraw Hill

REFERENCE BOOKS:

1. B.Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai
2. M. Rafiquzzaman, "Microprocessor Theory and Application" PHI.
3. Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai
4. Vaneet Singh and Gurmeet Singh, "Microprocessor and Interfacing" Satyaprakashan
5. J Uffenbeck , The 8086/8088 family , (PHI).
6. Liu,Gibson , Microcomputer Systems – The 8086/8088 family

ETCS315	FUNDAMENTALS OF iOS DEVELOPMENT	L	T	P	C

		1	**-**	**-**	**1**

Course Objective: The objective of the course is to provide skills to develop applications for OS X and iOS. It includes introduction to development framework Xcode. Objective-C is used as programming language to develop the applications. Objective-C is the superset of the C programming language and provides object-oriented capabilities and a dynamic runtime. Objective-C inherits the syntax, primitive types, and flow control statements of C and adds syntax for defining classes and methods.

UNIT I

Introduction to IDE and SDK of iOS App Development: Xcode-The SDK environment, Supporting tools, Advance settings. Development Technique, Fundamental of Object Oriented Programming, The MVC architecture.

UNIT II

Objective-C: Introduction to Objective C, Primitive Data Types, Conditions, Loops, Functions, Arrays, Pointers, Structures, Classes, Objects, Foundation, Memory Management, Inheritance, Categories, Protocols, Predicates, Blocks, Multi-Threading.
Objects Send and Receive Messages concept, Use of Pointers to Keep Track of Objects, Methods - Return Values.

UNIT III

Encapsulating Data: Properties of Encapsulation of an Object's Values, Declare Public Properties for Exposed Data, Use Accessor Methods to Get or Set Property Values, Concept of Dot Syntax, Properties Are Backed by Instance Variables.
Dealing with Errors: Use NSError for Most Errors, Some Delegate Methods Alert You to Errors, Some Methods Pass Errors by Reference

UNIT IV

Developing iOS Applications: iOS App Anatomy, Design Principles, Creating a Basic Hello World App with interface elements, UI View & Controller, UI Elements, Trigger Actions, Storyboard, Device Orientations, Using Gestures, Popovers and Modal Dialogs, Creating Universal Apps, Status Bar, Navigation Bar, Tab Bar, Content Views (e.g. Image view, Map View etc.), UI Table View and Table View Controller, Core Data, Test your App, Publishing your App.

TEXT BOOKS:

1. Effective objective C 2.0, Matt Galloway, Effective software development series, Scott Meyers.

REFERENCE BOOKS:

1. iOS 7 Development by James Bucanek.

2. Programming in Objective-C (5th Edition) (Developer's Library) by Stephen G. Kochan.
3. iOS 6 Development Unleashed: Developing Mobile Applications for Apple iPhone, iPad, and iPod Touch by Robert McGovern

ETCS361	JAVA PROGRAMMING LAB	L	T	P	C
		-	-	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.

ETCS365	COMPUTER NETWORKS LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Write specifications of latest desktops and laptops.
2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
3. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
4. Preparing straight and cross cables.
5. Study of various LAN topologies and their creation using network devices, cables and computers.
6. Configuration of TCP/IP Protocols in Windows/Linux.
7. Implementation of file and printer sharing.
8. Designing and implementing Class A, B, C Networks
9. Subnet planning and its implementation
10. Installation of ftp server and client.

ETCS363	FUNDAMENTALS OF iOS DEVELOPMENT LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Create an Objective-C program that displays the Phrase "Hello World".
2. Write an Objective-C program for displaying the value of variables.
3. Write an Objective-C program for displaying the sum of two variables.
4. Create an Objective-C program for displaying the subtraction of the two variables.
5. Create a Button using Objective-C.
6. Create a Decorated Button with event.
7. Create a Simple Calculator.
8. Write a program for UI switch.
9. Write a program for UI slider.
10. Write a program for creating Story Boards.

ETCS258	COMPUTER GRAPHICS LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Write a program to draw a point on screen. Study of various built in commands to draw basic objects on screen.
2. Write a program to implement Bresenham's Line Drawing Algorithm.
3. Write a program to implement various 2D, 3D Transformation matrices such as Translation, Scaling, Rotation, and Shear.
4. Write a program to implement Sutherland-Cohen line Clipping Algorithm.
5. Write a program to implement Bresenham's Circle Drawing Algorithm.
6. Write a program to implement Bezier Curves.
7. Write a program to implement B-Spline Curves.
8. Write a program to implement various Projections of 2D objects.
9. Write a program to implement various Projections of 3D objects.
10. Write a program to implement Isometric Projection.

ETEC353	MICROPROCESSOR SYSTEMS LAB	L	T	P	C
		-	-	2	1

List of Experiment using 8086 Micro-processor

ANY TEN EXPERIMENTS SHOULD BE PERFORMED:

1. a) Familiarization with 8086 Trainer Kit.
   b) Familiarization with Digital I/O, ADC and DAC Cards
   c) Familiarization with Turbo Assembler and Debugger S/Ws.
2. Write a program to arrange block of data in
   (i) Ascending
   (ii) descending order
3. Write a program to find out any power of a number such that Z = X .
   Where N is programmable and X is unsigned number.
4. Write a program to generate.
   (i) Sine Waveform (ii) Ramp Waveform (iii) Triangular Waveform Using DAC Card.
5. Write a program to measure frequency/Time period of the following functions.
   (i) Sine Waveform (ii) Square Waveform (iii) Triangular Waveform using ADC Card.
6. Write a program to increase, decrease the speed of a stepper motor and reverse its direction of rotation using stepper motor controller card.
7. Write a programmable delay routine to cause a minimum delay = 2MS and a maximum delay = 20 minutes in the increments of 2 MS
8. a) Use DOS interrupt to read keyboard string/character.
   b) Use BIOS interrupt to send a string/character to printer.
9. Write a program to :
   (i) Create disk file
   (ii) Open, write to and close- a disk file.
   (iii) Open, read from and close a disk file.
   (iv) Reading data stamp of a file using BIOS interrupt.
10. i) Erasing UVPROMs and EEPROMs
    ii) Reprogramming PROMs using computer compatible EPROM Programmer.
11. Studying and Using 8086 In-Circuit Emulator

ETCS 381	PRACTICAL TRAINING	L	T	P	C
		-	-	-	2

At the end of fourth semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization. The typed report should be in a prescribed format.

The report will be evaluated in the V Semester by a Committee consisting of three teachers' from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization. The student will interact with the committee through presentation to demonstrate his/her learning.

SEMESTER - VI

ETCS412	COMPILER DESIGN	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to provide a thorough understanding understand the theory and practice of compiler implementation, learn finite state machines and lexical scanning, context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation.

UNIT I

Introduction to Compiling: Compilers, Analysis of the source program, the phase of a compiler, Cousins of the compiler, the grouping of phases, Compiler-constructions tools.

A Simple One-Pass Compiler: Syntax definition, Syntax-directed translation, Parsing, A translator for simple expressions, Lexical analysis, Incorporating a symbol table, Abstract stack machines.

UNIT II

Lexical Analysis: The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language of specifying lexical analyzers, Design of a lexical analyzer generator.

Syntax Analysis: The role of the parser, writing a grammar, Top-down parsing; Bottom-up parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars, Parser generators.

UNIT III

Syntax-Directed Translation: Syntax-direct definitions, Construction of syntax trees, Bottom-up evaluation of S- attributed definitions, L-attributed definitions, and Top-down translation.

Type Checking: Type systems, Specification of a simple type checker.

Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, Parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques.

UNIT IV

Intermediate Code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions.

Code Generation: Issues in the design of a code generator, Target machine, Run-time storage management, Basic blocks and flow graphs.

Code Optimization: Introduction, The Principle sources of optimization.

TEXT BOOKS:

1. Aho, Ullman & Ravi Sethi, "Principles of Compiler Design", Pearson Education.

REFERENCE BOOKS:

1.Andrew L. Appel, "Modern Compiler Implementation in C",Delhi, Foundation Books.
2. Dick Gruneet. Al., "Modern Compiler Design", Wiley Dreamtech.
3. R. J. Schalkoff, "Artificial Intelligence – An Engineering Approach", McGraw Hill Int. Ed. Singapore.
4. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House.
5. Tim Johns, "Artificial Intelligence, Application Programming", Wiley Dreamtech.

ETCS312	INFORMATION AND NETWORK SECURITY	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course isto understand the fundamentals of security and to acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity

UNIT I

History of Information Security, Critical Characteristics of Information, NSTISSCSecurity Model, Components of an Information System, Securing the Components,Balancing Security and Access, SDLC, Security SDLC, Need for Security, Business Needs Threats, Attacks, Legal, Ethical andProfessionalIssues

UNIT II

Security Analysis: Risk Management, Identifying and Assessing Risk, Assessing and Controlling Risk

Logical Design: Blueprint for Security, Information Security Policy, Standards and Practices, NIST Models, VISA International Security Model, Design of SecurityArchitecture

UNIT III

Computer Security: Overview, Security Services, Mechanisms, Attacks-Access Control Matrix, Policy, Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

Cryptosystems & Authentication: Classical Cryptography, Substitution Ciphers, permutation Ciphers, Block Ciphers, DESModes of Operation, AES Linear Cryptanalysis, Differential Cryptanalysis, Hash Function, SHA 512, Message Authentication Codes, HMAC - Authentication Protocols

UNIT IV

Public Key Cryptosystems: Introduction to Public key Cryptography, Number theory, RSA Cryptosystem and Factoring Integer, Attacks on RSA

Network Security: Secret Sharing Schemes, Kerberos, Pretty Good Privacy (PGP), Secure Socket Layer (SSL), Intruders, Firewalls, Viruses

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education, 2006.

REFERENCE BOOKS:

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003
2. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
3. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007
4. Jonathan Katz, and Yehuda Lindell, "Introduction to Modern Cryptography", CRC Press, 2007

ETCS324	ADVANCED iOS DEVELOPMENT	L	T	P	C
		1	-	-	1

Course Objective: The objective of the course is to provide skills to develop applications for OS X and iOS. It includes introduction to development framework Xcode. Objective-C is used as programming language to develop the applications. Objective-C is the superset of the C programming language and provides object-oriented capabilities and a dynamic runtime. Objective-C inherits the syntax, primitive types, and flow control statements of C and adds syntax for defining classes and methods.

UNIT I

Values and Collections: Basic C Primitive Types in Objective-C, Additional Primitive Types, Hold Primitive Values in C Structures, Primitive Values in Objects ,Strings-Instances of the NSString Class ,Numbers Representation by Instances of the NS Number Class ,Representation of Other Values Using Instances of the NS Value Class , Collections as Objects ,Arrays as Ordered Collections ,Sets as Unordered Collections ,Dictionaries-Collection, Key-Value Pairs ,Represent nil with NS Null.

UNIT II

Working with Blocks: Block Syntax ,Blocks Take Arguments and Return Values ,Blocks Can Capture Values from the Enclosing Scope ,You Can Pass Blocks as Arguments to Methods or Functions ,Use Type Definitions to Simplify Block Syntax.

Dealing with Errors: Use NSError for Most Errors, Some Delegate Methods Alert You to Errors, Some Methods Pass Errors by Reference, Recovery of errors and generation of own errors.

UNIT III

Introduction to Swift: The language overview, Constants and Variables, Operators, Strings, Collections, Control Flow, Functions, Closures, Classes, Properties, Methods,Memory Management, Enumerations, Protocols, Nested Types, Error Handling, Playground.

UNIT IV

Advanced features of Swift Programming: Working with Arrays and Dictionaries, Optionals, Optional Binding, and Optional Chaining, Value ranges, Function Declarations, Utilizing Tuples, Closures and Trailing Closures, Computed Properties and Property Observers, Extensions, Generics, Memory Management, Debugging

TEXT BOOKS:

1. Beginning iOS Development with Swift by PawPrints Technologies, Feb 2015, kindle edition.

REFERENCE BOOKS:

1. Developing iOS 8 Apps with Swift by Stanford.

2.The Swift programming Language by Apple.

ETCS314	MOBILE COMPUTING	L	T	P	C
		3	1	-	4

Course Objective: To learn the concepts and principles of mobile computing and also to explore both theoretical and practical issues of mobile computing

UNIT I

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling.

Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes.

UNIT II

Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless markup Languages (WML).

UNIT III

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.

Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

UNIT IV

Global Mobile Satellite Systems: case studies of the IRIDIUM and GLOBALSTAR systems.

Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

TEXT BOOKS:

1. Yi-Bing Lin &ImrichChlamtac, "Wireless and Mobile Networks Architectures", John Wiley & Sons.

REFERENCE BOOKS:

1. Mark Ciampa, “Guide to Designing and Implementing wireless LANs”, Thomson learning, Vikas Publishing House.
2. Ray Rischpater, “Wireless Web Development”, Springer Publishing.
3. P.Stavronlakis, “Third Generation Mobile Telecommunication systems”, Springer Publishers.
4. Hansmann, “Principles of Mobile Computing”, Wiley Dreamtech.

ETCS222	COMPUTER SYSTEMS ORGANIZATION	L	T	P	C
		3	1	-	4

Course objective: The objective of the course is to provide a brief knowledge of Computer Architecture to students of engineering disciplines.

UNIT – I

General System Architecture: Classification of computers (Based on Computation methodology(Analog, digital, hybrid), based on generations, based on size & capability, based on Flynn’s criteria); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language ; Register Transfer language; Computer Buses (basic design using multiplexers), Bus width, Bus clocking(synchronous , asynchronous), bus arbitration, Bus examples(ISA bus, PCI bus, Universal serial bus) ; Computer Arithmetic ,Addition , subtraction (signed magnitude , signed 2’s complement , Multiplication (Booth’s algorithm)

UNIT – II

CPU Organization: CPU Architecture types (accumulator, register, stack, memory/ register) Instruction cycle (Fetch-Decode-Execute); Instruction set based classification of processors (RISC, CISC, and their comparison); Addressing modes (register, immediate, direct, indirect, indexed); Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid)

UNIT – III

Input /Output & Control Unit: Input Output Interface**,** Asynchronous data transfer (Strobe control, handshaking , serial transfer); Serial Vs parallel data transmission; Modes of data transfer (Programmed I/O, Interrupt driven, Direct Memory access (DMA)). Control Unit design:- Control unit design methods (hardwired & microprogrammed) Control Memory, Address Sequencing, Micro instructions.

UNIT – IV

Memory Organization: Memory device characteristics(access/ cycle time, cost per bit, volatility, storage density) ;Memory hierarchy ;Main memory Design (Semiconductor RAM & ROM organization, memory expansion,Static & dynamic memory types , their comparison); Associative memory Design ,Match logic ,Locality of reference principle(Temporal & Spatial) Cache mapping(Direct , associative , set associative); Cache writing

policies (Copy-Back , Writethrough); Virtual Memory(Address space , memory space , Address mapping using pages , Page replacement)

TEXT BOOKS:

1. M Mano, "Computer System and Architecture", PHI.

REFERENCES BOOKS:

1. Structured Computer Organisation by A.S. Tanenbaum, Prentice-Hall of India
2. J. P. Hayes, "Computer Architecture and Organization", McGraw Hill.
3. W. Stallings, "Computer Organization & Architecture", PHI.
4. Dandamudi, "Fundamental of Computer Organization & Design", Wiley Dreamtech.
5. Balabanian and Carlson, "Digital Logic Design Principles", Wiley Pub.

DEPARTMENTAL ELECTIVE (WITHOUT LAB)

ETCS318	PRINCIPLES OF PROGRAMMING LANGUAGES	L	T	P	C
		3	1	-	4

Course Objective:The aim of this course is to introduce the fundamental principles and techniques in the design and implementation of modern programming languages. The course covers these issues mainly as they relate to functional programming and object-oriented programming. The emphasis is on rigorous mathematical formalism and reasoning, both in describing programming languages (their syntax) and in analyzing their behavior (their semantics).

UNIT I

Introduction: Syntactic and semantic rules of a Programming language, Characteristics of a good programming language, Programming language translators compiler & interpreters Elementary data types – data objects, variable & constants, data types, Specification implementation of elementary data types, Declarations, type checking & type conversions, Assignment & initialization, Numeric data types, enumerations, Booleans & characters.

UNIT II

Structured data objects, Subprograms and Programmer Defined Data Type: Structured data objects & data types, specification & implementation of structured data types, Declaration & type checking of data structure, vector & arrays, records Character strings, variable size data structures, Union, pointer & programmer defined data objects, sets, files. Evolution of data type concept, abstraction, encapsulation & information hiding, Subprograms, type definitions, abstract data types.

UNIT III

Sequence Control and Data Control: Implicit & explicit sequence control, sequence control within expressions, sequence control within statement, Subprogram sequence control: simple call return, recursive subprograms, Exception &exception handlers, co routines, sequence control. Names & referencing environment, static &dynamic scope, block structure, Local data & local referencing environment, Shared data: dynamic &static scope. Parameter & parameter transmission schemes.

UNIT IV

Storage Management and Programming languages: Major run time elements requiring storage, programmer and system controlled storage management &phases, Static storage management, Stack based storage management, Heap storage management, variable & fixed size elements. Introduction to procedural, nonprocedural, structured, functional and object oriented programming language, Comparison of C & C++ programming languages.

TEXT BOOK:

1. T.W. Pratt, "Programming languages Design & implementation", Prentice Hall Publication.

REFERENCE BOOKS:

1. Ellis Horowitz, "Fundamentals of Programming languages", Galgotia publications (SpringerVerlag).
2. Allen Tucker & Robert Noonan, "Programming Languages – Principles and Paradigms", TMH.
3. C. Ghezzi, "Programming languages concepts", Wiley Publications.

ETCS320	DISTRIBUTED COMPUTING SYSTEMS	L	T	P	C
		3	1	-	4

Course Objective: This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission. The structure of distributed systems using multiple levels of software is emphasized

UNIT - I

Introduction: Distributed Systems, Examples of Distributed Systems, Resource Sharing and the Web Challenges, System Models- Introduction, Architectural Models, Functional Models, Characterization of Distributed Systems, Client-Server Communication,

Distributed Objects and Remote Invocation, Communication Between Distributed Objects, Remote Procedure Call, Events and Notifications.

UNIT - II

Distributed Operating Systems – Introduction, Issues, Communication Primitives, Inherent Limitations, Lamport's Logical Clock, Vector Clock, Causal Ordering, Global State, Cuts, Termination Detection, Distributed Mutual Exclusion, Non-Token Based Algorithms, Lamport's Algorithm - Token-Based Algorithms, Distributed Deadlock Detection Algorithms and Issues, Centralized Deadlock-Detection Algorithms, Agreement Protocols-Classification, Solutions, Applications.

UNIT- III

Distributed Resource Management - Distributed File systems, Architecture, Mechanisms, Design Issues, Distributed Shared Memory, Architecture, Algorithm, Protocols, Design Issues, Distributed Scheduling – Issues, Components, Algorithms.

UNIT- IV

Introduction to Distributed Algorithms, Kinds of Distributed Algorithm, Timing Models, Synchronous Network Algorithms: Synchronous Network Model, Leader Election in a Synchronous Ring, Algorithms in a General Synchronous Networks, Resource Security and Protection – Introduction, the Access Matrix Model, Implementation of Access Matrix Model, Safety in the Access Matrix

TEXT BOOK

1. Ajay D. Kshemkalyani and MukeshSinghal, "Distributed Computing – Principles, Algorithms and Systems", Cambridge University Press.

REFERENCE BOOKS

1. George Coulouris, Jean Dellimore and Tim KIndberg, "Distributed Systems Concepts and Design", Pearson Education, 4th Edition.
2. MukeshSinghal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-Hill.
3. Joshy Joseph and Craig Fellenstein, "Grid Computing", IBM Press.
4. Nancy A. Lynch, "Distributed Algorithms", Morgan Kaufmann Publishers.

ETCS322	E-COMMERCE AND ERP	L	T	P	C

		3	**1**	**-**	**4**

Course Objective: The objective of this course is to make students aware of the potential and limitations of ERP systems.The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

UNIT- I

Introduction and Concepts: Networks and Commercial transactions - Internet and other novelties, networks and electronic transactions today, Model for commercial transactions; Internet environment - Internet advantage, worlds wide web and other Internet sales venues; online commerce solutions.
Electronic Payment Methods: Updating traditional transactions; secure online offline secure processing; private data networks, Security protocols.

UNIT- II

Electronic Commerce Providers: On - line Commerce options, Company profiles, Electronic Payment Systems, Digital payment systems, First virtual Internet payment system, cyber cash model, On-line Commerce environments, Servers and commercial environments, E-commerce Servers
Digital Currencies: Operational process of Digicash, E-cash Trail, Using E-cash, Smart cards, Electronic Data Interchange: Basics, EDI versus Internet and EDI over Internet, Strategies, Techniques and Tools, Shopping techniques and online selling techniques.

UNIT- III

ERP - An Enterprise Perspective: Production finance, Personnel disciplines and their relationships, Transiting environment, MIS Integration for disciplines, Information/ workflow, Network Structure, client Server Integrator System, Virtual Enterprise.
ERP - Resource Management Perspective: Functional and Process of Resource, Management, Introduction to basicModules of ERP System: HRD, Personnel Management, Training and Development, Skill Inventory, Material Planning and Control, inventory, forecasting, Manufacturing, Production Planning, Production Scheduling, Production Control, Sales and Distribution, Finance, Resource Management in global scenario.

UNIT- IV

ERP - Information System Perspective: Functional to OLAP (Online Analysis and Processing), TP, OAS, KBS, MRP, BPR, SCM, REP, CRM, and Information Communication Technology.
ERP - Key Managerial Issues: Concept Selling, IT Infrastructure, Implication, of ERP System on business Organization, Critical success factors in ERP System, ERP Culture Implementation Issues, resistance to change, ERP Selection issues, return on Investment, pre and Post Implementation Issues.

TEXT BOOK

1. Ravi lalakota, Andrew Whinston, "Frontiers of Electronics Commerce", Addison Wesley.

REFERENCE BOOKS

1. V.K. Garg and N.K. Venkita Krishna, "Enterprise Resource Planning - Concepts and practice", PHI.
2. Greenstein and Feinman, "E-Commerce", TMH.
3. Bajan and Nag: "E-Commerce: The cutting Edge of Business", TMH.
   Greenstein, Feinman, "Electronic Commerce - Security, Risk Management and Control", TMH.

ETCS454	COMPILER DESIGN LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Write a lex Program to identify a simple and a compound statement.
2. Write a lex Program to count the number of keywords and identifiers in a sentence.
3. Write a lex program to convert an octal number to decimal number.
4. Write a Program to check whether given string a^nb^n is accepted by the grammar.
5. Write a program to check the validity of an arithmetic expression.
6. Write a Program to identify an input for the grammar a^nb (n>=10)
7. Write a program to decide whether given sentence is simple or compound.
8. Write a program to accept a block of PASCAL statements between begins and end and print the parse tree for the same.
9. Write a program to perform basic arithmetic operation in a calculator.
10. Do some more practice based on your class work.

ETCS366	MOBILE COMPUTING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. To check orthogonality of two codes.
2. To generate the Walsh codes.

3. To implement Code Division Multiple Access (CDMA).
4. To study frequency reuse.
5. To create a MIDlet suite with two MIDlets.
6. To study ChoiceGroup class and its implementation in J2ME.
7. To study Canvas class and its implementation in J2ME.
8. Write WML page using various tags such as select and option tags.
9. Write a WML page to display an image and to accept input from the user.
10. Study of Bluetooth Architecture.
11. Study of Wireless Application Protocol.
12. Study of IEEE 802.11 Network Topology.

ETCS374	ADVANCED iOS DEVELOPMENT LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS

1. Write a program for creating UI Date Picker.
2. Write a program for UI Progress View.
3. Create a UI Table view using Objective-C.
4. Write a program for Label view.
5. Develop a combined view for creating Button, Event and Label.
6. Write a program for UI segment control.
7. Create a program for Calendar using UI Date Picker.
8. Develop a scientific calculator using swings.
9. Create an editor like MS-word using swings.
10. Programming based on Swift Language.

SEMESTER - VII

ETCS401	ARTIFICIAL INTELLIEGENCE	L	T	P	C
		3	1	-	4

Course Objective: This course is an introduction to the basic concepts of Artificial Intelligence, with illustrations of current state of the art research and applications. The course will cover a broad spectrum of AI concepts and methods, and apply some of them in programming assignments.

UNIT I

Scope of AI: Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques-search knowledge, abstraction.
Problem Solving (Blind): State space search; production systems, search space control; depth-first, breadth-first search.
Heuristic Based Search: Heuristic search, Hill climbing, best-first search, A* Algorithm, Problem Reduction, Constraint Satisfaction.

UNIT II

Knowledge Representation: Predicate Logic: Unification, Modus Ponens, Modus Tokens, Resolution in Predicate Logic, Conflict Resolution Forward Chaining, Backward Chaining, Declarative and Procedural Representation, Rule based Systems.
Structured Knowledge Representation: Semantic Nets: Slots, exceptions and default frames, conceptual dependency.

UNIT III

Handling Uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning: Bayesian Inference, use of uncertainty factors.
Natural Language Processing: Introduction, Syntactic Processing, Semantic Processing, Pragmatic Processing.

UNIT IV

Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.
Expert Systems: Need and justification for expert systems, knowledge acquisition, Case Studies: MYCIN, RI.

TEXT BOOKS:

1. Artificial Intelligence, E. Rich and K. Knight, TMH.

REFERENCES BOOKS:

1. Artificial Intelligence, P. H. Winston,Pearson Education.
2. Introduction to AI and Expert Systems, D. W. Patterson, PHI.
3. Principles of AI, N. J. Nilsson, Narosa Publishing House.

ETMC421	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	-	-	3

UNIT-I

Promotion of Entrepreneurship: Meaning, definition and functions of an entrepreneur, qualities of a good entrepreneur; Role of Entrepreneur in economic development; Government measures for the promotion of small scale industries with special reference to Haryana; Cultural factors in developing entrepreneurship.

UNIT - II

Ownership and Location of Industrial Units: Different forms of Industrial Organization; Theories of Industrial location; Process of preparing project reports.

Size of Firm and Pricing

Concept of optimum firm, factors determining Optimum size.Technical, Managerial, Marketing Uncertainties and risk.Pricing Methods, Policies and procedures.

UNIT - III

Financing of Small Industries: Importance and need : Commercial Banks and term lending in India; Banks and under-writing of capital issues; Brief description about the role of other financial agencies viz; Industrial Finance Corporation of India. State Financial Corporation, Industrial Development Bank of India; Unit Trust of India.

UNIT - IV

Problems Faced by Small Enterprises: Problems connected with Marketing, Management of New Products; Power; Finance; Raw Material; Under-utilization of capacity; Causes of under – utilization; Rehabilitation of Sick Mills.

Government and Business

(a) Highlights of Industrial Policy and Licensing Policy.
(b) International Marketing with special reference to export documentation.

REFERENCE BOOKS :

1. Entrepreneurship of Small Scale Industries – Deshpande Manohar D, Asian Publishers, New Delhi
2. Environment and Entrepreneur – Tandon B.C., Asian Publishers, New Delhi.
3. The Industrial Economy of India – Kuchhal S.C.,Chaitanya, Allahabad.
4. Emerging Trends in Entrepreneurship Development Theories & Practices – Singh P.Narendra, International Founder, New Delhi

ETCS316	WEB TECHNOLOGIES	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce the basic concept and methodologies for web processing.

UNIT I

Overview of the Internet and World Wide Web and Search Engines, Common terminology: IP Addressing, URLs, Domain names. Website Creation and maintenance, Web Hosting and Publishing Concepts.

Static Webpages: HTML - Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and sound, lists: types of lists, tables, frames and floating frames, Developing Forms, Image maps.

UNIT II

Client-side scripting: JavaScript - Data Types, Control Statements, operators, Built in and User Defined Functions, Objects in JavaScript, Handling Events. HTML Document Object Model.

Page Styling: Separation of content and presentation in HTML, Cascading Style Sheets - Types of Style Sheets – Internal, inline and External style sheets, customizing common HTML elements, types of CSS selectors.

UNIT III

XML: Introduction to XML-Mark up languages, Features of Markup languages, XML Naming rules, Building block of XML, Document, Difference between HTML & XML, Components of XML, XML Parser, DTD's Using XML with HTML and CSS.

UNIT IV

Introduction to Web Services, UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services. AJAX –Introduction AJAX programming, Improving web page performance using AJAX.

Textbooks:

1. Internet and World Wide Web, Deitel H.M., P.J.Deitel , Pearson

Reference Books:

1. Web Technologies, Uttam K. Roy, Oxford University Press
2. HTML Black Book, Stephen Holzner, Wiley Dreamtech.
3. Web Technology, Rajkamal, Tata McGraw-Hill.
4. Web Technologies: A Computer Science Perspective, Jeffrey C. Jackson, Pearson.
5. XML: How to Program, Deitel&Deitel Nieto.

DEPARMENTAL ELECTIVE (WITHOUT LAB)

ETCS403	DISTRIBUTED ALGORITHMS	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce the basic concept and methodologies for distributed algorithms

UNIT I

Review of Prerequisite Topics: Graph theory, probability theory covering Markov's inequality, Chebyshev's inequality, Chernoff bounds, Markov chains and random walks.

UNIT II

Models for Distributed Computer Networks: Message passing and shared memory models, synchronous and asynchronous timing models, failure models. Complexity measures like time, space, and message complexity.

UNIT III

Fundamental Problems on Distributed Networks: Maximal independent set, minimum spanning tree, vertex colouring, dominating set, routing algorithms, leader election, Byzantine agreement, synchronizers, graph spanners, dynamic networks.

UNIT IV

Application Specific Problems: Storage and retrieval of data in peer-to-peer computing, coverage and routing in sensor networks, and rumour spreading in social networking.

Text Books:

1. Distributed Computing Principles, Algorithms and Systems,Ajay D. Kshemkalyani and Mukesh Singhal, Cambridge University Press.

Reference Books:

1. Distributed Computing: a Locality-Sensitive Approach, David Peleg, SIAM.
2. Distributed Algorithms, Nancy Lynch, Morgan Kaufmann Publishers.
3. Distributed Computing: Fundamentals, Simulations, and Advanced Topics, HagitAttiya and Jennifer Welch, Wiley.
4. Randomized Algorithms, by Rajeev Motwani and PrabhakarRaghavan, Cambridge University Press.

ETCS421	STORAGE SYSTEMS	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce the basic concept and methodologies for storage systems

UNIT I

Introduction: History: computing, networking, storage, Need for storage networking, SAN, NAS, SAN/NAS Convergence, Distributed Storage Systems, Mainframe/proprietary vs. open storage, Storage Industry Organizations and Major Vendors Market, Storage networking strategy (SAN/NAS or Distributed storage), Impact of Regulations: existing and new.

UNIT II

Technology: Storage components, Data organization: File vs. Block, Object; Data store; Searchable models, Storage Devices (including fixed content storage devices), File Systems, Volume Managers, RAID systems, Caches, Prefetching.

Network components: Connectivity: switches, directors, highly available systems, Fiber Channel, 1GE/10GE, Metro-Ethernet, Aggregation, Infiniband.

UNIT III

Error Management: Disk Error Management, RAID Error Management, Distributed Systems Error Management.

Highly available and Disaster-tolerant designs: Ordered writes, Soft updates and Transactions, 2-phase, 3-phase, Paxos commit protocols, Impossibility Results from Distributed Systems, Choose 2 of 3: Availability, Consistency and Partition Tolerance.

SAN Components: Fiber Channel, IP-based Storage (iSCSI, FCIP, etc.), Examples. **NAS:**NFS, CIFS, DAFS.

UNIT IV

Large Storage Systems: Google FS/BigTable, Cloud/Web-based systems (Amazon S3), FS+DB convergence, Programming models: Hadoop.

Archival Systems: Content addressable storage, Backup: server-less, LAN-free, LAN Replication issues, Storage Security, Storage Management, Device Management, NAS Management, Virtualization, Virtualization solutions.

Text Books:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information , EMC Education Services.

ETCS423	ROBOTICS	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce the basic concept and methodologies for robotics

UNIT I

Robot Anatomy Arm Geometry-Direct & Inverse Kinematics Problem, Arm Dynamics, DAlembert Equations of Motion, Synthesis of elements with mobility constraints, manipulations-trajectory planning, joint interpolated trajectories.

UNIT II

Control of Robot Manipulation-computed torque techniques, sequencing & adaptive control, resolved motion control.

UNIT III

Robot sensing-Range & Proximity & Higher-Level vision, illumination techniques, Imaging Geometry, Segmentation Recognition & Interpretation.

UNIT IV

Robot Programming Language, Characteristics of Robot Level & Task Level languages, Robot intelligence-State Space search, Robot learning, Robot Task Planning, Knowledge Engineering.

Latest trends in Robotics: Medical Robotics in Computer-

Text Books:

1. Robotics Control, Sensing, Vision & Intelligence, K.S Fu, R.C. CSG Lee, McGraw-Hill.

Reference Books:

1. Industrial Robotics, M.P. Groover, M.Weins, R.N. Nagel, N.C. Odrey, McGraw Hill
2. Robotics & AI, Andrew C. Straugard,PHI.

ETCS415	ADVANCE COMPUTER ARCHITECTURE	L	T	P	C
		3	1	-	4

UNIT I

Elements of modern computers (computing problems, algorithms, hardware, OS, system software);

Evolution of computer architecture; Factors affecting system performance; architectural development tracks (Multiple-processor tracks, Multi-Vector& SIMD tracks, Multithread & Dataflow tracks)

Conditions of parallelism (Data dependence, Resource dependence, control dependence, Bernstein's Conditions);Hardware & Software parallelism; Program partitioning & Scheduling; Program flow machines (Control flow, Dataflow, Demand driven); Parallel processor applications; Speedup performance laws (Amdahl's law, Gustafson'slaw); Scalability (Goals, Metrics, evolution of scalable architectures, open issues)

UNIT II

System Interconnect Architectures: Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors: Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction,

UNIT III

Memory Hierarchy Design: Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies.

Multiprocessor architectures: Symmetric shared memory architectures, distributed shared memory architectures, models of memory consistency, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, protocol design tradeoffs, synchronization,

UNIT IV

Parallel Models and Languages :- Parallel Programming Models(Shared-Variable, Message passing, Data-Parallel, Object-Oriented);Parallel languages & Compilers (language features for parallelism, parallel language constructs, optimizing compilers for

parallelism);Code optimization & partitioning (Scalar optimization , Local & Global optimization, Vectorization , code generation & scheduling , Trace scheduling compilation); Parallel programming environments

TEXT BOOKS:

1. Advanced computer architecture, Kai Hwang, McGraw Hills.
2. Computer Organization and Design, D. A. Patterson and J. L. Hennessey,Morgan Kaufmann.

REFERENCE BOOKS:

1. Computer Architecture and Organization, J.P. Hayes, McGraw Hills.
2. Memory System and Pipelined Processors,Harvey G.Cragon,Narosa Publication.
3. Parallel Computer, V.Rajaranam & C.S.R.Murthy, PHI.
4. Foundation of Parallel Processing, R.K. Ghose, Rajan Moona&Phalguni Gupta, Narosa Publications
5. Scalable Parallel Computers Architecture, Kai Hwang and Zu, MGH.
6. Computer Organization & Architecture, Stalling W, PHI.
7. Computer Architecture, Pipelined and Parallel Processor Design, M.J Flynn, Narosa Publishing.

ETCS420	GRAPH THEORY	L	T	P	C
		3	1	-	4

Course Objective: The course will cover all elementary concepts such as coloring, covering, Hamilton city, planarity, connectivity and so on, it will also introduce the students to some advanced concepts.

UNIT I:
INTRODUCTION
Graphs , Introduction , Isomorphism , Sub graphs , Walks, Paths, Circuits , Connectedness , Components , Euler Graphs , Hamiltonian Paths and Circuits , Trees , Properties of trees , Distance and Centers in Tree , Rooted and Binary Trees.

UNIT II:
TREES, CONNECTIVITY & PLANARITY
Spanning trees , Fundamental Circuits ,Spanning Trees in a Weighted Graph , Cut Sets , Properties of Cut Set , All Cut Sets , Fundamental Circuits and Cut Sets , Connectivity and Separability, Network flows , Isomorphism , Combinational and Geometric Graphs , Planer Graphs , DifferentRepresentation of a Planer Graph.

UNIT III:

MATRICES, COLOURING AND DIRECTED GRAPH

Incidence matrix , Submatrices , Circuit Matrix , Path Matrix , Adjacency Matrix , Chromatic Number , Chromatic partitioning , Chromatic polynomial , Matching , Covering , Four Color Problem , Directed Graphs , Types of Directed Graphs , Digraphs and Binary Relations , Directed Paths and Connectedness , Euler Graphs , Adjacency Matrix of a Digraph.

UNIT IV:

GRAPH ALGORITHM

Algorithms: Connectedness and Components , Spanning tree , Finding all Spanning Trees of a Graph , Set of Fundamental Circuits , Cut Vertices and Separability, Directed Circuits, Shortest Path Algorithm , DFS , Planarity Testing ,Isomorphism.

TEXT BOOKS

1. Graph Theory: With Application to Engineering and Computer Science, NarsinghDeo, PHI.

REFERENCES

1. Introduction to Graph Theory, R.J. Wilson, Pearson Education.
2. A First Look at Graph Theory, Clark J. & Holton D.A, Allied Publishers.
3. Elements of Discrete Mathematics, Liu C.L, McGraw Hill.

ETCS422	CLOUD COMPUTING	L	T	P	C
		3	1	-	4

Course Objective: The goal of this course is that the student will develop an understanding of the underlying structure of cloud and how they operate

UNIT I

Introduction: Cloud computing fundamentals, the role of networks in Cloud computing, Essential characteristics of Cloud computing, Cloud deployment model, Cloud service models,Multi-tenancy, Cloud cube model, Cloud economics and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines

UNIT II

Virtualization, Server, Storage and Networking: Virtualization concepts, types, Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures,

Internals of virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, HyperV.

UNIT III

Data in cloud: Storage system architecture, Big data, Virtualized Data Centre (VDC)architecture, VDC environments, concepts, planning and design, Managing VDC and cloud infrastructures, hybrid storage networking technologies (iSCSI, FCIP,FCoE), host system design consideration.

Cloud security: Cloud Security risks, Security, Privacy, Trust, Operating system security, Security of virtualization, Security risks posed by shared images, Security risk posed by a management OS, Xoar, Trusted virtual machine monitor.

UNIT IV

Quality of Service of Cloud: Taxonomy and survey of QoS management and service, Selection methodologies forcloud computing, Auto scaling,Load balancing and monitoring in open source cloud, Resourcescheduling for Cloud Computing.

Cloud patterns and application: Cloud Platforms: Amazon EC2 and S3, Cloudstack, Intercloud, Mobile Cloud Designingan image: Pre-packaged image, singleton instances prototype images Designing an architecture:Adapters, Facades, Proxies and balancers Clustering: The n-Tier Web pattern, Semaphores andLocking Map Reduce Peer-to-Peer framework.

Text Books:

1. Cloud Computing, Dr. Kumar Saurabh, Wiley Publication

Reference Books:

1.Cloud computing – Automated virtualized data center, Venkata Josyula,CISCO Press
2.Cloud and virtual data storage networking, Greg Schulr CRC Press
3.Handbook of Cloud Computing, Borko Furht,Springer

DEPARMENTAL ELECTIVE (WITH LAB)

ETCS425	MACHINE LEARNING	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce the basic concept and methodologies for machine learning.

UNIT I

Introduction and Background

Machine learning: overview and survey of its applications. Problem of induction and statistical inference: Input-output functions, Boolean functions, Parametric and

nonparametric inference, Probability, uncertainty and Bayes theorem, Introduction to typical learning tasks: regression, pattern recognition, feature selection, classification, clustering, rule induction (association). Model validation techniques: cross-validation, leave-one-out, majority, etc., Measures of performance (sensitivity, specificity, ROC curves, etc.)

UNIT II

Computational Environments for Machine Learning

Setting up of modeling frameworks (Weka, Orange and R), I/O formats, basic introduction to interfaces, Building models using Weka or Orange on UCI benchmark data sets.

UNIT III

Formulation of the Learning Problem

Learning as a statistical problem: estimation of probability measure and basic problems of statistics, learning as density estimation, risk, empirical risk and structural risk, introduction to ill-posed problems and regularization. Learning as an algebraic problem, learning as a computational problem: learn ability, PAC learning, bounds on data, algorithmic learning theory basics.

UNIT IV

Learning Paradigms

Supervised Learning: Additive model: logistic regression, Generative model: naïve Bayes classifier, Discriminative model: Decision trees, Neural networks.

Unsupervised Learning: Clustering: k-means, hierarchical, self-organizing map, EM algorithm, Feature selection principal component analysis.

Reinforcement Learning: Q-learning, Value function approximation, Policy search.

Text Books:

1. The Elements of Statistical Learning, T. Hastie, R. Tibshirani and J. H. Friedman,Springer.

ETCS427	MOBILE AND WIRELESS COMMUNICATION	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce the basic concept and methodologies for digital image process

UNIT I

Introduction to Wireless Communication System:

Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Trends in Cellular radio and personal communication. Second generation Cellular Networks, Third

Generation (3G) Wireless Networks , Wireless Local Loop(WLL), Wireless Local Area network(WLAN), Bluetooth and Personal Area Networks.

UNIT II

The Cellular Concept- System Design Fundamentals:

Cellular system, Hexagonal geometry cell and concept of frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio, Channel & co-channel interference reduction factor, S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference, Handoff Strategies, Umbrella Cell Concept, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular System-cell splitting, Cell sectorization , Repeaters, Micro cell zone concept, Channel antenna system design considerations.

UNIT III

Multiple Access Techniques:

Introduction, Comparisons of multiple Access Strategies like TDMA,CDMA, FDMA, OFDM, and CSMA Protocols.

Wireless Systems:

GSM system architecture, Radio interface, Protocols, Localization and calling, Handover, Authentication and security in GSM, GSM speech coding, Concept of spread spectrum, Architecture of IS-95 CDMA system, Air interface, CDMA forward channels, CDMA reverse channels, Soft handoff, CDMA features, Power control in CDMA, Performance of CDMA System, RAKE Receiver, CDMA2000 cellular technology, GPRS system architecture.

UNIT IV

Recent trends:

Introduction to Wi-Fi, WiMAX, ZigBee Networks, Software Defined Radio, UWB Radio, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network.

Text Books:

1. Wireless Communication, Theodore S. Rappaport, Prentice hall

Reference Books:

1. Wireless Communications and Networking, Vijay Garg, Elsevier

ETCS 306	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to explain what is data warehousing and data mining.

UNIT I

Introduction: Evolution Of Data Warehousing (Historical Context), The Data Warehouse - a Brief Overview, Characteristics, Operational Database Systems and Data Warehouse(OLTP & OLAP), Data Marts, Metadata.

Principles of Data Warehousing(Architecture and Design Techniques): System Processes, Data Warehousing Components, Architecture for a Warehouse, Three-tier Data Warehouse Architecture, Steps for the design and construction of Data Warehouses, Conceptual Data Architecture, Logical Architectures, Design Techniques.

UNIT II

Multidimensional Data Models: Types of Data and Their Uses, From Tables and Spreadsheets to Data Cubes, Identifying Facts and Dimensions, Fact Tables, Designing Fact Tables, Designing Dimension Table, Data Warehouse Schemas- STAR Schema, Snowflake Schema, OLAP, OLAP Operations**,** Hypercube**,** ROLAP, MOLAP, From Data warehousing to Data Mining, Data warehouse Usage

UNIT III

Data Mining: Motivation, Importance, Knowledge Discovery Process (KDD), KDD and Data Mining, Data Mining vs. Query Tools, Kind of Data, Data preprocessing, Functionalities, Interesting Patterns, Classification of data mining systems, Major issues.

UNIT IV

Classification and Prediction: Classification & Prediction, Issues Regarding Classification & Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back Propagation, Classification Parameters.

Cluster Analysis: Types of Data in Cluster Analysis, Partitioning Method, Hierarchical Method, Density Based Method, Grid Based Method, Model Based Clustering Method, Outlier Analysis.

Mining Association Rules: Association Rule Mining, Market Basket Analysis, Types of Association Rules, Methods for Mining Association

TEXT BOOKS:

1. Kamber and Han, “Data Mining Concepts and Techniques”, Hartcourt India P. Ltd.

REFERENCES BOOKS:

1. W. H. Inmon, “Building the operational data store”, 2nd Ed., John Wiley.
2. Paul Raj Poonia, “Fundamentals of Data Warehousing”, John Wiley & Sons.
3. Sam Anahony, “Data Warehousing in the real world: A practical guide for building decision support systems”, John Wiley.

ETCS451	ARTIFICIAL INTELLIEGENCE LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS:

Write the following programs using PROLOG.

1. Write a program to solve 8 queens problem.
2. Solve any problem using depth first search.
3. Solve any problem using best first search.
4. Solve 8-puzzle problem using best first search
5. Solve Robot (traversal) problem using means EndAnalysis.
6. Solve traveling salesman problem.

ETCS368	WEB TECHNOLOGIES LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS:

1. Write HTML/Java scripts to display your CV in Web Browser.
2. Creation and annotation of static web pages using any HTML editor.
3. Write a program to use XML and JavaScript for creation of your homepage.
4. Write a program in XML for creation of DTD which specifies a particular set of rules.
5. Create a Stylesheet in CSS/XSL and display the document in Web Browser.
6. Create a Registration Form with Table.
7. CSS : Inline Style , Internal Style ,and External Style Sheets
8. DHTML
   - I. Use user defined function to get array of values and sort them in ascending order
   - II. Demonstrate String and Math Object's predefined methods
   - III. Demonstrate Array Objects and Date Object's predefined methods
   - IV. Exception Handling
   - V. Calendar Creation : Display all month
   - VI. Event Handling
     - i. Validation of registration form
     - ii. Open a Window from the current window
     - iii. Change color of background at each click of button or refresh of a page
     - iv. Display calendar for the month and year selected from combo box
     - v. OnMouseover event

9. XML

I. Create any catalog

II. Display the catalog created using CSS or XSL

ETCS462	MINOR PROJECT	L	T	P	C
		-	-	-	2

Students will do literature survey and determine their problem statement for which they are going to develop the solution through software development. Students shall prepare the SRS document in proper format and do all the analysis part of the problem statement. Students shall develop the Design document, Code, Generate Test case and Test case report etc for their software developed.

ETCS 481	PRACTICAL TRAINING	L	T	P	C
		-	-	-	2

At the end of sixth semester each student would undergo six weeks Professional Training in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization. The typed report should be in a prescribed format.

The report will be evaluated in the seventh Semester by a Committee consisting of three teachers' from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization. The student will interact with the committee through presentation to demonstrate his/her learning.

LAB BASED ON DEPARTMENTAL ELECTIVE

ETCS471	MACHINE LEARNING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS:

1. Setting Up of Modeling Frameworks (Weka, Orange and R), I/O Formats, Basic Introduction to Interfaces.
2. Linear models in R, Writing Basic Interface for a Learner.

3. Models Using Weka or Orange on UCI Benchmark Data Sets. Writing Interfaces for a Classifier as Derived from a Learner.
4. k-Means Clustering, Writing Interface for a Cluste
5. r.
6. Coding any of the learning algorithms and testing them on suitable UCI Data Sets. Suggestions for algorithms: Decision trees, Naïve Bayesian, q-learning etc.

ETCS473	MOBILE AND WIRELESS COMMUNICATION LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS:

1. To set up a satellite communication link & study of change in uplink & downlink frequency.
2. To Study Transmission of Audio & Video Signals & Data communication over satellite link.
3. To Study Transmission of telemetry data like temperature & light intensity over satellite link.
4. To measure the propagation delay of signal in a Satellite communication link.
5. To study different GPS data like longitude, latitude & different types of dilute of precision using GPS receiver.
6. To study selection of various PN codes like Gold, Barker & MLS in CDMA technology.
7. To study generation (spreading) & demodulation (Despreading) of DSSS modulated signal.
8. To study Voice communication over DSSS.
9. To study Minimum shift keying modulation & de modulation.
10. FHSS Modulation & demodulation & transfer of numeric data.

ETCS362	DATA WAREHOUSING AND DATA MINING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS:

1. Demonstration of data preprocessing on datasets using WEKA and R tools.

2. To list all the categorical (or nominal) attributes and the real valued attributes using WEKA or R mining tool.
3. Create a data classification model using decision tree in WEKA or R.
4. Create a data classification model using naive bayesin WEKA or R.
5. Create a data classification model using rule based classifies in WEKA or R.
6. Create a data classification model using statistical classifiersin WEKA or R.
7. Create a data classification model using neural networksin WEKA or R.
8. Create a data classification model using in WEKA or R.
9. Demonstrate the working of k-means algorithm for clustering the data.
10. Create a clustering model using hierarchical clustering algorithm in WEKA or R

SEMESTER - VIII

ETCS414	NEURAL NETWORK	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to provide a thorough understanding and implementation of the basic structure of neural networks.

UNIT I

Introduction to ANN: what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks, Trends in Computing Comparison of BNN and ANN

Basics of Artificial Neural Networks: characteristics of neural networks terminology, models of neuron Mc Culloch - Pitts model, Perceptron, Adaline model, Basic learning laws, Topology of neural network architecture

UNIT II

Backpropagation networks: Architecture of feed forward network, single layer ANN: Adaptive filtering problem, Unconstrained Organization Techniques, multilayer perceptron, back propagation learning, input - hidden and output layer computation, backpropagation algorithm, applications, selection of tuning parameters in BPN, Numbers of hidden nodes, learning.

UNIT III

Activation & Synaptic Dynamics: Introduction, Activation Dynamics models, synaptic Dynamics models, stability and convergence, recall in neural networks.

Basic functional units of ANN for pattern recognition tasks: Basic feedforward, Basic feedback and basic competitive learning neural network, **Feedforward neural networks** –

Linear responsibility X-OR problem and solution, Analysis of pattern mapping networks summary of basic gradient search methods, **Feedback neural networks -** Pattern storage networks, stochastic networks and simulated annealing, Boltzmann machine and Boltzmann learning

UNIT IV

Competitive learning neural networks: Components of CL network pattern clustering and feature mapping network, ART networks, Features of ART models, character recognition using ART network**.**

Applications of ANN: Pattern classification – Recognition of Olympic games symbols, Recognition of printed Characters. Neocognitron – Recognition of handwritten characters.

TEXT BOOK:

1. Neural networks A comprehensive foundations, Simon Haykin, Pearson Education

REFERENCE BOOKS:

1. Artificial neural networks, B. Vegnanarayana, Prentice Hall of India (P) Ltd
2. Neural networks, Fuzzy logic and Genetic Algorithms, S. Rajsekaran , VijayalakshmiPari, PHI

OPEN ELECTIVE (WITHOUT LAB)

DEPARTMENTAL ELECTIVE (WITH LAB)

ETCS405	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	1	-	4

Course Objective: The objective of this course is to introduce the basic concept and methodologies for digital image processing.

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 Neighbours, 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.

UNIT – II

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

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, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

UNIT - III

Image Compression: Coding, Interpixel and Psycho-visual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation

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.

TEXT BOOKS:

1. Digital Image Processing, Rafael C. Conzalez & Richard E. Woods,Pearson Education.
2. Fundamental of Digital Image Processing, A.K. Jain,PHI.

REFERENCE BOOKS:

1. Digital Image Processing, Bernd Jahne,Springer.

2. Digital Image Processing: Piks Inside, William K Pratt,John Wiley & Sons.

ETCS413	ADVANCE COMPUTER NETWORKS	L	T	P	C
		3	1	-	4

Course Objective: The goal of this course is that the student will develop an understanding of the underlying structure of networks and how they operate. At the end of this course a student should be able to: Explain basic networking concepts by studying client/server architecture, network scalability and geographical scope, the Internet, intranets and extranets.

UNIT I

Introduction: Introduction to Network models-ISO-OSI, SNA, Apple talk and TCP/IPmodels. Review of Physical layer and Data link layers, Review of LAN (IEEE 802.3, 802.5,802.11b/a/g, FDDI) and WAN (Frame Relay, ATM, ISDN) standards.

UNIT II

Network Layer: Logical Addressing: IPv4 Addresses, IPv6 Addresses – Internet Protocol: Internetworking,IPv4, IPv6, Transition from IPv4 to IPv6 – Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intra domain Multicast Protocols, Inter domain Multicast Protocols, Node-Level Multicast algorithms CIDR –Introduction , CIDR addressing, CIDR address blocks and Bit masks 8, Advanced Routing : Routing architecture , Routing between peers (BGP) , IP switching andMulti-Protocol Label Switching (MPLS), MPLS Architecture and related protocols, TrafficEngineering (TE) and TE with MPLS , NAT and Virtual Private Networks (L2, L3, andHybrid)

UNIT III

Sockets: Socket Programming: Creating sockets, POSIX data type, Socket addresses, Assigning address to a socket, Java socket programming, Thread programming, Berkeley Sockets: Overview, socket address structures, byte manipulation &address conversion functions, elementary socket system calls –socket, connect, bind, listen, accept, fork, exec, close,TCP ports (ephemeral, reserved), Berkeley Sockets: I/ O asynchronous & multiplexing models, select & poll functions, signal & fcntl functions, socket implementation (client & server programs), UNIX domain protocols

UNIT IV

Network Security: Network Security Practice: Authentication Applications- Kerberos, X.509 Authentication Service; Electronic Mail Security- Pretty Good Privacy, S/ MIME; IP Security- IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations;

TEXT BOOKS:

1. TCP/IP Protocol Suite, B. A. Forouzan, TMH.

REFERENCE BOOKS:

1. Computer Networks-Protocols, Standards and Interfaces, U. Black, PHI.
2. Computer Communication Networks, W. Stallings, PHI.
3Network Security Essentials, W. Stallings, Addison Wesley.

ETCS428	NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	1	-	4

Course Objective: The objective of the course is to provide a brief knowledge of Natural Language processing to the students and develop their skills in solving problems in language processing.

UNIT I

Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

UNIT II

Introduction to semantics and knowledge representation, Some applications like machinetranslation, database interface. Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

UNIT III

Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, MovementPhenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

UNIT IV

Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

Text Books:

1. Natural Language Understanding, Allen, Pearson Education.

Reference Books:

1. Speech and Language Processing – An introduction to Language processing,Computational Linguistics, and Speech Recognition, D. Jurafsky& J. H. Martin,Pearson Education.
2. Foundations of Statistical Natural Language Processing, Manning, Christopher and Heinrich SchutzeMIT Press.

ETCS430	ADVANCE DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	1	-	4

UNIT I

Relational Model Issues

ER model, Normalization, Query Processing, Query Optimization, Transaction Processing, Concurrency Control, Recovery, Database Tuning

UNIT II

Distributed Databases

Parallel Databases, Inter and Intra Query Parallelism, Distributed Database Features, Distributed Database Architecture, Fragmentation, Distributed Query Processing, Distributed Transaction Processing, Concurrency Protocol, Recovery, Commit Protocols

UNIT III

Object and Object Relational Databases

Concepts for object databases: Object identity, Object structure, Type constructors, Encapsulation ofoperations, Methods, Persistence, Type and class hierarchies, Inheritance, Complex objects, Object database standards, languages and design: ODMG model, ODL, OQL, Object relational and
Extended, Relational systems: Object, relational features in SQL / Oracle.

UNIT IV

Enhanced Data Models

Active database concepts and triggers, Temporal databases, Spatial databases, Multimedia databases, Deductive databases, XML databases: XML data model, DTD, XML schema, XML querying, Geographic informationsystems, Genome data management

Text Books:

1.Database Systems, A Practical Approach toDesign, Implementation and Management,Thomas Connolly and CarlolynBegg, Pearson Education

REFERENCES:

1.Fundamentals of Database Systems, R. Elmasri, S.B. Navathe, Pearson Education.
2.Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Tata McGraw Hill
3.An Introduction to Database Systems, C.J.Date, A.Kannan, S.Swamynathan, PearsonEducation.

ETCS464	MAJOR PROJECT	L	T	P	C
		-	-	-	6

Students are expected to prepare Major projects on topics of general importance using new software and presentation tools. Students will also prepare a project report along with implementation and present it for the final evaluation.

LAB BASED ON DEPARTMENTAL ELECTIVE

ETCS455	DATA IMAGE PROCESSING LAB	L	T	P	C
		-	-	2	1

Course Outline: Experiments will be based on Image Representation, Image transformation, Image Enhancements, Edge Detection, Morphological Image processing and Segmentation.

1. Write a program of Point processing in spatial domain.
   a) Negation of an image.
   b) Thresholding an image.
   c) Contrast stretching of an image.
2. Write a program of Bit Plane Slicing.
3. Write a program of Histogram Equalization.
4. Write a program of Histogram Specification.
5. Write a program of Zooming by interpolation and replication.
6. Write a program of Filtering in spatial domain
   a) Low pass filtering
   b) High pass filtering
   c) Median filtering
7. Write a program of Edge Detection using derivative filter mask
   a) Prewitt

b) Sobel
c) Laplacian

8. Write a program of Data compression using Huffman coding.

9. Write a program of Filtering in frequency domain
a) Low pass filter
b) High pass filter

10. Write a program of Hadamard transform.

ETCS459	ADVANCE COMPUTER NETWORKS LAB	L	T	P	C
		-	-	2	1

Course Outline: Using Socket programming (in any language of our choice)

1. Write a program to determine the IP Address.
2. To study about Networking, Network configuration and commands.
3. To study about different networking devices.
4. To study about Hubs, switches, routers etc.
5. Write a program to obtain the information about host, port and protocol.
6. Write a program to access day time services form server using socket.
7. Write a program to get remote and local socket.
8. Write a program to find the port on a running server.
9. Write a program to read the source code of the web page.
10. Write a program to create socket for sending and receiving data.

ETCS458	NATURAL LANGUAGE PROCESSING LAB	L	T	P	C
		-	-	2	1

LIST OF EXPERIMENTS:

1. Word Analysis: To learn about morphological features of a word by analyzing it.
2. Word Generation: Generating word forms from root and suffix information.
3. Morphology: Understanding the morphology of a word by the use of Add-Delete table.
4. N-Grams: Calculate bigrams from a given corpus and calculate probability of a sentence.
5. N-Grams Smoothing: To apply add-one smoothing on sparse bigram table.

6. Building POS Tagger: To know the importance of context and size of training corpus in learning Parts of Speech.
7. Chunking: Understanding the concept of chunking and get familiar with the basic chunk tagset.
8. Building Chunker: To study the importance of selecting proper features for training a model and size of training corpus in learning how to do chunking.

Note: The experiments can be performed with the help of the online tools available for "Natural Language Processing Lab" at Virtual Labs -- http://cse24-iiith.virtual-labs.ac.in/

ETCS460	ADVANCE DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
		-	-	2	1

Course Outline: The student should be able to understand SQL Commands, develop procedures and functions in SQL, and develop packages in SQL.

List of Experiments

1. Working basic SQL commands (DDL, DML, DCL, and TCL).
2. Executing Single Row and Group functions.
3. Running SQL queries on Join and Integrity constraints.
4. Implementation of Synonyms, Sequences, Views and Indexes.
5. Design a database using first and second normal form.
6. Perform the Locks & Partitions operations.
7. Simple programs using PL/SQL blocks.
8. Apply the concepts of Exception handling in PL/SQL block.
9. Create Cursors and Triggers.
10. Use the concept of Proceduresand Function in PL/SQL block
11. Devise a Package for a banking system to maintain its customer details.
12. Mini Project.