JIS COLLEGE OF ENGINEERING

(An Autonomous Institution)

COURSE STRUCTURE AND SYLLABUS

For

B.TECH.
In
Information Technology

Affiliated to West Bengal University of Technology

(Finalized on BOS Meeting dated 13.09.2014)

B. Tech in Information Technology

1st Year - Semester 1

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
HU101	Professional Communication	2	0	0	2	30	70	100
M101	Mathematics-I	3	1	0	4	30	70	100
PH101	Physics –I	3	1	0	4	30	70	100
EE101	Basic Electrical Engineering	3	1	0	4	30	70	100
ME101	Engineering Mechanics	3	1	0	4	30	70	100
HU191	Language Lab	0	0	2	2	40	60	100
PH191	Physics Lab-I	0	0	3	2	40	60	100
EE191	Basic Electrical Engineering Lab	0	0	3	2	40	60	100
ME191	Engineering Workshop Practice	0	0	3	2	40	60	100
IT191	Computer Practice Lab	0	0	3	2	40	60	100
XC181	NCC/NSS	0	0	2	1	40	60	100
	Total	14	4	16	29	390	710	1100

L-Lecture T-Tutorial P- Practical IE- Internal Exam FE –Final Exam

B. Tech in Information Technology

1st Year - Semester 2

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
HU201	Values & Ethics on Profession	2	0	0	2	30	70	100
M201	Mathematics-II	3	1	0	4	30	70	100
CH201(IT)	Engineering Chemistry	3	1	0	4	30	70	100
EC201	Basic Electronics Engineering	3	1	0	4	30	70	100
IT201	Principle of Procedural Programming	3	1	0	3	30	70	100
CH291	Engineering Chemistry Lab	0	0	3	2	40	60	100
EC291	Basic Electronics Engineering Lab	0	0	3	2	40	60	100
IT291	Programming Lab	0	0	3	2	40	60	100
ME291	Engineering Graphics Lab	0	0	3	2	40	60	100
	Total	14	4	12	25	310	590	900

L-Lecture T-Tutorial P- Practical IE- Internal Exam FE –Final Exam

B. Tech in Information Technology

2st Year - Semester 3

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
M301 (IT)	Mathematics-III (Discrete Mathematics and Graph theory)	3	1	0	4	30	70	100
PH301	Physics –II	3	1	0	4	30	70	100
IT301	Digital Electronics	3	1	0	4	30	70	100
IT302	Data Structures and Algorithms	3	1	0	4	30	70	100
IT303	Numerical Methods	3	1	0	3	30	70	100
PH391	Physics II Lab	0	0	3	2	40	60	100
IT391	Digital Electronics Lab	0	0	3	2	40	60	100
IT392	Data Structures and Algorithms Lab using C	0	0	3	2	40	60	100
IT393	Numerical Methods & Programming Lab	0	0	3	2	40	60	100
	Total	15	5	12	27	310	590	900

L-Lecture T-Tutorial P- Practical IE- Internal Exam FE –Final Exam

B. Tech in Information Technology

2st Year - Semester 4

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
IT401	Computer Organization & Architecture	3	1	0	4	30	70	100
IT402	Operating System-I	3	1	0	4	30	70	100
IT403	Database Management System- I	3	1	0	4	30	70	100
IT404	Object Technology & UML	3	0	0	3	30	70	100
IT405	Formal Language and Automata Theory	3	1	0	3	30	70	100
IT491	Computer Organization & Architecture Lab	0	0	3	2	40	60	100
IT492	Operating System Lab	0	0	3	2	40	60	100
IT493	Database Management System- I Lab	0	0	3	2	40	60	100
IT494	Object Technology & UML Lab	0	0	3	2	40	60	100
IT495	Visual Programming Lab	0	0	3	2	40	60	100
HU481	Technical Report Writing & Language Laboratory	1	0	2	2	40	60	100
	Total	16	4	17	30	390	710	1100

L-Lecture T-Tutorial P- Practical IE- Internal Exam FE –Final Exam

B. Tech in Information Technology

3rd Year - Semester 5

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
IT501	Data Communication and Networking (Networking I)	3	1	0	4	30	70	100
IT502	Microprocessor & Microcontroller	3	1	0	4	30	70	100
IT503	Database Management System- II	3	1	0	4	30	70	100
IT504	Software Engineering & Project Management	3	0	0	3	30	70	100
IT505	A. Artificial Intelligence B. Operation Research & Optimization Techniques C. Computer Graphics D. Object Oriented Programming with C++	3	1	0	4	30	70	100
IT591	Data Communication &Networking/Networking I Lab	0	0	3	2	40	60	100
IT592	Microprocessor & Microcontroller Lab	0	0	3	2	40	60	100
IT593	Database Management System- II Lab	0	0	3	2	40	60	100
IT 594	Software Engineering & Project Management Lab	0	0	3	2	40	60	100
IT595	A. Artificial Intelligence Lab B. Operation Research & Optimization Techniques Lab C. Computer Graphics Lab D. Object Oriented Programming with C++ Lab	0	0	3	2	40	60	100
	Total	15	4	15	29	350	650	1000
MC581	Project and Technical Report Writing and Presentation on Industrial Training-I (2 weeks duration)	0	0	0	Mandatory course			
MC582	General Proficiency-I (General aptitude, Technical Communication & Soft Skill)	0	0	3	Mandatory course			
MC583	Professional Certification Program I	0	0	0	Mandatory course			

L-Lecture T-Tutorial P- Practical IE- Internal Exam FE –Final Exam

B. Tech in Information Technology

3rd Year - Semester 6

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
IT601	System Software & Network Administration (Networking II)	3	1	0	4	30	70	100
IT602	Web Technology(Advance Java & J2EE)	3	1	0	4	30	70	100
IT603	Soft Computing	3	0	0	3	30	70	100
IT604	Multimedia Technology	3	0	0	3	30	70	100
IT605	A. Design Analysis of Algorithm B. Digital Image Processing C. Advanced Operating System	3	1	0	4	30	70	100
IT691	System Software & Network Administration Lab/Networking II Lab	0	0	3	2	40	60	100
IT692	Web Technology lab (Advance Java & J2EE Lab)	0	0	3	2	40	60	100
IT693	Soft Computing Lab	0	0	3	2	40	60	100
IT694	Multimedia Technology Lab	0	0	3	2	40	60	100
HU691	Foreign Language Lab(Japanese/French/German/Spanish)	0	0	3	2	40	60	100
	Total	15	3	15	28	350	650	1000
MC681	Project ,Technical Report Writing and Presentation on Industrial Training-II (2 weeks duration)	0	0	0	Mandatory course			
MC682	General Proficiency-II (General aptitude, Technical Communication & Soft Skill)	0	0	3	Mandatory course			
MC683	Professional Certification Program II	0	0	0	Mandatory course			

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B. Tech in Information Technology

4th Year - Semester 7

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
IT701	E-Commerce & ERP	3	1	0	4	30	70	100
IT702	Mobile Communication	3	1	0	4	30	70	100
IT703	A. Cloud Computing & SOA B. Pattern Recognition C. Compiler Design	3	0	0	3	30	70	100
IT704	A. VLSI Design B. Computer Vision & Robotics C. Bioinformatics & DNA Computing	3	0	0	3	30	70	100
IT791	E-Commerce & ERP Lab	0	0	3	2	40	60	100
IT792	C# and .NET Framework Lab	0	0	3	2	40	60	100
IT781	Minor Project	0	0	3	4	40	60	100
IT782	Technical Report Writing and Presentation on Industrial Training-III (4 Weeks Duration)	0	0	0	2	0	50	50
HU783	General Proficiency-III (Group discussion ,Soft Skill & Personality Development)	0	0	3	2	0	50	50
	Total	12	2	15	26	240	560	800
MC783	Professional Certification Program III	0	0	0	MANDATORY COURSE			

L-Lecture T-Tutorial P- Practical IE- Internal Exam FE –Final Exam

B. Tech in Information Technology

4th Year - Semester 8

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
HU801	Industrial Management	3	1	0	2	30	70	100
IT801	Internetworking Technologies	3	1	0	3	30	70	100
IT802	A. Data Mining and Warehousing B. Real Time and Embedded Systems C. Building Enterprise Applications	3	0	0	3	30	70	100
IT803	A. Network Security & Cryptography B. Natural Language Processing C Remote Sensing and GIS	3	0	0	3	30	70	100
IT891	Software Testing Lab	0	0	3	2	40	60	100
IT892	Mobile Application Development Lab	0	0	3	2	40	60	100
IT881	Major Project	0	0	6	8	40	60	100
IT882	Grand Viva	0	0	0	2		100	100
MC881	General proficiency-IV (Practice Session for GRE,TOEFLE,CAT,MAT,GMAT etc.)	0	0	3	MANDATORY COURSE			
	Total	12	2	15	25	240	560	800

L-Lecture T-Tutorial P- Practical IE- Internal Exam FE –Final Exam

JIS College of Engineering
Dept. of Information Technology
Syllabus for B.Tech. (Information Technology) Programme

First Year First Semester

Paper Name: Professional Communication
Paper Code: HU101
Contacts:2L
Credit:2

Course Objectives:

The objectives of this course are

- To enable an individual to speak, read, and listen with understanding to simple current English
- To write a connected passage about a simple subject or incident.
- To develop in the learners the ability to listen, read and understand English.
- To train pupils' ears to understand English uttered by speakers.
- To help pupils read and analyze extensive texts for information, pleasure and enlightenment.
- To help pupils reinforce grammatical points already taught.
- To enable pupils speak good English.
- To teach the basic tenses of present, past and future.
- To teach pupils to practice important writing techniques.
- To develop in the learners the ability to promote the writing skill until they are able to write a complete paragraph and are ready to do any writing required in the university or in life.

Course Structure and Syllabus:

Fundamentals of Technical Communication : process of communication, language as a tool of communication, levels of communication , flow of communication, barriers to communication, communication across cultures; Technical Communication: meaning, significance, characteristics, difference between technical and general communication.[4L]

Elements of Written Communication: words and phrases, word formation, synonyms and antonyms, homophones, one word substitution, sentence construction, paragraph construction,tense,preposition,voice change .[8L]

Forms of Technical Communication: business letters, job application letter and resume, business letters: sales & credit letters, letters of enquiry, letters of quotation, order, claim and adjustment letters, official letters: D.O. letters, government letters, letters to authorities, etc.

Technical Reports: general format of a report, formal and informal reports, memo report, progress report, status report, survey report, trip report, trouble report, laboratory report, research papers, dissertations and theses.
Technical Proposals: purpose, characteristics, types, structure. [8L]

Presentation Strategies: defining the subject, scope and purpose, analysing audience & locale, collecting materials, preparing outlines, organising the contents, visual aids, nuances of delivery, extemporaneous, manuscripts, impromptu, memorization and non- verbal strategies.[6L]

Value-based Text Reading: [4L]
(A) Study of the following essays from the text book with emphasis on writing skills:

1. The Thief by Ruskin Bond
2. The Open Window by Saki
3. Marriage is a private Affair by Chinua Achebe
4. The Moon in the Earthen Pot by Gopini Karunakar

Suggested Text / Reference Books:

1. Board of Editors: Contemporary Communicative English for Technical Communication, Pearson Longman,2010
2. Dr. D. Sudharani: Manual for English Language Laboratory Pearson Education (W.B. edition), 2010
3. Technical Communication Principles and Practice by Meenakshi Raman, Sangeeta Sharma(Oxford Higher Education)
4. Effective Technical Communication by Barun K.Mitra(Oxford Higher Education)
5. V. Sashikumar (ed.): Fantasy- A Collection of Short Stories Orient Black swan (Reprint 2006)

Course Outcomes: At the end of this course

- Graduate will be able to assess through assignments, tests, mid-term and final exams and most importantly through practical performances.
- Graduates will be able to reveal their understanding of concepts / principles of communication in English language through these tests..
- Graduates will be able to present themselves well in front of large audience on a variety of topics. Moreover they got the knack for structured conversation to make their point of views clear to the listeners.

Paper Name: Mathematics-I
Paper Code: M101
Contacts:3L+1T
Credit:4
Course Objectives
The objectives of this course are

- To make aware students about the importance and symbiosis between Mathematics and Engineering.
- To achieve a fluency with Mathematical tools which is an essential weapon in modern Graduate Engineer's Armory.
- To balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve Engineering problems by retaining the philosophy of "learning by doing".

Course Structure and Syllabus:

Matrix: Determinant of a square matrix, Minors and Cofactors, Laplace's method of expansion of a determinant, Product of two determinants, Adjoint of a determinant, Jacobi's theorem on adjoint determinant. Singular and non-singular matrices, Adjoint of a matrix, Inverse of a non-singular matrix and its properties, orthogonal matrix and its properties, Trace of a matrix.Rank of a matrix and its determination using elementary row and column operations.

Infinite Series: Preliminary idea of sequence, Infinite series and their convergences/divergences, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's root test, D'Alembert's ratio test and Raabe's test. Alternating series, Leibnitz's

test. Absolute convergence and Conditional convergence. Power series (Definition and Examples).

Calculus of functions of single variable: Successive differentiation : Higher order derivatives of a function single variable, Leibnitz's theorem(statements and its applications).Rolle's theorem and its applications.

Mean value theorem- Lagrange & Cauchy and their application, Taylor's theorem with Lagrange's and Cauchy's form of remainders and its application, Taylor's and Maclaurin's theorem(Statements only), Maclaurin's infinite series expansion of functions: sinx, cosx , e^x, log(1+x), $(a+x)^n$, n being an positive integer or a fraction (assuming that the remainder Rn $\rightarrow$0 as n$\rightarrow\infty$in each case). Reduction formulae both for indefinite and definite integrals of types

$$\int \sin^n x,\ \int \cos^n x,\ \int \sin^m x \cos^n x,\ \int \cos^m x \sin nx,\ \int \frac{dx}{\left(x^2+a^2\right)^n},\ m,n$$

are positive integers.

Calculus of functions of several variables: Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives and related problems, Homogeneous functions and Euler's theorem and related problems up to three variables, Chain rules, Differentiation of implicit functions, Total differentials and their related problems, Jacobians up to three variables and related problems, Maxima, minima and saddle points of functions and related problems, Concept of line integrals, Double and triple integrals.

Vector Calculus: Scalar and vector fields . Vector function of a scalar variable, Differentiation of a vector function, Gradient of a scalar point function, Directional derivative. Divergence and curl of a vector point function and related problems . Green's Theorem, Gauss Divergence Theorem and Stoke's Theorem (Statements and Applications).

Suggested Text / Reference Books:

1.Advanced Engineering Mathematics 8e by Erwin Kreyszig is published by Wiley India.
2.Engineering mathematics: B.S.Grewal (S.Chand &Co.).
3.higher Engineering Mathematics: John Bird (4th Edition, 1st India Reprint 2006,Elsevier.
4.mathematics Handbook : for Science and Engineering,L.Rade and B.Westergen(5PthP edition,1PstP Indian Edition 2009,Springer)
5.Calculus :M.J.Strauss,G.L.Bradly and K.L.Smith (3PrdP,1PstP Indian Edition 2007,Pearson Education)
6.Engineering mathematics: S.S.Sastry (PHI,4PthP Edition,2008)
7.Advanced Engineering Mathematics,3E:J.L.Goldberg and E.F.Abonfadel (OUP),Indian Edition.

Course Outcomes: By At the end of this course

- Graduates will be able to learn Euler's formula , De Moivre's theorem and their applications.
- Graduates will be able to learn about successive differentiation, Leibnitz theorem and mean value theorems.
- Graduates will be able to learn about Convergence and divergence of a sequence and series with tests for convergence of the series.
- Graduates will be able to learn about L'Hospital's rule, Euler's theorem on homogeneous functions, Jacobian and their applications.

- Graduates will be able to learn about Maxima and minima of functions of several variables and Lagrange's method of multipliers.
- Graduates will be able to learn about Special functions namely Gamma, beta and error function with applications.
- Graduates will be able to learn about application of rule of differentian and integration under the integral sign.
- Graduates will be able to understand the term exact differential equation and solution of linear differential equation using integrating factors.
- Graduates will be able to find the orthogonal trajectories of Cartesian and polar equations and application of ODE.

Paper Name: Physics-I
Paper Code: PH101
Contacts:3L+1T
Credit:4
Course Objectives:
The objectives of this course are

- To provide an adequate exposure and develop insight about the basic principles of physics along with the possible applications.
- To be acquainted with the basic physics principles which would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.
- To create awareness about the vital role played by science and engineering in the development of new technologies.
- To provide the necessary exposure to the practical aspects, which is an essential component for learning science.
- To achieve this a course can be primarily introduced clarifying some the basics of physical sciences attached to computers and communications as well as an advanced course which will form fundamentals of future learning on devices, communications and new age technologies.

Course Structure and Syllabus:

1.01: Classical Mechanics: Limitations of Newtonian Mechanics, constraint, degree of freedom, generalized coordinates, Lagrange's equation (No derivation), Hamilton's principle, Applications of Lagrange's equation: Linear Harmonic Oscillators-Differential equation and its solution, superposition of two linear SHM's (with same frequency), Lissajous' figures. 4L

1.02: Damped vibration: Introduction – differential equation and its solution, critical damping, Logarithmic decrement. 1L

1.03: Forced vibration: Introduction – differential equation, Amplitude and velocity resonance, Sharpness of resonance and Quality factor, Application to L-C-R Circuit 2L

1.04: Electromagnetic theory-I:
1.04-A: Vector operators, Gradient, Divergence, Curl-Physical significance, Gauss's divergence theorem (statement only), Stoke's theorem (statement only) and their applications. 2L
1.04-B: Development of electromagnetic theory, Electromagnetic spectrum, Concept of displacement current, equation of continuity, Maxwell's field equations with physical significance, wave equation in free space, transverse nature of electromagnetic wave, electromagnetic waves in a charge free conducting medium, skin depth, Poynting vector. 3L

Module 2: OPTICS 1:

2.01: Interference – Conditions for sustained interference, Young's double slit as an example . Qualitative idea of Spatial and Temporal Coherence, Conservation of energy and intensity distribution, Fresnel's Biprism, thin films of uniform thickness (derivation) Newton's ring. 4L

2.02: Diffraction of light – Fresnel and Fraunhofer class. Fraunhofer diffraction for single slit and double slits (elementary treatment, Intensity distribution). Plane transmission grating (No deduction of the intensity distributions is necessary). Missing orders. Dispersive power, Rayleigh criterion (qualitative), Resolving power of grating (Definition and formulae). Use of grating as a monochromator. 3L

2.03: Polarization: General concept of Polarization, Plane of vibration and plane of polarization, Concept of Plane, Circularly and Elliptically polarized light (using wave equations), Polarization through reflection and Brewster's law, Double refraction (birefringence) -Ordinary and Extra-ordinary rays, Nicol's Prism. 3L

2.04: Laser : Spontaneous and Stimulated emission of radiation, Population inversion, Einstein's A & B co-efficient (derivation of the mutual relation), concept of laser as a polarized source, Optical resonator and Condition necessary for active Laser action, Ruby Laser, He-Ne Laser, semiconductor Laser-applications of laser. 3L

2.05: Fiber optics: Optical Fibers – Core and cladding, total internal reflection step index and graded index fiber, Calculation of Numerical aperture and acceptance angle, losses in the fiber, applications. 2L

Module 3: Elementary solid state physics

3.00: Crystallography & Solid state physics: Space lattice, unit cell, crystal systems, Bravais lattices, basis, co-ordination number and atomic packing fraction, scc, bcc and fcc and hcp structures lattice planes, indexing of directions, Miller indices, interplaner spacing, Bragg's law & its application to real crystal structure (NaCl, KCl). 4L

Module 4: Quantum Mechanics I:

4.01: Matter waves: Concept of de Broglie's Matter waves, derivation of wavelength of matter waves in different forms, Concept of Phase velocity and Group velocity (qualitative) 2L

4.02: Wave mechanics: Concept and Physical significance of wave function _ and interpretation of | _ |2, _(normalization and probability interpretation), Heisenberg's Uncertainty principle with illustration; Schrödinger's equation- time dependent and time independent form (derivation). Discussion with relevant problems. 3L

4.03: Operator algebra: Operator, Commutator, Formulation of quantum mechanics and Basic postulates, Operator correspondence, Expectation values, Ehrenfest theorem. Discussion with relevant problems. 4L

List of Assignments/Tests:

- **15 marks Internal test 1 & Internal test 2 (best of the two would be considered)**
- **Assignments in regular classes, tutorial classes and surprise tests.**

General idea about Measurements and Errors (Mandatory):

Measurand (objects to be measured) precision, significant number., accuracy, certainty, resolution; Errors - types and sources of errors (definitions and examples), Systematic error, Random error, Ambiguity error, Dynamic error, with example of Slide calipers, Screw-gauge, Carrey Foster bridge. Study of different types of unit cells with model system.

Experiments on Classical Mechanics:

1. Study of torsional oscillation of torsional pendulum & determination of time period using various load of the oscillator.
2. Experiments on Lissajous figure (using CRO).
3. Study of LCR circuit using ac signal and determination of Q factor.

Experiments on Optics:

4. Determination of wavelength of light by Newton's ring method.
5. Determination of wavelength of light by Fresnel's bi-prism method.
6. Determination of wavelength of light by Laser diffraction method.
7. Determination of numerical aperture and the energy losses related to optical fibre experiment
8. Study of Hydrogen/ Helium spectrum using transmission grating and measurement of Rydberg Constant.
9. Inspection of Laser beam profile-to find beam divergence.
10. Study of half-wave and quarter wave plates.
11. Measurement of specific rotation of an optically active solution by polarimeter

Experiments on electromagnetic theory:

12. Measurement of nodal and antinodal points along a transmission wire and measurement of wave length.

Experiments on Quantum Mechanics I

13. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
14. Measurement of Stopping potential using a photocell and determination of Planck's Constant.

Suggested Text / Reference Books:

Module 1: Experiments on Classical Mechanics:

1. Classical Mechanics- J. C. Upadhyay (Himalya Publishers)
2. Classical Mechanics-Shrivastav
3. Classical Mechanics-Takwal & Puranik (TMH)
4. Sound-N. K. Bajaj (TMH)
5. Advanced Acoustics-D. P. Roy Chowdhury (Chayan Publisher)
6. Principles of Acoustics-B.Ghosh (Sridhar Publisher)
7. A text book of sound-M. Ghosh (S. Chand publishers)
8. Electromagnetics-B.B. Laud (TMH)
9. Electricity Magnetism-B.Ghosh (Book & Allied Publisher)
10. Electricity Magnetism-Chattopadhyay & Rakshit (New Central Book Agency)
11. A text book of Light- K.G. Mazumder & B.Ghoshs, (Book & Allied Publisher)
12. Electricity Magnetism-Fewkes and Yardwood (Oxford University Press)

Module 2: OPTICS 1:

1. A text book of Light- K.G. Mazumder & B.Ghoshs (Book & Allied Publisher)
2. A text book of Light-Brijlal & Subhramanium, (S. Chand publishers)
3. Modern Optics-A. B. Gupta (Book & Allied Publisher)
4. Optics-Ajay Ghatak (TMH)
5. Optics-Hecht
6. Optics-R. Kar, Books Applied Publishers

Module 3: Elementary solid state physics

1. Solid state physics-Puri & Babbar (S. Chand publishers)
2. Materials Science & Engineering-Kakani Kakani
3. Solid state physics- S. O. Pillai
4. Introduction to solid state physics-Kittel (TMH)
5. Solid State Physics and Electronics-A. B. Gupta, Nurul Islam (Book & Allied Publisher)

Module 4: Quantum Mechanics I:

1. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
2. Quantum Mechanics-Bagde Singh (S. Chand Publishers)

3. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
4. Quantum Mechanics-Binayak Datta Roy (S. Chand Publishers)
5. Quantum Mechanics-Bransden (Pearson Education Ltd.)
6. Perspective of Modern Physics-A. Beiser (TMH)

General Reference:

1. Refresher courses in physics (Vol. 1, Vol. 2 & Vol. 3)-C. L. Arora (S. Chand Publishers)
2. Basic Engineering Physics-Amal Chakraborty (Chaya Prakashani Pvt. Ltd.)
3. Basic Engineering Physics-I -Sujoy Bhattacharya, Saumen Paul (TMH)
4. University Physics-Sears & Zemansky (Addison-Wesley)

PHYSCIS-I SYLLABUS (PROPOSED) AS PER MODULES & EXAM-GROUP* DIVISION

STREAM	MODULE -1	MODULE-2	MODULE -3	MODULE -4	GR-A *	GR-B*
1st year Basic Physics course	OPTICS 1: 4+3+3+3+ 2 =15L	Waves and Vibration, Electromag netic theory-I: 2+2+3+5=12 L	Elementar y solid state physics 4L	Quantum Mechanics I: 9L	1.01: Classical Mechanics (4L) 1.02: Damped vibration (1L) 1.03: Forced vibration (2L) 2.02:.Diffraction of light (3L) 2.05: Fiber optics (2L) 3.00 Elementary solid state physics. (4L) 4.03: Operator algebra (4L)	1.04 A & B: Electromagnetic theory-I (5L) 2.01: Interference (4L) 2.03: Polarization (3L) 2.04: Laser (3L) 4.01: Matter waves: (2L) 4.02: Wave mechanics (3L)

Course Outcome: At the end of this course

- Graduates will be able to be equipped with basic understanding of core of the physical phenomena behind various devices and used in computers and communications.
- Graduates at the same time they will be able to be exposed to the basics of new age scientific & technological fronts.

Paper Name: Basic Electrical Engineering
Paper Code: EE101
Contacts: 3L + 1T = 4
Credits: 4
Course Objectives:
The objectives of this course are

- To understand the basic of and be able to apply, techniques for steady-state DC circuit analysis.
- To understand the basicof simple AC circuit.
- To understand the concept of Electrostatic & Electromagnetism.

- To understand the basic of different types of electrical machines and transformer.
- To understand the basic structure of power system.

Course Structure and Syllabus:

DC Network Theorem:[7L] Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchhoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, star-delta conversion. Maximum power transfer theorem with proof.

Electromagnetism:[5L] Biot-savart law, Ampere's circuital law, field calculation using Biot-savart & ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, Lifting power of Electromagnet.

AC fundamental:[] Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram,behaviour of AC series , parallel and series parallel circuits, Power factor, Power in AC circuit, Effect of frequency variation in RLC series and parallel circuits, Resonance in RLC series and parallel circuit, Qfactor, band width of resonant circuit.

Electrostatics:[5L] Coulomb's law, Electric Field Intensity, Electric field due to a group of charges, continuous charge distribution, Electric flux, Flux density, Electric potential, potential difference, Gauss's law, proof of gauss's law, its applications to electric field and potential calculation, Capacitor, capacitance of parallel plate capacitor, spherical capacitor, isolated spheres, concentric conductors, parallel conductors. Energy stored in a capacitor.

DC Machines:[6L] Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Speedtorque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armaturevoltage and field control)

Single phase transformer:[4L] Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation.

3 phase induction motor:[5L] Types, Construction, production of rotating field, principle of operation, equivalent circuit and phasor diagram, rating, torque-speed characteristics (qualitative only). Starter for squirrel cage and wound rotor induction motor. Brief introduction of speed control of 3 phase induction motor (voltage control, frequency control, resistance control)

Three phase system: [3L]Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.

General structure of electrical power system:[1L] Power generation to distribution through overhead lines and under-ground cables with single lone diagram.

Suggested Text / Reference Books:

Text books:

1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition

2. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
3. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
4. Basic Electrical Engineering, J.P. Tewari, New age international publication

Reference books:

1. Basic Electrical Engineering (TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
2. Electrical Engineering Fundamental, Vincent.D.Toro, Pearson Education, Second Edition.
2. Hughes Electrical & Electronics Technology, 8/e, Hughes, Pearson Education.
3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH
5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

Course Outcomes: At the end of this course

- Graduates will be able to understand Ohm's Law, Kirchhoff;s Laws and how to apply them in DC circuit.
- Graduates will be able to understand node and mesh analysis techniques for circuit analysis.
- Graduates will be able to understand Thevenin's , Norton's and superposition theorem for circuit analysis.
- Graduates will be able to understand the basic RLC circuit, and also able to analyze the circuit.
- Graduates will be able to have the basic knowledge of DC Machines, Induction Machine and Transformers

Paper Name: Engineering Mechanics
Paper Code:ME101
Contacts:3L+1T
Credit:4
Course Objectives:
The objectives of this course are

- To understand the basic concept of Engineering Mechanics.
- To understand the Laws of Mechanics.
- To understand the properties of different materials.
- To understand share force and bending moment
- To get idea of how to apply the same in Engineering.

Course Structure and Syllabus:
Module 1:
Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector).
Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i,j,k; Cross product and Dot product and their applications.
Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces.
Module 2:
Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equations of equilibrium.
Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.
Module 3:
Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector,quadralateral, composite areas consisting of above figures.

Moments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone.
Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety.
Module 4:
Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and nonuniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs. Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion).
Module 5:
Kinetics of particles: Newton's second law; Equation of motion; D.Alembert's principle and free body diagram; Principle of work and energy ; Principle of conservation of energy; Power and efficiency.

Books Recommended
1. Engineering Mechanics [Vol-I & II]by Meriam & Kraige, 5th ed. – Wiley India
2. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. – PHI
3. Engineering Mechanics by Timoshenko , Young and Rao, Revised 4th ed. – TMH
4. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P
5. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda– Chhaya Prakashani
6. Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press.
7. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed. – Pearson

Course Outcomes: At the end of this course

- Graduates will be able to understand the theoretical concept of application.
- Graduates will be able to understand the application of different laws.
- Graduates will be able to understand where to apply which material and how much load..
- Graduates will be able to be made practical and application oriented.

Paper Name: Language Lab
Paper Code: HU191
Credit:2
Contacts:2
Course Objectives:
Objectives are :

- To enable an individual to speak, read, and listen with understanding to simple current English
- To write a connected passage about a simple subject or incident.
- To develop in the learners the ability to listen, read and understand English.
- To train pupils' ears to understand English uttered by speakers.
- To help pupils read and analyze extensive texts for information, pleasure and enlightenment.
- To help pupils reinforce grammatical points already taught.
- To enable pupils speak good English.

Course Structure and Syllabus:

a) Honing ‘Listening Skill’ and its sub skills through Language Lab Audio device; 3P
b) Honing ‘Speaking Skill’ and its sub skills; 2P
c) Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/Stress/ Intonation/ Pitch &Accent) of connected speech; 2P
j) Honing ‘Conversation Skill’ using Language Lab Audio –Visual input; Conversational Practice Sessions
(Face to Face / via Telephone , Mobile phone & Role Play Mode); 2P
k) Introducing ‘Group Discussion’ through audio –Visual input and acquainting them with key strategies for success; 2P
f) G D Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD; 4P
g) Honing ‘Reading Skills’ and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages; Learning Global / Contextual / Inferential Comprehension; 2P
h) Honing ‘Writing Skill’ and its sub skills by using Language Lab Audio –Visual input; Practice Sessions 2P
Total Practical Classes 17
Books Recommended:
Dr. D. Sudharani: Manual for English Language Laboratory Pearson Education (WB edition),2010
Board of Editors: Contemporary Communicative English for Technical Communication,Pearson Longman,
2010

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

- Communicate in English properly and fluently
- Participate in GD actively

Paper Name: Physics Lab-I
Paper Code: PH191
Course Objectives:
The objectives of this course are

- To provide an adequate exposure and develop insight about the basic principles of physics along with the possible applications.
- To be acquainted with the basic physics principles which would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.
- To create awareness about the vital role played by science and engineering in the development of new technologies.

Course Structure and Syllabus:
General idea about Measurements and Errors (Mandatory):
Measurand (objects to be measured), precision, accuracy, certainty, resolution; Errors - types and sources of errors (definitions and examples), Systematic error, Random error, Ambiguity error, Dynamic error, with example of Slide calipers, Screw-gauge, Carrey Foster bridge. Study of different types of unit cells with model system.
Any 7 to be performed from the following experiments
Experiments on Classical Mechanics:

1. Study of torsional oscillation of torsional pendulum & determination of time period using various load of the oscillator.
2. Experiments on Lissajous figure (using CRO).
3. Experiments on LCR circuit.
Experiments on Optics:
4. Determination of wavelength of light by Newton's ring method.
5. Determination of wavelength of light by Fresnel's bi-prism method.
6. Determination of wavelength of light by Laser diffraction method.
7. Determination of numerical aperture and the energy losses related to optical fibre experiment

8. Study of Hydrogen/ Helium spectrum using transmission grating and measurement of Rydberg Constant.
9. Inspection of Laser beam profile-to find beam divergence.
10. Study of half-wave and quarter wave plates.
Experiments on electromagnetic theory:
11. Measurement of nodal and antinodal points along a transmission wire and measurement of wave length.
Experiments on Quantum Mechanics I
12. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
13. Measurement of Stopping potential using a photocell and determination of Planck's Constant.

Course Outcomes

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

- Understand Measurement and Error
- Understand practically classical mechanics and Optics

Paper Name: Basic Electrical Engineering Lab
Paper Code: EE191
Contacts:3P
Credit:2
Course Objectives:
The objectives of this course are

- To understand the basic of and be able to apply, techniques for steady-state DC circuit analysis.
- To understand the basicof simple AC circuit.
- To understand the concept of Electrostatic & Electromagnetism.
- To understand the basic of different types of electrical machines and transformer.
- To understand the basic structure of power system.

Course Structure and Syllabus:

List of Experiments:
Sl. No Name of the Experiments
1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin's theorem.
(b) Verification of Norton's theorems.
4. Verification of Maximum power theorem.

5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit
8. Calibration of ammeter and voltmeter.
9. Open circuit and Short circuit test of a single phase Transformer.
10. No load characteristics of D.C shunt Generators
11. Starting and reversing of speed of a D.C. shunt
12. Speed control of DC shunt motor.
13. Measurement of power in a three phase circuit by two wattmeter method.

Course Outcomes

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

- Get a practical idea about Fluorescent lamps, Tungsten and Carbon filament lamps.
- Get a practical idea about R-L-C Series circuit serial and parallel.
- Get a practical idea about Power theorem
- Get a practical idea about DC.
- Get a practical idea about transformer, and motor

Paper Name: Engineering Workshop Practice
Paper Code: ME191
Contact: 1L+3P= 4
Credits: 2
Course Objectives:

- To develop general machining skills in the students.
- To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude.

Course Structure and Syllabus:

A. THEORETICAL PART

1. INTRODUCTION TO MANUFACTURING; Socio-economic role, Definition, Major grouping and Examples. - 1L

2. ENGINEERING MATERIALS; Classification / Major grouping, Physical, Chemical and Mechanical properties, Applications - 1L

3. DIFFERENT CONVENTIONAL MANUFACTURING PROCESSES MAINLY COVERING BASIC PRINCIPLES, DIFFERENT METHODS AND GENERAL APPLICATIONS; Manufacturing by forming /shaping from solid (input) to solid (product); Forging, Rolling, Drawing, Extrusion; Press tool work- Bending, Shearing, Drawing and Coining. - 3L

4. FORMING / SHAPING FROM LIQUID TO SOLID- CASTING; General principles, General classification or Types of casting; Sand mould casting- procedural steps and requirements; Pattern, Mould,
Melting, Pouring, Solidification, Extracting and Fettling. Other casting processes (for larger volume and quality); Centrifugal casting, Investment casting, Die casting. -3L

5. JOINING PROCESSES; Welding (Permanent Joining)- General classification and basis; Gas welding,
Arc welding, Friction welding and Resistance welding, w.r.t. Principle, Requirements, Relative Advantages
and Applications; Brazing and soldering.

- 2L

6. REMOVAL (MACHINING) PROCESS; Principle and purpose of machining, Machining requirements,

Machine tools- Definition, General classification w.r.t, functional principles and applications; Major machining parameters (and responses)- Speed, Feed and Depth of cut; Tool geometry (Rake, Clearance and

Cutting angles), Cutting fluid application; Elementary machining operations- Facing, Centering, Turning, Threading, Drilling, Boring, Shaping and Milling. -2L

B. SCHEDULE OF PRACTICAL CLASSES

Suggested apportionment / weigtage:

• Machining (and fitting)- 50% (6 days) 18 hrs

• Casting (including pattern making molding and preparation) - 25% (3 days 9hrs)

• Welding (gas, arc and resistance) (2 days 6hrs) and Sheet Metal Working (1 day 3hr)- 25% (3 days 9hrs)

FEASIBLE TYPES / MODELS OF ASSIGNMENTS

i) FITTING (in 2 days or 6 hours); Making a gauge from MS plate as shown in Fig.1.

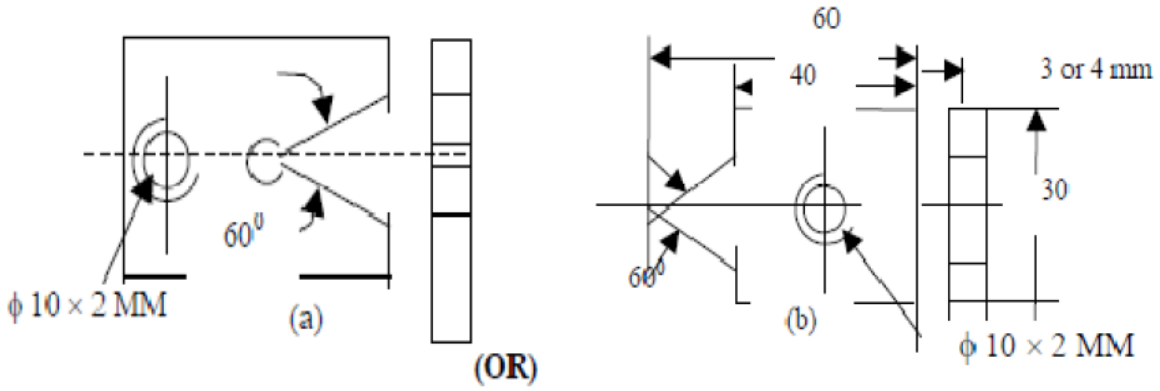


Fig.1: Job for fitting practice

Operations required:

11. Squaring and finishing of the blank by filing
12. Making the Vee-portion by sawing and filing
13. Drilling (in machine) and tapping (hand)

ii) MACHINING (in 3 days or 9 hours); To make a pin as shown in Fig.2 from a 20mm mild steel rod in a lathe.

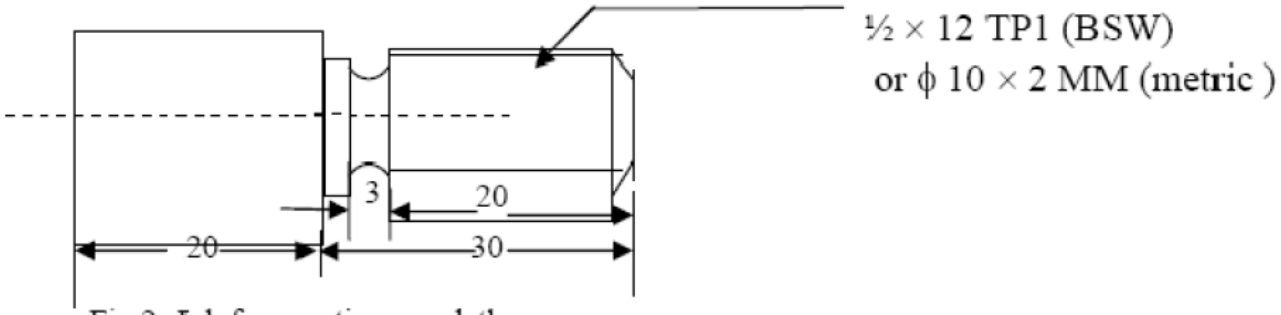
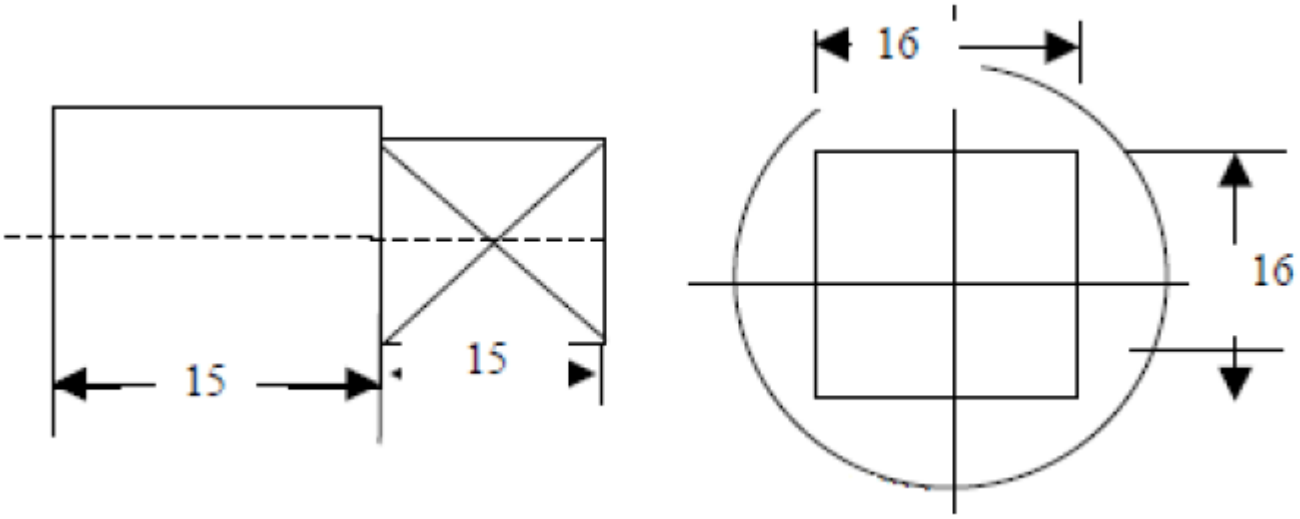


Fig.2: Job for practice on a lathe

iii) MACHINING (in 1 day or 3 hours); To make a MS prism as shown in Fig.3 from a 20mm mild steel rod in a shaping and / or milling machine.



iv) PATTERN MAKING, SAND MOULDING AND CASTING (in 3 classes or 9 hours); To make a wooden pattern and a sand mould with that pattern for casting a cast iron block as shown in Fig.4.

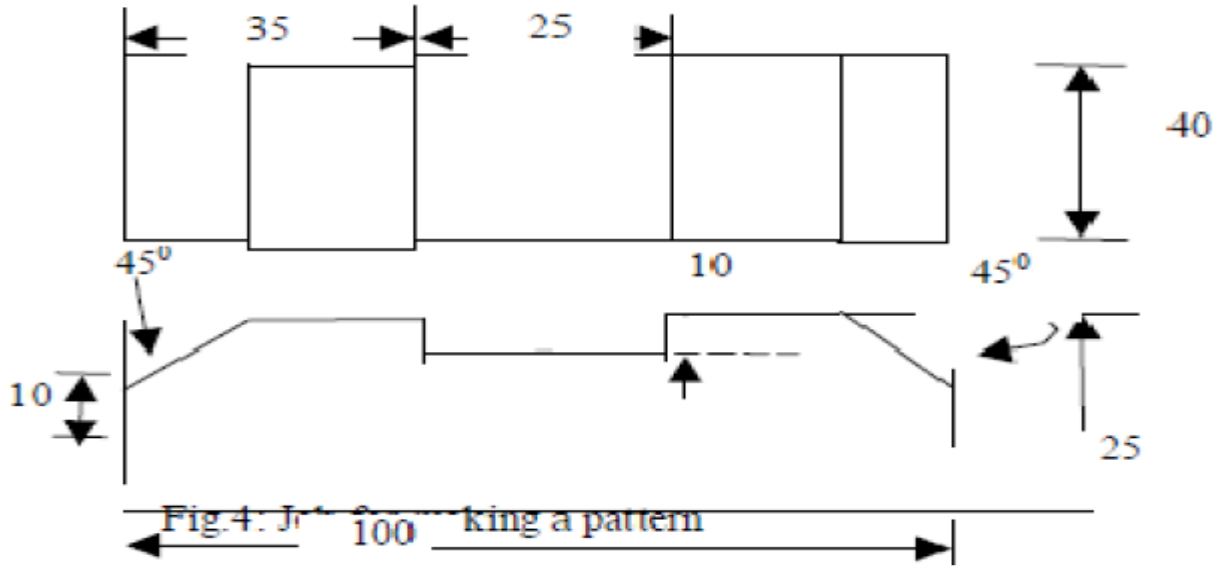
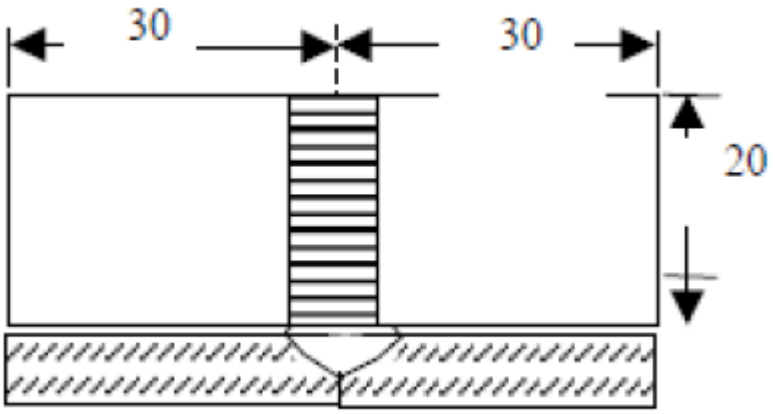


Fig.4: J king a pattern

v) WELDING (GAS WELDING) (in 1 class or 3 hours); To join two thin mild steel plates or sheets (1 to 3 mm thick) as shown in Fig. 5 by gas welding.

Fig.5: Welding specimen for practice



vi) WELDING (ARC WELDING) (in 1 day or 3 hours); To join two thick (6mm) MS plate as shown in Fig. 5 by arc welding.
vii) SHEET METAL WORK (in 1 day or 3 hours); Forming a cone, for example.

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

- UNDERSTAND DIFFERENT CONVENTIONAL MANUFACTURING PROCESSES MAINLY COVERING BASIC
- UNDERSTAND PRINCIPLES, DIFFERENT METHODS AND GENERAL APPLICATIONS
- PERFORM WELDING AND CASTING

Paper Name: Computer Practice Lab
Paper Code: IT191
Contact: 3P
Credits: 2

Course Objectives:

- Work in various application software like word, Excel, Power Point etc.
- Have a clear understanding of basic commands used in Operating system.
- Design problem specific Flow chart and Algorithm for problem solving.
- Have concept of basic anatomy of computer system

Course Structure and Syllabus:

1.History of Computer, Generation of Computer, Classification of Computers
2.Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices
3.Different number systems and their conversions (Decimal, Binary, Octal , and Hexadecimal), binary Arithmetics
4. Logic gates : AND gate, OR gate, NOT.
5.Assembly language, High level language, Compiler, Assembler, Interpreter, Linker, Loader (basic concepts)
6.Networking Concepts, LAN, MAN, WAN, WWW, Internet and Email.
7.MS-OFFICE(MS-WORD,MS-EXCEL,MS-POWERPOINT
8.Design of Programming Logic:Algorithm and Flowchart, Construction of flowchart and algorithms
9.Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Basic organization of UNIX,Kernel

10.Basic DOS and UNIX commands

Course Outcomes:

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

- Understand basic structural and functional units of computers.
- Understand logic gates
- Understand about program and development structure of programs
- Draw flow chart and algorithms
- Use MS office properly
- Understand the basic networking.

Paper Name: NCC/NSS
Paper Code: XC181
Course Objectives:

To enable the students to understand the community in which they work.
To understand themselves in relation to their community.
To identify the needs and problems in the community in the solution of which they can be involved.
To develop among themselves a sense of social and civic responsibility.
To apply education- find practical solution to individual & community problems.
To develop competence required for group living and sharing responsibilities.
Gain skills in mobilising community participation.
To acquire leadership qualities and democratic attitude.
To develop capacity to meet emergencies and national disasters
To practice national integration.

Course outcomes :
At the end of the course students will :

- Understand community work
- Involve them on social work
- Understand national integration and social harmony

First Year Second Semester

Paper Name: Values & Ethics on Profession
Paper Code:HU201
Contact: 2L
Credits: 2
Course Objectives:
The objectives of this course are

- To acquaint the student with the literature of ethics and values.
- To identify some of the events, conditions, and trends that make ethical practices inconsistent and out of phase with contemporary times.
- To demonstrate that human values, ethics and the political realities of one's job and day-to-day
- associations are often in conflict.
- To help students develop a sensitivity to ethical issues in their own work and the means that they June use to respond to those issues.
- To make sure that students understand the source and permanence of their values.
- To make sure that students understand how culture is the dominant influence in their values.

Course Structure and Syllabus:

Science, Technology and Engineering as knowledge and as Social and Professional Activities
Effects of Technological Growth:
Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development
Energy Crisis: Renewable Energy Resources Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics Appropriate Technology Movement of Schumacher; later developments Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis. Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.
Group-B
Ethics of Profession:
Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.
Profession and Human Values:
Values Crisis in contemporary society
Nature of values: Value Spectrum of a good life
Psychological values: Integrated personality; mental health
Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution.
Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity
Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Suggested Text / Reference Books:
1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994 (2nd Ed)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.

3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.

Course Outcomes:

- Graduates will be able to be provided with opportunities to examine ethical and value issues which confront educational leaders and how leaders might supply responses if not solutions to those issues.
- Graduates will be able to demonstrate how individual values not only drive ethical behavior but also ethical decisions.
- Graduates will be able to examine ethics against a backdrop of two themes: equity and choice.

Paper Name: Mathematics-II
Paper Code:M201
Contact: 3L+1T
Credits: 4
Course Objectives:
The objectives of this course are

- To make aware students about the Ordinary and Linear differential equations
- To make aware students about the Applications of differential equations
- To make aware students about the Linear Algebra
- To make aware students about the Infinite series
- To make aware students about the Complex numbers and elementary functions of complex variable.

Course Structure and Syllabus:

Module I
Ordinary differential equations (ODE)- First order and first degree Exact equations,Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation).
Module II
ODE- Higher order and first degree :General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Eulerequations, Solution of simultaneous linear differential equations.
Module III
Basics of Graph Theory:Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph,; Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices, Matrix representation ofa graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite grap
Module IV
Tree: Definition and properties, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using Kruskal's and Prim's algorithm.
Module V
Improper Integral:Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations. Problems related to Beta and Gamma functions.

Laplace Transform (LT): Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of ( )f tt, LT of ( )nt f t, LT of derivatives of ( )f t, L.T. of ( )f u du_.Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT:Definition and its properties; Convolution Theorem(statement only) and its application to the evaluation of inverse LT, Solution of linearODE with constant coefficients (initial value problem) using LT. Z transform.

Suggested Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, (Wiley Eastern)
2. Graph Theory: V. K. Balakrishnan, (Schaum's Outline, TMH)
3. A first course at Graph Theory: J. Clark and D. A. Holton (Allied Publishers LTD)
4. Introduction to Graph Theory: D. B. West (Prentice-Hall of India)
5. Graph Theory: N. Deo (Prentice-Hall of India)
6. Engineering Mathematics:B.S. Grewal (S. Chand & Co.)
7. Higher Engineering Mathematics: John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
8. Calculus: Strauss, Bradley and Smith (3PrdPedition, Pearson Education)
9. Engineering Mathematics (Volume 2): S. S. Sastry (Prentice-Hall of India)
10. Advanced Engineering Mathematics, 3E: M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OU P), Indian Edition
11. An Introduction to Differential Equations, R.K. Ghosh and K.C.Maity (New Central Book Agency)

Course Outcome: At the end of this course

- Graduates will be able to analyze differential equations.
- Graduates will be able to apply mathematical tools such as directional derivatives and divergence which play significant roles in many applications.
- Graduates will be able to become familiar with the applications of differential equations to engineering problems.
- Graduates will be able to become conversant with the fundamentals of Linear algebra.
- Graduates will be able to understand the basic of infinite series and their applications. The student becomes familiar with the complex numbers and elementary functions of complex variable.

Paper Name: Engineering Chemistry
Paper Code:CH201 (IT)
Contacts: 3L + 1T = 4
Credits: 4
Course objectives:
The objectives of this course are

- To develop technology based on materials development.
- To evolve starting from Stone age to the present days advance materials age is totally based on development of new material which is quite impossible without the knowledge of Chemistry rather Basic science.
- To be included by most of the esteemed institute around the world which includes Chemistry or basic science in their UG technical course. So to be competent with respect to global scenario students of JISCE must have the fundamental knowledge of Chemistry or Basic science.
- To be at a pace with the present age students must have the knowledge of advance materials which could be included in Chemistry syllabus e.g. semiconductors like Silicon or Germanium is the most indispensable part of the computers. The transition from computers to super computers is possible only by the introduction of Nano materials.

Course Structure and Syllabus:

Module 1

Chemical Thermodynamics:

Concept of Thermodynamic system: Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

Introduction to first law of thermodynamics: different statements, mathematical form.

Internal energy: Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas.

Enthalpy: Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas. 3L

Heat Capacity: Definition, Classification of Heat Capacity (Cp and CV): Definition and General expression of Cp - CV. Expression of Cp - CV for ideal gas.

Reversible and Irreversible processes: Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas, Adiabatic changes: Work done in adiabatic process, Interrelation between thermodynamic parameters (P, V and T), slope of P-V curve in adiabatic and isothermal process. Application of first law of thermodynamics to chemical processes: exothermic, endothermic rocesses, law of Lavoisier and Laplace, Hess's law of constant heat summation, Kirchoff's law. 3L

2nd law of thermodynamics: Statement, Mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature. 2L

Evaluation of entropy: characteristics and expression, entropy change in irreversible cyclic process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases. 2L Work function and free energy: Definition, characteristics, physical significance, mathematical expression of _A and _G for ideal gas, Maxwell's Expression (only the derivation of 4 different forms), Gibbs Helmholtz equation. Condition of spontaneity and equilibrium reaction. 2L

Module 2

Electrochemistry:

Conductance Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte). Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions. Conductometric titrations: SA vs SB & SA vs WB; precipitation titration KCl vs AgNO3. 2L

Electrochemical cell:

Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, quinhydrone half cell and calomel half cell, Glass electrode (construction, representation, cell reaction, expression of potential, Discussion, Application)

Storage cell, fuel cell (construction, representation, cell reaction, expression of potential, Discussion, Application). 5L

Module 3

Solid:

Chemical bonding and states of matter Hydrogen bond, metallic bond and their applications. 2L

Solid state Chemistry Introduction to stoichiometric defects (Schottky & Frenkel) and non – stoichiometric defects (Metal excess and metal deficiency).

Conduction in Metal, Semiconductor-n type and p type, Effect of temperature on conductivity , p-n junction, rectifiers, transistors. Photovoltaic cell, Fabrication of integrated circuits.

Role of silicon and germanium in the field of semiconductor. 4L

Module 4

Polymers and Nanomaterials Introduction, classification, Hydrocarbon Molecules, Thermoplastic, Thermosetting Polymers. Basic Concepts Molecular Weight, Polymer Crystallinity. Crystallization, Melting and glass transition phenomena, Polymerization: addition, condensation, Copolymerization, Degree of polymerization, PDI. 3L

Electronic polymers-synthesis, properties, application. 2L
Preparation, properties, engineering applications of: polyethylene, PVC, Bakelite, nylon, natural rubber, vulcanization. elastomers – Buna-s, 2L
Introduction to Nanomaterials- Basic principle of nanoscience and technology, creation and use of buckyballs, structure, properties and uses of Carbon nanotubes, Applications of nanotechnology. 3L
Module 5
Industrial Chemistry
Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Coal analysis: Proximate and ultimate analysis.
Liquid fuel: Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane
number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Bio-diesel.
Gaseous fuels: Natural gas, water gas, Coal gas, bio gas. 5L

Suggested Text / Reference Books:
1. Sashi Chawla, A Text Book of Engineering Chemistry, Dhanpat Rai & Co.Pvt. Ltd.
2. Engineering Chemistry, P. C. Jain, Dhanpat Rai Publication
3. P. C. Rakshit, Physical Chemistry, Sarat Book House (7th Edition).
4. P. Ghosh, Polymer Science and Technology of Plastics and Rubbers, Tata McGraw Hill Publishing Company Limited.
5. F.W.Billmeyer : Textbook of Polymer Science is published by Wiley India (is now an Indian Imprint.)
6. Joel R. Fried, Polymer Science and Technology, Pearson Education (2nd Edition).
7. I. L. Finar, Organic Chemistry, Addison Wesley Longman, Inc.
8. Physical Chemistry, Atkins, 6th Edition, Oxford Publishers.
9. Organic Chemistry, Mark Loudon, 4th Edition, Oxford Publishers..
10. Concise_Inorganic_Chemistry,_J._D._Lee,_Black_Well_Science

Course Outcomes: At the end of this course

- Graduates who are more competent with respect to global scenario
- Graduates will be able to develop innovative technologies based on different disciplines
- Graduates will be able to develop fundamental knowledge for higher studies
- Graduates will be able to be more motivated students in the field of interdisciplinary research
- Graduates will be able to be more generally aware about the everyday's life.

Paper Name: Basic Electronics Engineering
Paper Code:EC201
Contacts: 3L + 1T = 4
Credit:4
Course Objectives:
The objectives of this course are

- To familiarize students about the basic electronic components.
- To enable the students to get an idea about working principal and application of diode, transistor, FET, MOSFET and OP-AMP etc.
- To give students a preliminary knowledge of logic level and gates of digital electronics.

Course Structure and Syllabus:

Module-I
Semiconductors: Conductors, Semiconductors and Insulators, electrical properties, band diagrams. Intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers.
Diodes and Diode Circuits Formation of P-N junction, energy band diagram, built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.
Module-II
Bipolar Junction Transistors: Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action and current amplification factors for CB and CE modes. Biasing and Bias stability.
Module-III
Field Effect Transistors: Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles.
Module-IV
Feed Back Amplifier (basic concept), Oscillators and Operational Amplifiers:Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors; topologies of feedback amplifier; effect of feedback on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feedback, instability and oscillation, condition of oscillation, Barkhausen criteria.
Introduction to integrated circuits: Introduction to binary number; Basic Boolean algebra; Logic gates and
function realization.
Suggested Text / Reference Books:
1. Millman & Halkias: Integrated Electronics.
2. Sedra & Smith: Microelectronics Engineering.
3. Malvino: Electronic Principle.
4. Schilling & Belove: Electronics Circuits.
5. Millman & Grabal: Microelectronics.
6. Salivahanan: Electronics Devices & Circuits.
7. Boyelstad & Nashelsky: Electronic Devices & Circuit Theory.

Course Outcomes:

- Graduates will be able to make simple circuits using electronics components.
- Graduates will be able to be helped to do experiments in Electronics lab.

Paper Name: Principle of Procedural Programming
Paper Code:IT201
Contacts: 3L+1T
Credit: 3
Course Objectives:
The objectives of this course are

- To Gain good knowledge on pointer, structure and file handling.
- To become comfortable with the advanced aspects of the C programming language.

- To gain an in-depth knowledge on what is happening at compile, link and runtime on a target processor.
- To introduce good quality and style for real-time embedded programming.
- To gain hands-on experiences of programming up interrupts and real-time operating systems.

Course Structure and Syllabus:

Fundamentals of Computer:
History of Computer, Generation of Computer, Classification of Computers ,Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices ,Binary & Allied number systems ,representation of signed and unsigned numbers. Basic concepts of Assembly language, high level language, compiler and assembler , Basic concepts of operating system, Concept of Algorithm & flow chart
C Fundamentals:
The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements Operators & Expressions: Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Input and Output: Standard input and output, formatted output -- printf, formatted input scanf.
Flow of Control:
Statement and blocks, if - else, switch, loops - while, for do while, break and continue, go to and labels
Fundamentals and Program Structures:
Basic of functions, function types, functions returning values, functions not returning values, auto, external, static and register variables, scope rules, recursion, function prototypes, C preprocessor, command line arguments.
Arrays and Pointers:
One dimensional arrays, pointers and functions, multidimensional arrays.
Structures Union and Files:
Basic of structures, structures and functions, arrays of structures, bit fields, formatted and unformatted files

Text Book:
1. Introduction To Computing (TMH WBUT Series), E. Balagurusamy,TMH
2. Gottfried Programming with C Schaum
3. Kerninghan B.W. & Ritchie D.M. The C Programming Language
4. Sinha & Sinha Fundamental of Computers
5. Kanetkar Y. Let us C
Reference Books:
1. Rajaram Computer Concepts & C Program, Scitech
2. Rajaraman V. Fundamental of Computers

Course Outcomes: At the end of this course

- Graduates will be able to follow the software development process (requirements analysis, design, implementation, and testing) in the development of multi-source code files.
- Graduates will be able to employ good software engineering practices such as incremental development, data integrity checking, and adherence to style guidelines.
- Graduates will be able to construct programs that demonstrate effective use of advanced c features including the pre-processor, pointers, void *, static and external variables, advanced data structures, and dynamic memory management.

- Graduates will be able to select and model data using primitive and structured types.
- Graduates will be able to analyse and construct effective algorithms.
- Graduates will be able to use development environment features including make processors, editors, debuggers, compilers, linkers, and libraries.
- Graduates will be able to identify and comprehend c documentation.
- Graduates will be able to work well with peer developers in a team situation including mentoring and peer reviews.

Paper Name: Engineering Chemistry Lab
Paper Code: CH291
Contact: 3P
Credits: 2
Course Objectives:
The objectives of this course are

- To develop technology based on materials development.
- To evolve starting from Stone age to the present days advance materials age is totally based on development of new material which is quite impossible without the knowledge of Chemistry rather Basic science.
- To be included by most of the esteemed institute around the world which includes Chemistry or basic science in their UG technical course. So to be competent with respect to global scenario students of JISCE must have the fundamental knowledge of Chemistry or Basic science.

Any six experiments
1. To Determine the alkalinity in a given water sample.
2. Red-ox titration (estimation of iron using permanganometry)
3. To determine calcium and magnesium hardness of a given water sample separately.
4. To determine the value of the rate constant for the hydrolysis of ethyl acetate catalyzed by hydrochloric acid.
5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water)
6. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)
7. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.
8. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.
9. Determination of dissolved oxygen present in a given water sample.
10. To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution)

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

- Process to find alkalinity in a given water sample.
- Red-ox titration
- The process to determine calcium and magnesium hardness of a given water sample
- Heterogeneous equilibrium
- Viscosity of solutions

- Conduct metric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution
- pH- metric titration
- The process to determine dissolved oxygen present in a given water sample

Paper Name: Basic Electronics Engineering Lab
Paper Code:EC291
Course Objectives:
The objectives of this course are

- To familiarize students about the basic electronic components.
- To enable the students to get an idea about working principal and application of diode, transistor, FET, MOSFET and OP-AMP etc.
- To give students a preliminary knowledge of logic level and gates of digital electronics.

Paper Name: Programming Lab
Paper Code:IT291
Contact: 3P
Credits: 2
Course Objectives: The objectives of this course are

- To Gain good knowledge on pointer, structure and file handling.
- To become comfortable with the advanced aspects of the C programming language.
- To gain an in-depth knowledge on what is happening at compile, link and runtime on a target processor.
- To introduce good quality and style for real-time embedded programming.
- To gain hands-on experiences of programming up interrupts and real-time operating systems.

Course Structure and Syllabus:

Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT, FET) and electronic equipment like DC power supplies, multi-meters etc.
Familiarisation with measuring and testing equipment like CRO, Signal generators etc.
Study of I-V characteristics of Junction diodes.
Study of I-V characteristics of Zener diodes.
Study of Half and Full wave rectifiers with Regulation and Ripple factors.
Study of I-V characteristics of BJTs (CE, CB).
Study of I-V characteristics of FETs (CS, CD).

Course Outcomes:

At the end of the course students will :

- Be familiar with CRO practically
- Come to know characteristics of diode.
- Be familiar with rectifiers
- Be familiar with BJTs and FETs .

Paper Name: Engineering Graphics Lab
Paper Code: ME291
Contacts: 1L+3P
Credits: 3
Course Objectives:

This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.

- A thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering.
- Topics cover: geometric transformations, geometric algorithms, software systems, 3D object models (surface, volume and implicit), visible surface algorithms, image synthesis.
- Shading and mapping, ray tracing, radiosity, global illumination, Monte Carlo path tracing, photon mapping, and anti-aliasing.
- The interdisciplinary nature of computer graphics is emphasized in the wide variety of examples and applications.
- Aiming at conducting Tutorial, seminars and remedial classes.

Course Structure and Syllabus:

A. THEORETICAL PART
1. Introduction to Lines, Lettering, Dimensioning, Scales. - 1L
2. Geometrical Construction and Curves - 1L
3. Projection of Points, Lines and Surfaces - 2L
4. Projection of Solids - 2L
5. Isometric Views - 1L
6. Sectional Views - 1L
7. Development of Surfaces - 1L
8. Introduction to Computer Aided Drafting - 3L

B. PRACTICAL PART
1. LINES, LETTERING, DIMENSIONING, SCALES; Plain scale, Diagonal scale.- 6hrs
2. GEOMETRICAL CONSTRUCTION AND CURVES; Construction of polygons, Parabola, Hyperbola, Ellipse. - 6hrs
3. PROJECTION OF POINTS, LINES, SURFACES; Orthographic projection- 1st and 3rd angle projection, Projection of lines and surfaces– Hexagon. - 3hrs
4. PROJECTION OF SOLIDS; Cube, Pyramid, Prism, Cylinder, Cone. - 6hrs
5. DRAWING ISOMETRIC VIEW FROM ORTHOGONAL/ SECTIONAL VIEWS OF SIMPLE SOLID OBJECTS. - 3hrs
6. FULL AND HALF SECTIONAL VIEWS OF SOLIDS. - 3hrs
7. DEVELOPMENT OF SURFACES; Prism, Cylinder, Cone. - 3hrs
8. COMPUTER AIDED DRAFTING (Using AutoCAD and/or similar softwares); Introduction: Cartesian and Polar coordinate system, Absolute and Relative coordinates; Basic editing commands: Line, Point, Trace, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Editing methods; Basic object selection methods, Window and crossing window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror; Display commands: Zoom, Pan, Redraw, Regenerate; Simple dimensioning and text, Simple exercises. - 6hrs

Suggested Text / Reference Books:

1. Narayana, K.L. and Kannaiah, P. Text Book of Engineering Drawing"Engineering Graphics", Scitech Publication
2. Bhatt, N.D. "Elementary Engineering Drawing", Charotar Book Stall, Anand, 1998
3. Lakshminarayanan, V. and Vaish Wanar, R.S., "Engineering Graphics", Jain Brothers, New Delhi, 1998
4. Chandra, A.M. and Chandra Satish, "Engineering Graphics", Narosa, 1998
5. Jolhe, "Engineering Graphics", Tata McGraw-Hill- WBUT Series
6. Gill, P.S., "A Text Book of Engineering Drawing", Katson Publishing House (Kataria and Sons)
7. Venugopal, K., "Engineering Drawing & Graphics + AutoCAD", New Age International
8. Ventaka Reddy K., "Text Book of Engineering Drawing (2nd Edition)", BS Publication.

Course Outcomes:

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

- Lines, Lettering, Dimensioning, Scales
- Geometrical Construction and Curves
- Projections
- Isometric and Projection views
- Computer Aided Drafting

Second Year First Semester

Paper Name:Mathematics-III (Discrete Mathematics and Graph theory)
Paper Code: M301
Contacts:3L+1T
Credits:4

Course Objectives:

The objectives of this course are

- To develop an understanding of counting, functions and relations.
- To be familiar with fundamental notions of statistics, such as sample space, mean and distributions.
- To understand the fundamental concepts of set theory, Functional and relational properties and operations, Boolean algebra.
- To apply basic probability theory and its applications, counting principles.
- To understand recursive definitions and solutions of simple of recurrence relations and generating functions.
- To understand Graph algorithms and their application in computer science.
- To understand fundamentals of Group theory, Rings and their applications.

Course Structure and Syllabus:

Module I:

Introduction to Propositional Calculus: Propositions, Logical Connectives, Conjunction, Disjunction, Negation and their truth table. Conditional Connectives, Implication, Converse, Contrapositive, Inverse, Biconditional statements with truth table, Logical Equivalence, Tautology, Normal forms-CNF, DNF and related examples.

Module II:

Order, Relation and Lattices: POSET, Hasse Diagram, Minimal , Maximal, Greatest and Least elements in a POSET, Lattices and its properties, Principle of Duality, Distributive and Complemented Lattices. 10L

Module III:

Counting Techniques: Permutations, Combinations, Binomial coefficients, Pigeon- hole Principle, Principles of inclusion and exclusions;

Module IV

Recurrence relations: Formulation/Modelling of different counting problems in terms of recurrence relations, Solution of linear recurrence relations with constant coefficients (upto second order) by (i) The iterative method (ii) Characteristic roots method (iii) Generating functions method.

Module V:

Graph Coloring: Chromatic Numbers and its bounds, Independence and Clique Numbers, Perfect Graphs-Definition and examples, Chromatic polynomial and its determination, Applications of Graph Coloring. Matchings: Definitions and Examples of Perfect Matching, Maximal and Maximum Matching, Hall's Marriage Theorem (Statement only) and related problems.

Suggested Text / Reference Books:

Texts:

1. Russell Merris, Combinatorics, Wiley-Interscience series in Discrete Mathematics and Optimisation
2. N. Chandrasekaran and M. Umaparvathi, Discrete Mathematics, PHI
3. Gary Haggard, John Schlipf and Sue Whitesides, Discrete Mathematics for Computer Science, CENGAGE Learning
4. Gary Chartrand and Ping Zhang – Introduction to Graph Theory, TMH

References:

1. J.K. Sharma, Discrete Mathematics, Macmillan
2. Winfried Karl Grassmann and Jean-Paul Tremblay, Logic and Discrete Mathematics, PEARSON.

3. S. K. Chakraborty and B. K. Sarkar, Discrete Mathematics, OXFORD University Press.
4. Douglas B. West, Introduction to graph Theory, PHI

Course Outcomes: At the end of this course

- Graduates will be able to apply induction and other proof techniques towards solving recurrences and other problems in elementary algebra.
- Graduates will be able to distinguish between functions and relations.
- Graduates will be able to compute the probability of an event in a well-defined distribution.
- Graduates will be able to solve problems involving sets, functions, relations, graphs and trees, Boolean algebra.
- Graduates will be able to calculate number of possible outcomes of elementary combinatorial processes such as permutations and combinations.
- Graduates will be able to be familiar and work in ease with mathematical notations and common concepts in discrete mathematics and implementation of groups in coding theory.
- Graduates will be able to solve mathematical as well as graphical problems in a systematic and logical manner.

Paper Name: Physics II
Paper Code: PH(IT) 301
Contacts:3L+1T
Credits:4

Course Objectives:

The objectives of this course are

- To provide an adequate exposure and develop insight about the basic principles of physics along with the possible applications.
- To be acquainted with basic physics principles which would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.
- To create awareness about the vital role played by science and engineering in the development of new technologies.
- To provide the necessary exposure to the practical aspects, which is an essential component for learning science.
- To achieve this by primarily introducing a course clarifying some the basics of physical sciences attached to computers and communications as well as an advanced course which will form fundamentals of future learning on devices, communications and new age technologies.

Course Structure and Syllabus:

Module 1: Quantum Mechanics-II, Quantum Computation and Communication
1.01: Vector space & Heisenberg representation: Elements of linear vector spaces- The idea of n-dimensional vector space, use of 'bra-ket' notation, linear independence, basis, inner product, norm of a vector; Hilbert space, Ortho normality; Matrix representation of bra & kets; linear operators; Pauli matrices; Definitions of Hermitian, Inverse and Unitary operators; Commutators; Tensor products. 4L
1.02: Quantum Computation & Communication: Idea of 'qubit' and examples of single qubit logic gates- Classical bits, Qubit as a two level system; Bloch vector representation of state of qubit; Polarization states of photon and measurements; Pauli gates, Phase shift gate, Quantum gates as

rotations in Bloch sphere; concept of entanglement. Bell's inequality- the paradox, joint state of entangled particles; Two-qubit controlled gates; entanglement generation Quantum
circuit for transforming computational basis to Bell basis; Quantum Teleportation (Basic idea) 6L

Module 2: PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY

2.01: Applications of Schrödinger's equation – Finite Potential Barrier, WKB approximation (qualitative) -connection with
semiconductor diode- tunneling effect. 3L

2.02: Free electron theory- Free electron theory-Drude model (qualitative), Ohm's law, Wideman Franz law, Electron scattering and
resistance, relaxation time, diffusion length, mean free path. 2L

2.03: Band Theory: Introduction to Band theory (mention qualitatively improvement over free electron theory)- Kronig-Penny model
(Use Schr_dinger picture to obtain Energy-band (E-k) diagram), formation of allowed and forbidden energy bands, Concept of
effective mass – electrons and holes, crystal momentum, Density of states (qualitative), Energy bands of metal, insulator,
semiconductor, magneto-resistance, magnetostriction, Piezoelectric effect, Hall effect-applications. 3L

2.04 : Semiconductors and insulators: Direct & indirect band gaps, Fermi-Dirac distribution function (temperature dependencequalitative
discussions). Fermi level for intrinsic and extrinsic semiconductors (dependence on temperature and doping concentration
viz. p type, n-type), Diffusion and drift current (qualitative). Generation and re-combination, quasi-Fermi energy level (basic
concepts) band diagram of p-n, Schotkey diode, BJT and MOS-capacitors-principle of operation, Flat band and threshold
voltages. 5L

Module 3: SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES

3.01: SOLID STATE ELECTRONICS DEVICES: Classification of different types of diode on the basis of doping
concentration: rectifier diode (qualitative idea), Zener diode (qualitative idea), tunnel diode, IMPATT diode (importance of negative resistance), PNPN transistors - simple working principle, I-V characteristics, triggering-operating principle &
application. 3L

3.02: Field effect transistors: Basic principles of p and n channel MOSFETS, CMOS, NMOS and VLSI MOSFETSapplications. 2L

3.03 Sensor & Detectors: Semiconductor sensors and detectors-applications-Charge Coupled device (CCD). 1L

3.04: OPTO ELECTRONIC DEVICES: Basic background of photonic devices, Photoconductivity, Optical devices, Importance of reverse current in optical detectors, photo-diodes, photo voltaic effects (solar cells), Light Emitting Diode (as direct band gap material), avalanche and photodiode, Photo-transistors (Basic idea & application), LDR-operation & applications. 3L

Module 4: Storage & Display devices:

4.01: Storage devices: Magnetic field and Magnetization; Magnetic susceptibility, Paramagnetism, Concept of magnetic moment, Bohr Magneton, Curie's Law; Ferromagnetism, phenomenon of hysteresis-hysteresis loss, Hard ferromagnets, applications of permanent magnets; Comparison and applications of Soft ferromagnets (Permalloys, Ferrites). Magnetic resonance, NMR and MRI (qualitative discussions related to applications). 4L

4.02: Different Magnetic storage devices-Hard disc (examples related to computers compared with semiconductor storage viz. Pendrive), Optical storage-CD, DVD, Blu-ray Disc. 2L

4.03: Display devices:

Operation and application of CRT, Liquid crystal display (LCD, LED, Plasma display, Thin film transistor display). 2L

List of Assignments/Tests:

_ 15 marks Internal test 1 & Internal test 2 (best of the two would be considered)

_ Assignments in regular classes, tutorial classes, surprise tests or through Problem oriented guided inquiry learning (POGIL)

Suggested Text / Reference Books:

Module 1: Quantum Mechanics-II, Quantum Computation and Communication

1. Advanced Quantum Mechanics-J. J. Sakurai (TMH)
2. Quantum Mechanics-Schiff (Addison-Wesley)
3. Quantum Computation and Quantum Information(10th Anniversary Edition)-Nielsen & Chuang (Cambridge University
Press)
4. The physics of quantum information-Dirk Bouwmeester, Artur K. Ekert, Anton Zeilinger (Springer)
5. Quantum Mechanics-Cohen Tanuje.

Module 2: PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY

1. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
2. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
3. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
3. Solid state physics- S. O. Pillai
4. Introduction to solid state physics-Kittel (TMH)
5. Solid State Physics- Ali Omar (Pearson Eduction)
6. Integrated Electronics-Millman Halkias (TMH)
7. Solid State Physics-A. J. Dekker (Prentice-Hall India)

Module 3: SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES

1. Solid state electronics-S. M. Zee & Sanjoy Banerjee
2. Optoelectronic devices-Pallab Bhattacharjee

Module 4: Storage devices & Applications

1 Introduction to solid state physics-Kittel (TMH)
2. Solid State Physics- Ali Omar (Pearson Eduction)
3. Solid state physics- S. O. Pillai
4. Solid State Physics-A. J. Dekker (Prentice-Hall India)
5. Materials Science-Raghavan

PHYSCIS-II SYLLABUS, Paper Code: PH 301 (IT) (PROPOSED) AS PER MODULES & EXAMGROUP* DIVISION

STREAM	MODULE -1	MODULE-2	MODULE -3	MODULE -4	GR-A *	GR-B*
IT	Quantum Mechanics-II, Quantum Computation and Communication 4+6=10L	PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY 2+2+4+3=11L	SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES 3+4+4=11L	Storage & Display devices 8L	1.01: Vector space & Heisenberg representation (4L) 2.01: Applications of Schrödinger's equation (2L) 2.02: Free electron theory (2L) 2.03: Energy	1.01: Quantum Computation & Communication (6L) 2.04 : Semiconductors and insulators (3L) 3.02: Field effect transistors (4L) 3.03: OPTO ELECTRONIC

					Band Theory (4L) 3.01: SOLID STATE ELECTRONICS DEVICES (3L) 4.01: Storage devices. (5L)	**DEVICES (4L) 4.02: Display devices (3L)**

Course Outcome: At the end of this course

- Graduates will be able to be equipped with basic understanding of core of the physical phenomena behind various devices and used in computers and communications.
- Graduates will be able to be exposed to the basics of new age scientific & technological fronts.

Paper Name: Digital Electronics
Paper Code: IT301(EC)
Contacts:3L+1T
Credits:4
Course Objectives:
The objectives of this course are

- To be familiar with Binary Number System & Boolean Algebra (recapitulation); BCD, ASCII, EBDIC, Gray codes and their conversions ; Signed binary number representation with 1's and 2's complement methods
- To be familiar withBinary arithmetic, Venn diagram, Boolean algebra (recapitulation) ;
- To be familiar with representation in SOP and POS forms ;
- To be familiar with Minimization of logic expressions by algebraic method. Combinational circuits - Adder and Subtractor circuits (half & full adder & subtractor); Encoder, Decoder,Comparator, Multiplexer, De-Multiplexer and Parity Generator.
- To familiar withRegisters (SISO,SIPO,PIPO,PISO),Ring counter, Johnson counter,Basic concept of Synchronous and Asynchronous counters (detail design of circuits excluded),
- To be familiar with Design of Mod N Counter. A/D and D/A conversion techniques – Basic concepts (D/A:R-2-R only,A/D: successive approximation,Logic families- TTL, ECL, MOS and CMOS - basic concepts.

Course Structure and Syllabus:

Number systems and arithmetic (Fixed and floating point), Combinational logic analysis and design: logic minimisation methods, Combinational logic circuits: adder, subtractor, multiplexer, demultiplexer, encoder, decoder, comparator; Logic families (TTL, ECL, CMOS, BICMOS), Delay, Hazards. Sequential logic design: latches and flip-flops (SR,D,JK,T), Setup and Hold time , Clock frequency, Finite state machine design, ASM charts, state minimization, state assignment, synthesis using D-FF and JK-FF, counters, shift registers, MSI devices as state machines, Memory cells.

Suggested Text / Reference Books:
1. J.F.Wakerly, Digital Design Principles and Practices, PH, 1999.
2. D.D. Givone, Digital Principles and Design, TMH, 2002
3. M. Raffiquzzman & Rajan Chandra, Modern Computer Architecture, Galgotia Publications, 1990.
4. David Patterson and John Hennessy, Computer Organization and Design, Elsevier, 2007.
5. MALVINO LEACH

Course Outcome of Digital Electronics : At the end of this course

- Graduate will be able to convert from one number system to another,
- Graduate will be able to work out problems related to Boolean algebra, minimisation problems etc.
- Graduate will be able to learn to differentiate between the combinational and sequential circuits
- Graduate will be able to design simple circuits.

Paper Name: Data Structures & Algorithms

Code: IT302
Contacts: 3L +1T
Credits: 4
Course Objectives:

The objectives of this course are

- To provide knowledge in various data structures and algorithms.
- To introduce techniques for analyzing the efficiency of computer algorithms.
- To provide efficient methods for storage, retrieval and accessing data in a systematic manner.
- To explore the world of searching, sorting, traversal and graph algorithm.
- To write complex applications using structured programming methods.
- To demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, and trees.
- To use various data structures effectively in application programs.
- To implement various data structures in more than one manner.
- To compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.
- To demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.
- To compare the efficiency of various sorting algorithms in terms of both time and space.
- To program multiple file programs in a manner that allows for reusability of code.
- To trace and code recursive functions.

Course Structure and Syllabus:

Module -I. Linear Data Structure[8]
Introduction (2L):
Concepts of data structures: a) Data and data structure b) Abstract Data Type and Data Type.
Algorithms and programs, basic idea of pseudo-code. Algorithm efficiency and analysis, time and space analysis of algorithms – order notations.
Array (2L):
Different representations – row major, column major. Sparse matrix - its implementation and usage. Array representation of polynomials.
Linked List (4L):
Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.
Module -II: Linear Data Structure[7]
[Stack and Queue (5L):
Stack and its implementations (using array, using linked list), applications.
Queue, circular queue, dequeue. Implementation of queue- both linear and circular (using array, using linked list), applications.
Recursion (2L):

Principles of recursion – use of stack, differences between recursion and iteration, tail recursion.
Applications - The Tower of Hanoi, Eight Queens Puzzle.

Module -III. Nonlinear Data structures [15]

Trees (9L):

Basic terminologies, forest, tree representation (using array, using linked list).
Binary trees - binary tree traversal (pre-, in-, post- order), threaded binary tree (left, right, full) - non-recursive traversal algorithms using threaded binary tree, expression tree.
Binary search tree- operations (creation, insertion, deletion, searching).
Height balanced binary tree – AVL tree (insertion, deletion with examples only).
B- Trees – operations (insertion, deletion with examples only).

Graphs (6L):

Graph definitions and Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list.
Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, forward-edge), applications.
Minimal spanning tree – Prim's algorithm

Module - IV. Searching, Sorting:[10L]

Sorting Algorithms (5L): Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap), radix sort.
Searching (2L): Sequential search, binary search, interpolation search.
Hashing (3L): Hashing functions, collision resolution techniques.

Suggested Text / Reference Books:

1. "Data Structures And Algorithm using C", Amitiva Nag, J.P.Singh
2. "Fundamentals of Data Structures of C" by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.
3. "Data Structures in C" by Aaron M. Tenenbaum.
4. "Data Structures" by S. Lipschutz.
5. "Data Structures Using C" by Reema Thareja.
6. "Data Structure Using C", 2/e by A.K. Rath, A. K. Jagadev.
7. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.

Course Outcomes: At the end of this course

- Graduates will be able to use different kinds of data structures which are suited to different kinds of applications, and some are highly specialized to specific tasks. For example, B-trees are particularly well-suited for implementation of databases, while compiler implementations usually use hash tables to look up identifiers.
- Graduates will be able to manage large amounts of data efficiently, such as large databases and internet indexing services.
- Graduates will be able to use efficient data structures which are a key to designing efficient algorithms.
- Graduates will be able to use some formal design methods and programming languages which emphasize on data structures, rather than algorithms, as the key organizing factor in software design.
- Graduates will be able to store and retrieve data stored in both main memory and in secondary memory.

Paper Name: Numerical Methods
Paper Code:IT303
Contacts:3L+1T
Credits:3
Course Objectives: The objectives of this course are

- To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
- To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
- To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.
- To facilitate numerical computing.

Course Structure and Syllabus:

Module 1
Approximation in numerical computation:
Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors [2]
Module 2
Basic concept of C programming Language:
Datatype, Variable, Control Statements, Arrays, Functions. [5]
Module 3
Interpolation:
Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation. [6]
Module 4
Numerical solution of Algebraic equation:
Bisection method, Regula-Falsi method, Newton-Raphson method, Secant's method. [6]
Module 5
Numerical Differentiation & Integration:
Numerical Differentiation**,** Numerical Integration using Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms. [6]
Module 6
Numerical solution of a system of linear equations:
Gauss elimination method, Gauss- Jordan method, Matrix inversion, LU Factorization method, Jacobi iterative method, Gauss-Seidel iterative method. [8]
Module 7
Numerical solution of ordinary differential equation:
Euler's method, Modified Euler's method, Taylor's Series, Runge-Kutta methods, Predictor-Corrector methods.[9]

Suggested Text / Reference Books:

Text Books:
1. Dutta & Jana: Introductory Numerical Analysis, Shreedhar Prakashani.
2. Sastry: Introductory Methods of Numerical Analysis, PHI.
3. Let us C: Kanetkar, Yash Publication.
Reference Books:
1. Dey & Gupta: Numerical methods, TMH.
2. Mollah & Chakrabarty: Computing Systems, JBBL.
3. Sinha & Dinda: Numerical & Statistical Methods with Programming in C, Scitech.

Course Outcomes: At the end of this course

- Graduates will be able to apply Numerical analysis which has enormous application in the field of Science and some fields of Engineering.
- Graduates will be able to apply advanced numerical methods which are essential in making numerical weather prediction feasible.
- Graduates will be able to compute the trajectory of spacecrafts which requires the accurate numerical solutions of a system of ordinary differential equations.
- Graduates will be able to apply Numerical analysis in Car companies which can improve the crash safety of their vehicles by using computer simulations of car crashes. Such simulations essentially consist of solving partial differential equations numerically.
- Graduates will be able to apply the knowledge of Numerical analysis in Hedge funds (private investment funds) which use tools from all fields of numerical analysis to attempt to calculate the value of stocks and derivatives more precisely than other market participants.
- Graduates will be able to apply the knowledge of Numerical analysis in Airlines which use sophisticated optimization algorithms to decide ticket prices, airplane and crew assignments and fuel needs. Historically, such algorithms were developed within the overlapping field of operations research.
- Graduates will be able to apply the knowledge of Numerical analysis in Insurance companies which use numerical programs for actuarial analysis.

Paper Name:Physics II Lab
Paper Code: PH391
Contact: 3
Credits: 2
Course Objectives:

The objectives of this course are

- To provide an adequate exposure and develop insight about the basic principles of physics along with the possible applications.
- To be acquainted with basic physics principles which would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.
- To create awareness about the vital role played by science and engineering in the development of new technologies.
- To provide the necessary exposure to the practical aspects, which is an essential component for learning science.
    - To achieve this by primarily introducing a course clarifying some the basics of physical sciences attached to computers and communications as well as an advanced course which will form fundamentals of future learning on devices, communications and new age technologies.

Course Structure and Syllabus:

Any 7 to be performed from the following experiments
Experiments on PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY
1. Determination of band gap of a semiconductors/thermistor.
2. Determination of Hall co-efficient of a semiconductors.
3. Measurement of Magnetoresistance of a semiconductor.
4. Determination of velocity of ultrasonic wave using piezoelectric crystal & compressibility of the given liquid.
Experiments on SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES

5. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells & measurement of maximum workable power.
6. Study of I-V characteristics of a thyristor
7. Study of I-V characteristics of a LED.
8. Study of phototransistor.
9. Study of a temperature sensor characteristics.
10. Study of I-V characteristics of Tunnel diode.
11. Study of LDR characteristics.

Experiments on Magnetism & Storage devices

12. Study of hysteresis curve of a ferromagnetic material using CRO.
13. Use of paramagnetic resonance and determination of lande-g factor using esr setup.
14. Measurement of Curie temperature of the given sample.
15. Study of dipolar magnetic field behavior.

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

- PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY
- SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES
- Magnetism & Storage devices

Paper Name:Digital Electronics Lab
Paper Code: IT391
Course Objectives:
The objectives of this course are

- To be familiar with Binary Number System & Boolean Algebra (recapitulation); BCD, ASCII, EBDIC, Gray codes and their conversions ; Signed binary number representation with 1's and 2's complement methods
- To be familiar withBinary arithmetic, Venn diagram, Boolean algebra (recapitulation) ;
- To be familiar with representation in SOP and POS forms ;
- To be familiar with Minimization of logic expressions by algebraic method. Combinational circuits - Adder and Subtractor circuits (half & full adder & subtractor); Encoder, Decoder,Comparator, Multiplexer, De-Multiplexer and Parity Generator.
- To familiar withRegisters (SISO,SIPO,PIPO,PISO),Ring counter, Johnson counter,Basic concept of Synchronous and Asynchronous counters (detail design of circuits excluded),
- To be familiar with Design of Mod N Counter. A/D and D/A conversion techniques – Basic concepts (D/A:R-2-R only,A/D: successive approximation,Logic families- TTL, ECL, MOS and CMOS - basic concepts.

Course Structure and Syllabus:

Digital Circuit design using SSI/MSI:
Combinational Circuit design using gates,
MUX, decoders, arithmetic circuits,
ALU Sequential Circuits design - counters, shift registers,
sequence generators, signature detectors.

Course Outcomes:

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

- Digital Circuit design using SSI/MSI
- Combinational Circuit design using gates
- MUX, decoders, arithmetic circuits,
- ALU Sequential Circuits design - counters, shift registers, sequence generators, signature detectors.

Paper Name:Data Structures and Algorithms Lab using C
Paper Code: IT392
Contacts: 3
Credits: 2
Course Objectives:

The objectives of this course are

- To provide knowledge in various data structures and algorithms.
- To introduce techniques for analyzing the efficiency of computer algorithms.
- To provide efficient methods for storage, retrieval and accessing data in a systematic manner.
- To explore the world of searching, sorting, traversal and graph algorithm.
- To write complex applications using structured programming methods.
- To demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, and trees.
- To use various data structures effectively in application programs.
- To implement various data structures in more than one manner.
- To compare different implementations of data structures and to recognize the advantages and disadvantages of the different implementations.
- To demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.
- To compare the efficiency of various sorting algorithms in terms of both time and space.
- To program multiple file programs in a manner that allows for reusability of code.
- To trace and code recursive functions.

Course Structure and Syllabus:

Experiments should include but not limited to :
Implementation of array operations:
Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem :
Evaluation of expressions operations on Multiple stacks & queues :
Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists:
Polynomial addition, Polynomial multiplication
Sparse Matrices : Multiplication, addition.
Recursive and Nonrecursive traversal of Trees
Threaded binary tree traversal. AVL tree implementation
Application of Trees. Application of sorting and searching algorithms
Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

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

- elementary data structures such as stacks, queues, linked lists, trees and graphs
- design and analyze the time and space efficiency of the data structure
- how to identify the appropriate data structure for given problem
- practical knowledge on the application of data structures
- different data structures to represent real world problems
- design algorithms to solve the problems.

Paper Name:Numerical Methods &Programming Lab
Paper Code: IT393
Contacts: 3
Credits: 2
Course Objectives:

The objectives of this course are

- To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
- To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
- To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.
- To facilitate numerical computing.

Course Structure and Syllabus:

1.Assignments on Newton forward /backward, Lagrange's interpolation.
2.Assignments on numerical solution of Algebraic Equation by Bisection, Regular-falsi and Newton Raphson, Secant's methods.
3.Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule
4.Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations
5.Assignments on ordinary differential equation: Euler's and Runga-Kutta methods

Course Outcomes:

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

- Interpolation techniques
- Numerical solution to algebraic equations
- Numerical integration
- Numerical solution of a system of linear equations
- Ordinary differential equation

Second Year Second Semester

Paper Name: Computer Organization &Computer Architecture
Paper Code:IT401
Contacts: 3L+1T
Credits:4
Course Objectives:

The objectives of this course are

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementationof fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory.

Course Structure and Syllabus:

Pre-requisite: Concept of basic components of a digital computer, Basic concept of Fundamentals & Programme structures. Basic number systems, Binary numbers, representation of signed and unsigned numbers, Binary Arithmetic as covered in Basic Computation & Principles of Computer Programming Second semester, first year. Boolean Algebra, Karnaugh Maps, Logic Gates – covered in Basic Electronics in First year

Module – 1: [**8L]**
Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler.
Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes. [7L]

Module – 2: [8L]
Overflow and underflow.Design of adders - ripple carry and carry look ahead principles. [3L]
Design of ALU. [1L]
Fixed point multiplication -Booth's algorithm. [1L]
Fixed point division - Restoring and non-restoring algorithms. [2L]
Floating point - IEEE 754 standard. [1L]

Module – 3: **[13L]**
Memory unit design with special emphasis on implementation of CPU-memory interfacing. [2L]
Memory organization, static and dynamic memory, memory hierarchy, associative memory. [3L]
Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies. (8L)

Module – 4: [13L]
Design of control unit - hardwired and microprogrammed control. [3L]
Introduction to RISC architectures. RISC vs CISC architectures. [2L]
I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA. [3L]
Pipelining: Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards and structural hazards, techniques for handling hazards. Exception handling. Pipeline optimization techniques; [5L]

Module – 5: [6L]
Instruction-level parallelism: basic concepts, techniques for increasing ILP, superscalar, superpipelined and VLIW processor architectures. Array and vector processors. (6L)

Module – 6: [12 L]
Multiprocessor architecture: taxonomy of parallel architectures; Centralized shared- memory architecture: synchronization, memory consistency, interconnection networks. Distributed shared-memory architecture.
Cluster computers. (8L)
Non von Neumann architectures: data flow computers, reduction computer architectures, systolic architectures. (4L)

Suggested Text / Reference Books:

Text Books:

1. Mano, M.M., "Computer System Architecture", PHI.
2. Kai Hwang"Advance Computer Architecture" McGraw Hill
3. Behrooz Parhami " Computer Architecture", Oxford University Press
4. Nicholas P Carter"Computer Architecture & Organization" McGraw Hill,

Reference Book:

1. Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
2. Hamacher, "Computer Organisation", McGraw Hill,
3. N. senthil Kumar, M. Saravanan, S. Jeevananthan, "Microprocessors and Microcontrollers" OUP
4. Chaudhuri P. Pal, "Computer Organisation & Design", PHI,
5. P N Basu- "Computer Organization & Architecture" , Vikas Pub

Course Outcomes: At the end of this course

- Graduates will be able to be introduced to the design and analysis of the hardware of a computer system and its components such as control unit, arithmetic and logical (ALU) unit, input/output, and memory unit.
- Graduates will be able to apply various design techniques such as pipelining and microprogramming in the design of the central processing unit of a computer system.
- Graduates will be able to become familiar with various ways to design ALU.
- Graduates will be able to learn various ways for interconnecting I/O devices to the system.
- Graduates will be able to study system memory, its implementation, management, and interconnection to the rest of the computer system.
- Graduates will be able to become familiar with the hardware description language and its application in describing computer hardware.
- Graduates will be able to become familiar with some of the basic fundamentals for high performance computer system design.

Paper Name: Operating System I
Paper Code: IT402
Contacts: 3L+1T
Credits:4

Course Objective:

The objectives of this course are

- To explain the objectives and functions of modern operating systems.
- To analyze the tradeoffs inherent in operating system design.
- To describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve.
- To describe the need for concurrency within the framework of an operating system.
- To demonstrate the potential run-time problems arising from the concurrent operation of many separate tasks.

- To explain the different states that a task may pass through and the data structures needed to support the management of many tasks.
- To summarize the various approaches to solving the problem of mutual exclusion in an operating system.
- To explain conditions that lead to deadlock.
- To compare and contrast the common algorithms used for both preemptive and non-preemptive scheduling of tasks in operating systems, such as priority, performance comparison, and fair-share schemes.
- To explain memory hierarchy and cost-performance trade-offs.
- To explain the concept of virtual memory and how it is realized in hardware and software.
- To summarize the principles of virtual memory as applied to caching and paging.
- To evaluate the trade-offs in terms of memory size (main memory, cache memory, auxiliary memory) and processor speed.
- To defend the different ways of allocating memory to tasks, citing the relative merits of each.
- To describe the reason for and use of cache memory.
- To discuss the concept of thrashing, both in terms of the reasons it occurs and the techniques used to recognize and manage the problem.

Course Structure and Syllabus:

Introduction [4L]
Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multiprogrammed, timesharing,real-time, distributed, parallel.
System Structure[3L]
Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.
Process Management [17L]
Processes [3L]: Concept of processes, process scheduling, operations on processes, co-operating processes, interprocess communication.
Threads [2L]: overview, benefits of threads, user and kernel threads.
CPU scheduling [3L]: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS,SJF, RR, priority), algorithm evaluation, multi-processor scheduling.
Process Synchronization [5L]: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.
Deadlocks [4L]: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention,deadlock avoidance, deadlock detection, recovery from deadlock.
Storage Management [19L]
Memory Management [5L]: background, logical vs. physical address space, swapping, contiguous memory allocation,paging, segmentation, segmentation with paging.
Virtual Memory [3L]: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.
File Systems [4L]: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.
I/O Management [4L]: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices,network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering,caching, spooling and device reservation, error handling), performance.

Disk Management [3L]: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability,disk formatting, boot block, bad blocks.

Protection & Security [4L]

Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Suggested Text / Reference Books:

1. Milenkovie M., "Operating System : Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley.

Course Outcome: At the end of this course

- Graduates will be able to understand the difference between processes and threads.
- Graduates will be able to understand the issues and use of locks, semaphores and monitors for synchronizing multithreaded systems and implement them in multithreaded programs.
- Graduates will be able to understand the issues of scheduling of user level processes/threads.
- Graduates will be able to design and implement multiprocessing,
- Graduates will be able to understand the concepts of deadlock in operating systems and how they can be managed/avoided.
- Graduates will be able to understand virtual memory management.
- Graduates will be able to design and implement virtual memory management.
- Graduates will be able to understand the types of security problems faced by operating systems and how to minimize these problems.
- Graduates will be able to understand the organization and synchronization of distributed operating systems.
- Graduates be able to understand the differences between multiprocessor and multicomputer configurations.
- Graduates will be able to understand communication in distributed systems and how it can be used in remote procedure calls, remote objects and message-oriented communication.
- Graduates will be able to understand organizing principles for distributed systems through election algorithm.

Paper Name:Database Management System-I
Paper Code: IT403
Contacts: 3L+1T
Credits:4
Course Objectives:

The objectives of this course are

- To understand values of Data.
- To understand significant role of DBMS.
- To understand need for normalizing a Database.
- To understand problems with unnecessary duplication of data.
- To understand concepts of transaction
- To understand concepts of concurrent transactions

Introduction [2L]
Why Database: Relation among DB, DBMS and DBS,Characteristics of Data in Database, Advantage of DBMS over FPS. Database models, Database Users, Role of DBA, Three Schema architecture of DBMS.

Entity Relationship Model [3L]
Components of ER Model, ER Modeling Symbols, Attribute inheritance, Extended E-R features: Super Class and Sub class types.

Relational DBMS [8L]
Introduction to Relational DBMS, RDBMS Terminology. Keys, Relationships, First Normal Form, Functional dependencies, Second Normal form, Third Normal Form, Boyce-Codd Normal form, Fourth Normal Form, Fifth Normal form, Case study.

Relational Algebra and Relational Calculus [4L]
Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database.

Introduction to SQL [8L]
History of SQL, Characteristics of SQL, Advantages of SQL, SQL in Action SQL data types and Literals, Types of SQL commands, SQL Operators and their precedence, Tables, Views and indexes, Queries and Sub Queries, Aggregate functions, Insert, Update and Delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL, Embedded SQL.

Internals of RDBMS [6L]
Physical data structures, Query optimization : join algorithm, statistics and cost based optimization. Transaction processing, Concurrency control and Recovery Management : transaction model properties, Serializability, lock base protocols, two phase locking, Timestamp protocol.

File Organization & Index Structures [6L]
File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree and hash tree .

Backup and Recovery [4L]
Database backups, Why plan backups?, Hardware protection and redundancy, Transaction logs, Database recovery, Data storage, Causes and classification of failures, Recovery concepts and terminology, Recovery facilities, Recovery techniques, Disaster Database Management System.

Database Security and Integrity [4L].
Types of Integrity constraints, Restrictions on integrity constraints, Data security Risks, Complex user management requirements, Dimensions of security, Data security requirements, Protecting data with in the database, Granting and revoking privileges and roles, System viability Factors, Authenticating users to the database.

Suggested Text / Reference Books:
Text Books:
1. Henry F. Korth and Silberschatz Abraham, “Database System Concepts”, Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, “Fundamentals of Database Systems”, Benjamin Cummings Publishing. Company.
3. Ramakrishnan: Database Management System , McGraw-Hill
4. Gray Jim and Reuter Address, “Transaction Processing : Concepts and Techniques”, Moragan Kauffman Publishers.
5. Jain: Advanced Database Management System CyberTech
6. Date C. J., “Introduction to Database Management”, Vol. I, II, III, Addison Wesley.
7. Ullman JD., “Principles of Database Systems”, Galgottia Publication.
Reference:

1. James Martin, “Principles of Database Management Systems”, 1985, Prentice Hall of India, New Delhi
2. “Fundamentals of Database Systems”, Ramez Elmasri, Shamkant B.Navathe, Addison Wesley Publishing Edition
3. “Database Management Systems”, Arun K.Majumdar, Pritimay Bhattacharya, Tata McGraw Hill

Course Outcome:
At the end of this course

- Graduates will be able to acquire knowledge of handling large volume of data.
- Graduates will be able to acquire skills to deal with Real life database implementation.
- Graduates will be able to response off faster queries and serve as many users as possible concurrently.
- Graduates will be able to fit with any Database project in industry after completion of degree.

Paper Name: Object Technology & UML
Paper Code: IT404
Contacts: 3L+1T
Credits:3
Course Objectives:
The objectives of this course are

- To design a group of collaborating objects to implement a given set of requirements;
- To assign the responsibilities for the actions implied by the requirements to the appropriate objects;
- To partition these responsibilities into appropriately named methods;
- To write definitions for the classes that can be used to generate these objects;
- To deduce the data necessary to implement the requirements, and partition that data among the objects
- To define appropriate instance variables to store these data;
- To create abstract super-classes in order to share common code.
- To arrange the concrete and abstract classes in an appropriate hierarchy

Course Structure and Syllabus:

Prerequisites of Object Oriented Programming & UML:
The fundamental point in learning programming is to develop the critical skills of formulating programmatic solutions for real problems. It will be based on basic knowledge of algorithms and

procedural programming language. Once the basic skill of writing programs using loop, methods and

arrays will be clear then the student can develop object oriented software using class encapsulation and inheritance.

Object oriented design [10 L]
Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects,aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Object oriented concepts [4 L]
Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism
Basic concepts of object oriented programming using Java [22 L]
Implementation of Object oriented concepts using Java.Language features to be covered:
Class & Object proprieties [6L]
Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers,
operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt() , compareTo(),equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase() ,trim() , valueOf() methods) & StringBuffer classes (discuss append(), capacity(), charAt(),
delete(), deleteCharAt(),ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods),concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.
Reusability properties[6L] – Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method
dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member
access for packages.
Exception handling & Multithreading [6L] – Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread
synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.
Applet Programming (using swing) [4L] – Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.
Textbooks/References:
1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill
3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – TMH
4. R.K Das – "Core Java For Beginners" – VIKAS PUBLISHING
5. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
6. Ivor Horton's Beginning Java 2 SDK – Wrox

7. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – TMH

Course Outcomes: At the end of this course

- Graduates will be able to understand the key concepts of object oriented programming and have an ability to design OO programs and appreciate the techniques of good design;
- Graduates will be able to program presciently in an OO programming language;
- Graduates will be able to have an ability to use application libraries, in this case the use of the java API;

- Graduates will be able to familiar with good programming practices such as testing, debugging, documentation and version control;
- Graduates will be able to apply key object oriented concepts and libraries to develop GUI applications;
- Graduates will be able to understand the concepts underlying design patterns and a working knowledge of a number of well known design patterns (singleton, observer, factory, iterator, decorator etc);
- Graduates will be able to familiar with and apply distributed and concurrent programming concepts such as threads, object locking and synchronization.
- Graduates will be able to apply an understanding of ethical principles to problems which commonly arise in the Information Technology industry.

Paper Name: Formal Language & Automata Theory
Paper Code: IT405
Contacts: 3L+1T
Credits:3
Course Objectives:
The objectives of this course are
- To understand the basic computing mechanism.
- To understand the working principle of digital computer
- The input to output conversion process of digital computers
- To understand the concepts of DFA & NFA which give the knowledge and working principle of modern computer system under different possible states and for every possible input.

Course Structure and Syllabus:

Module 1:
Fundamentals: Basic definition of sequential circuit, block diagram, mathematical representation, concept
of transition table and transition diagram (Relating of Automata concept to sequential circuit concept)
Design of sequence detector, Introduction to finite state model
Finite state machine: Definitions, capability & state equivalent, kth- equivalent concept , Finite memory definiteness, testing table & testing graph.
Minimization of FSM-completely specified and incompletely specified(Merger graph, Merger table, Compatibility graph)
Equivalence between two FSM's , Limitations of FSM
Application of finite automata, Finite Automata with output- Moore & Melay machine. [11]
Module 2:
Deterministic finite automaton and non deterministic finite automaton. Transition diagrams and Language
recognizers.
Finite Automata: NFA with Î transitions - Significance, acceptance of languages.
Conversions and Equivalence: Equivalence between NFA with and without Î transitions. NFA to DFA conversion. DFA minimization. Myhill- Nerode theorem
Regular Languages : Regular sets.Regular expressions, identity rules. Arden's theorem state and prove

Constructing finite Automata for a given regular expressions, Regular string accepted by NFA/DFA . Pumping lemma of regular sets. Closure properties of regular sets (proofs not required).
Grammar Formalism: Regular grammars-right linear and left linear grammars.Equivalence between regular
linear grammar and FA.[10]

Module 3:

Context free grammar. Derivation trees, sentential forms. Right most and leftmost derivation of strings. (Concept only)
Context Free Grammars, Ambiguity in context free grammars. Minimization of Context Free Grammars.
Chomsky normal form and Greibach normal form.[9]
Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted). Closure
property of CFL, Ogden's lemma & its applications .
Push Down Automata: Push down automata, definition.
Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence.
Equivalence of CFL and PDA, interconversion.Introduction to DCFL and DPDA. [9]

Module 4:

Turing Machine : Turing Machine, definition, model [1L]
Design of TM, Computable functions,Church's hypothesis, counter machine,Types of Turing machines
Universal Turing Machine, Halting problem[6]

Suggested Text / Reference Books:

Text Books:

1. Switching & Finite Automata, ZVI Kohavi, 2nd Edn., Tata McGraw Hill
2. An Introduction to Computing , Peter Linz, Narosa. Reference Books:
3. Introduction to Automata Theory Language and Computation", Hopcroft H.E. and Ullman J. D.,

Pearson education.
4 .Theory of Computer Science ", Automata Languages and computation", Mishra and Chandrashekaran, 2nd edition, PHI.
5. Formal Languages and Automata Theory, C.K.Nagpal, Oxford.
6. Introduction to languages and the Theory of Computation, John C Martin, TMH
7. Theory of Computation ,Verma & Rao.SCITECH edition.

Course Outcomes: At the end of this course

- Graduates will be able to gain knowledge of computing
- Graduates will be able to apply the knowledge of Formal Language & Automata Theory in the field of mathematics, graph theory in computer science.

Graduates will be able to process with minimum logic & circuitry.It enhances their problem solving capability and analytical, logical skills.

Paper Name: Computer Organization & Architecture Lab
Paper Code: IT491
Contacts:3P
Credits:2
Course Objective:

- To provide students basic experimental experiences in the operation of various familiesof digital circuits.
- To develop skills in the design of transistor-level digital circuits and simulate them inXilinx

Course Structure and Syllabus:

1. Implementation of simple 8-to-1 line and 4-to-1 line Multiplexer
2. Realization of the basic gates (AND, OR, NOR, NOT, NAND).
3. Implementation of HALF ADDER circuit using basic gates and verify its output.
4. Implementation of FULL ADDER circuit using basic gates and verify its output.
5. Implementation of HALF SUBTRACTER circuit using basic gates and verify its output.
6. Implementation of FULL SUBTRACTER circuit using basic gates and verify its output.
7. Implementation of 1:4 De-Multiplexer and 1:8 De-Multiplexer
8. Implementation of 2:4 decoder and 3:8 Decoder using logic gates.
9. Implementation of 4:2 Encoder and 8:3 En coder using logic gates.
10. Implementation of Binary to its corresponding Gray conversion and vice versa.
11. Implementation of 4-bit Comparator.
12. Implementation of D-Flip-Flop and SR- Flip-Flop,JK Flip-Flop and T Flip-Flop.
13. Implementation of Circuit for 8-bit adder.
14. Implementation of ALU Design.
15. Implementation of CPU Design.

Course Outcomes:
A student who successfully fulfills the course requirements will have demonstrated:

- Able to operate laboratory equipment.
- Able to design the digital circuits with basic resistors and semiconductor devices to meet a set of specifications
- Able to analyze and design digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, multiplier).
- Able to analyze sequential digital circuits like flip-flops, registers, counters.
- An ability to simulate the designed digital circuits using Xilinx software.
- An ability to construct, analyze, and troubleshoot the digital circuits.

  An ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report.

Paper Name: Operating System Lab
Paper Code: IT492
Contacts: 3P
Credits:2

Course Objectives:

- Introduce the basic principles in Operating System.
- The management modules present in the OS like process management, Memory management, File management, Disk management, Network management, I/O management

Course Structure and Syllabus:

1. **Managing Unix/Linux Operating System [8P]:**
Creating a bash shell script, making a script executable, shell syntax (variables, conditions, control

structures, functions,commands). Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock,I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Backup schedules and methods Kernel loading, init and the inittab file, Run-levels, Run level scripts. Password file management, Password security, Shadow file, Groups and the
group file, Shells, restricted shells, user-management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users & user groups.
2. **Process [4P]**: starting new process, replacing a process image, duplicating a process image, waiting for a
process, zombie process.
3. **Signal [4P]**: signal handling, sending signals, signal interface, signal sets.
4. **Semaphore [6P]**: programming with semaphores (use functions semctl, semget, semop, set_semvalue,
del_semvalue, semaphore_p, semaphore_v).
5. **POSIX Threads [6P]**: programming with pthread functions (viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel)
6. **Inter-process communication [6P]**: pipes(use functions pipe, popen, pclose), named pipes(FIFOs, accessing FIFO),message passing & shared memory(IPC version V).

Course Outcomes:

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

- Management of UNIX/LINUS operating System
- Life cycle of process practically
- Signal handling practically
- Programming on Semaphore
- Thread programming in details and Inter thread communications

Paper Name: Database Management System- I Lab

Paper Code: IT493
Contacts: 3P
Credits:2
Course Objectives:

The objectives of this course are

- To understand values of Data.
- To understand significant role of DBMS.
- To understand need for normalizing a Database.
- To understand problems with unnecessary duplication of data.
- To understand concepts of transaction

Course Structure and Syllabus:

Structured Query Language
1. **Creating Database**
_ Creating a Database
_ Creating a Table

_ Specifying Relational Data Types
_ Specifying Constraints
_ Creating Indexes
2. **Table and Record Handling**
_ INSERT statement
_ Using SELECT and INSERT together
_ DELETE, UPDATE, TRUNCATE statements
_ DROP, ALTER statements
3. **Retrieving Data from a Database**
1. The SELECT statement
2. Using the WHERE clause
3. Using Logical Operators in the WHERE clause
4. Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING
Clause
5. Using Aggregate Functions
6. Combining Tables Using JOINS
7. Subqueries
4. **Database Management**
_ Creating Views
_ Creating Column Aliases
_ Creating Database Users
_ Using GRANT and REVOKE
Cursors in Oracle PL / SQL
Writing Oracle PL / SQL Stored Procedures

Course Outcomes:

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

- SQL in details: creation tables, record handling, retrieval of data , different clause
- Data base Management
- Cursors in Oracle PL / SQL
- Writing Oracle PL / SQL Stored Procedures

Paper Name: Object Technology & UML Lab

Paper Code: IT494
Contacts: 3P
Credits:2
Course Objectives:
The objectives of this course are

- To design a group of collaborating objects to implement a given set of requirements;
- To assign the responsibilities for the actions implied by the requirements to the appropriate objects;
- To partition these responsibilities into appropriately named methods;
- To write definitions for the classes that can be used to generate these objects;
- To deduce the data necessary to implement the requirements, and partition that data among the objects
- To define appropriate instance variables to store these data;
- To create abstract super-classes in order to share common code.
- To arrange the concrete and abstract classes in an appropriate hierarchy

Course Structure and Syllabus:

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on multithreaded programming

6. Assignments on applet programming

Note: Use Java for programming

Preferably download "**java_ee_sdk-6u4-jdk7-windows.exe**" from **http://www.oracle.com/technetwork/java/javaee/downloads/java-ee-sdk-6u3-jdk-7u1-downloads-523391.html**

Course Outcomes:

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

- Programming on class and object
- Features of polymorphism
- Features of Inheritance
- Exception handling
- Thread programming, synchronization and inter thread communications

Applet programming

Paper Name: Visual Programming Lab
Paper Code: IT495
Contacts: 3P
Credits:2
Course Objectives:

- Visual Basic provides an environment called the IDE (Integrated Development Environment) that provides a platform for visual programming.
- With the user diversion towards graphical user interfaces, computer programming languages are also changing.
- Visual Basic is graphical user interface programming language which has a bulk of inbuilt user friendly tools for understanding programming language concepts.
- Visual Basic helps to enhance the intellectual and motor skills of students.
- The course content is designed to understand and implement the event driven requirement of user and providing a solution via Visual Basic Programming.

Course Structure and Syllabus:

Introduction to Visual Basic & difference with BASIC.
Concept about form Project, Application, Tools, Toolbox,
i. Controls & Properties. Idea about Labels, Buttons,Text Boxes.
ii. Data basics, Different type variables & their use in VB,
iii. Sub-functions & Procedure details, Input box () & Msgbox ().
iv. Making decisions, looping
v. List boxes & Data lists, List Box control, Combo Boxes, data Arrays.
vi. Frames, buttons, check boxes, timer control,

vii. Programming with data, ODBC data base connectivity.
viii. Data form Wizard, query, and menus in VB Applications,
ix. Graphics.
9. Case studies using any of the following items including relevant form design with the help of visual programming aids.
a) Payroll accounting system.
b) Library circulation management system.
c) Inventory control system.
d) University examination & grading system.
e) Patient information system.
f) Tourist information system.
g) Judiciary information system.
h) Flight reservation system.
i) Bookshop automation software.
j) Time management software.

Course Outcomes:

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

- Concept about form Project, Application, Tools, Toolbox,
- Controls & Properties. Idea about Labels, Buttons, Text Boxes.
- Data basics, Different type variables & their use in VB,
- Sub-functions & Procedure details, Input box () & Msgbox ().
- Making decisions, looping
- List boxes & Data lists, List Box control, Combo Boxes, data Arrays.
- Frames, buttons, check boxes, timer control,
- Programming with data, ODBC data base connectivity.
- Data from Wizard, query, and menus in VB Applications, Graphics
- Simple project development

Paper Name: Technical Report Writing &Language Laboratory
Paper Code: HU481
Contact: 1l+2p
Credit : 2

Course Objectives:

This course has been designed:

- To inculcate a sense of confidence in the students.
- To help them become good communicators both socially and professionally.
- To assist them to enhance their power of Technical Communication.

Course Structure and Syllabus:

Guidelines for Course Execution:
Objectives of this Course: This course has been designed:
1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.
Detailed Course Outlines:
A. ***Technical Report Writing*** : 2L+6P

1. Report Types (Organizational / Commercial / Business / Project)
2. Report Format & Organization of Writing Materials
3. Report Writing (Practice Sessions & Workshops)

B. ***Language Laboratory Practice***

I. Introductory Lecture to help the students get a clear idea of Technical Communication & the need of Language

Laboratory Practice Sessions :2L

2. Conversation Practice Sessions: (To be done as real life interactions) 2L+4P

a) Training the students by using Language Lab Device/Recommended Texts/cassettes /cd's to get their Listening Skill & Speaking Skill honed

b) Introducing Role Play & honing over all Communicative Competence

3. Group Discussion Sessions: 2L+6P

a) Teaching Strategies of Group Discussion

b) Introducing Different Models & Topics of Group Discussion

c) Exploring Live /Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure

Interview Sessions; 2L+6P

a) Training students to face Job Interviews confidently and successfully

b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication

4. Presentation: 2L+6P

a) Teaching Presentation as a skill

b) Strategies and Standard Practices of Individual /Group Presentation

c) Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids

5. Competitive Examination: 2L+2P

a) Making the students aware of Provincial /National/International Competitive Examinations

b) Strategies/Tactics for success in Competitive Examinations

c) SWOT Analysis and its Application in fixing Target

Books – Recommended:

Nira Konar: English Language Laboratory: A Comprehensive Manual
PHI Learning, 2011

D. Sudharani: Advanced Manual for Communication Laboratories &
Technical Report Writing,Pearson Education (W.B. edition), 2011

References:

Adrian Duff et. al. (ed.): Cambridge Skills for Fluency
A) Speaking (Levels 1-4 Audio Cassettes/Handbooks)
B) Listening (Levels 1-4 Audio Cassettes/Handbooks)
Cambridge University Press 1998

Mark Hancock: English Pronunciation in Use
4 Audio Cassettes/CD'S OUP 2004

Course Outcomes:

At the end of the course students will be

- good communicators both socially and professionally.
- Able to write technical report professionally.

Third Year First Semester

Paper Name: Data Communication and Networking/Networking I
Paper Code: IT501
Contacts:3L+1T
Credit:4
Course Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computernetworking area.
- Introduce the student to advanced networking concepts, preparing the student for Entry to the advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Structure and Syllabus:

Overview of Data Communication and Networking: [4L]
Introduction; Data communications: components, data representation (ASCII,ISO etc.), direction of data flow (simplex, half duplex, full duplex); network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN); Internet: brief history, Protocols and standards; Reference models: OSI and TCP/IP.

Physical Level: [6L]
Overview of data (analog & digital), signal(analog & digital), transmission (analog & digital) & transmission media (guided & unguided); Circuit switching: time division & space division switch, TDM bus; Telephone Network;

Data link Layer: [9L]
Types of errors, framing, error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC; Point to Point Protocol, LCP, NCP, Token Ring; Reservation, Polling, Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA Traditional Ethernet, fast Ethernet;

Network layer: [8L]
Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : IP addressing, subnetting; Routing : techniques, Routing Protocols, ARP, IP, ICMP, IPV6;.

Transport layer: [7L]
Process to Process delivery; UDP; TCP; Congestion Control: Open Loop, Closed Loop choke packets; Quality of service: techniques to improve QoS: Leaky bucket algorithm, Token bucket algorithm,

Application Layer [6L]
Introduction to DNS, SMTP, SNMP, FTP, HTTPS, Firewalls.

Suggested Text / Reference Books:

1. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH
2. A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI
3. W. Stallings – "Data and Computer Communications (5th Ed.)" – PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI

Course Outcomes :
After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network

- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used

to assist in network design and implementation

Paper Name: Microprocessor & Microcontroller
Paper Code: IT502
Contacts:3L+1T
Credit:4
Course Objectives:

- To study the architecture and addressing modes of 8085 and to write assembly language programs of 8085
- To study the architecture and addressing modes of 8086
- To know the importance of different peripheral devices and their interfacing to 8085
- To study the architecture and addressing modes of 8051
- To study interrupts of 8085

Course Structure and Syllabus:

Module -1: **[8L]**
Introduction to Microcomputer based system. History of evolution of Microprocessor and Microcontrollers and their advantages and disadvantages. [1L]
Architecture of 8085 Microprocessor, Pin description of 8085. [2L]
Address/data bus Demultiplexing , Status Signals and the control signals. [1L]
Instruction set of 8085 microprocessor, Addressing modes, [3L]
Timing diagram of the instructions (a few examples). [1L]
Module -2: **[9L]**
Assembly language programming with examples, Counter and Time Delays,Stack and Subroutine [6L]
Interrupts of 8085 processor(software and hardware), I/O Device Interfacing-I/O Mapped I/O and Memory Mapped I/O , Serial (using SID and SOD pins and RIM, SIM Instructions) and Parallel data transfer, [3L]
Module 3: [10L]
The 8086 microprocessor- Architecture, Addressing modes, Interrupts [3L]
Introduction to 8051 Microcontroller –Architecture, Pin Details [3L]
Addressing modes, Instruction set, Examples of Simple Assembly Language. [4L]
Module -4: [9L]
Memory interfacing with 8085, 8086 [2L]
Support IC chips- 8255 ,8251,8237/8257,8259 [4L]
Interfacing of 8255 PPI with 8085 and Microcontroller 8051. [2L]
Brief introduction to PIC microcontroller (16F877) [1L]
Suggested Text / Reference Books:
1. Fundamentals of microprocessor and microcontroller- B.Ram
2. The 8051 Microcontroller and Embedded System- Mazidi
3. Microprocessor Architecture, Programming and Applications with the 8085- Ramesh s Gaonkar

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

- To Describe 8085 architecture and 8086 architecture
- To write assembly language program in 8085 for various application
- To create the memory interfacing techniques with 8085, 8086 and 8051
- To Describe interrupts of 8085 and 8086.

- To Describe various peripherals of 8085 and their working principle
- To Differentiate 8085 and 8086.

Data Base Management System-II
Paper Code: IT503
Contacts:3L+1T
Credit:4
CourseObjectives:

- Understand the concept of a database transaction and related database facilities, including concurrency control, backup and recovery, and data object locking and protocols.
- Understand different database system architecture models and Identify suitable architecture for an organization.
- Understand methodologies of Parallel database, Distributed database and Object-Oriented database system.
- Implement methodologies of Parallel database, Distributed database and Object-based database system.
- Understand methodologies of different advanced applications development.
- Identify different advanced data types and new applications of DBMS.
- Understand advanced transaction processing.
- Understand different aspects of XML.

Course Structure and Syllabus:

Unit I Transactions :
Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Testing for serializability.

(4 Hours)

Concurrency Control : Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Multiple granularity, Multiversion schemes, Deadlock handling, Insert and delete operations, Weak levels of consistency, Concurrency in index structures (6 Hours)
Unit II
Recovery System : Failure classification, Storage structure, Recovery and atomicity, Log-based recovery, Recovery with concurrent transactions, Buffer management, Failure with loss of nonvolatile storage, Advanced recovery techniques, Remote backup systems. (4 Hours)
Unit III
Database-System Architectures :
Centralized and client–server architectures, Server system architectures, Parallel systems, Distributed systems, Network types. (4 Hours)
Parallel Databases :
Parallel databases, I/O parallelism, Interquery parallelism, Intraquery parallelism, Intraoperation parallelism, Interoperation parallelism, Design of parallel systems. (4 Hours)
Unit IV
Distributed Databases:
Homogeneous and heterogeneous databases, Distributed data storage, Distributed transactions, Commit

protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases, Directory systems. (5 Hours)

Object-Based Databases:

Overview of object-based databases, Complex data types, Structured types and inheritance in SQL, Table inheritance, Array and multiset types in SQL, Introduction of object-identity and reference types in SQL, Object-oriented versus object-relational. (5 Hours)

Unit V

Advanced Application Development :

Performance tuning, Performance benchmarks, Standardization, Application migration. (1 Hours)

Advanced Data Types & New Applications

Motivation, Time in databases, Spatial and geographic data, Multimedia databases, Mobility and personal databases, Temporal database. (3 Hours)

Advanced Transaction Processing

Transaction-processing Monitors, Transactional workflows, E-Commerce, Main-memory databases, Real-time transaction systems, Long-duration transactions, Transaction management in multidatabases (5 Hours)

Unit VI

XML :

Motivation, Structure of XML data, XML document schema, Querying and transformation, Application program interfaces to XML, Storage of XML data, XML applications, UML. (5 Hours)

Suggested Text / Reference Books:

1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, "Fundamentals of Database Systems", Benjamin Cummings Publishing. Company.

3.H.B.Singh- Database Management System

Course Outcomes:

At the end of the course students will

- Evaluate and Apply Advanced Database Development Techniques.
- Evaluate Database Systems.
- Administer Database Systems.
- Design & Implement Advanced Database Systems.

Paper Name: Software Engineering & Project Management
Paper Code: IT504
Contacts:3L
Credit: 3
Course Objectives:

In this course, students will gain a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

- Knowledge of basic SW engineering methods and practices, and their appropriate application;
- A general understanding of software process models such as the waterfall and evolutionary models.

- An understanding of the role of project management including planning, scheduling, risk management, etc.
- An understanding of software requirements and the SRS document.
- An understanding of different software architectural styles.
- An understanding of implementation issues such as modularity and coding standards.
- An understanding of approaches to verification and validation including static analysis, and reviews.
- An understanding of software testing approach such as unit testing and integration testing.
- An understanding of software evolution and related issues such as version management.
- An understanding on quality control and how to ensure good quality software.
- An understanding of some ethical and professional issues that are important for software engineers.
- Development of significant teamwork and project based experience.

Course Structure and Syllabus:

Module 1
Introduction
Software, Type of software, Definition of Software Engineering, Aim and Objective. 1L
Module 2
Software Development Life-cycle 2L
Feasibility Study, Requirements gathering and analysis, SDLC, steps involve in SDLC, maintenance, Role of metrics and measurement.
Module 3
Software Development Life-Cycle Model 5L
Waterfall model, prototyping, iterative enhancement model, evolutionary model incremental model, spiral model. Implementation level and Comparative study of different model
Module 4 5L
Software Requirement Specification
Problem analysis, formal specification, requirement specification, validation, metrics.
Module 5 4L
System Design
Design, Problem partitioning, abstraction, top-down and bottom-up design, Structured approach. Functional versus object-oriented approach, design specification and verification metrics, monitoring and control, Cohesion and Coupling.
Module 6
Coding 4L
Introduction to Coding Standard and Specification, Top-down and bottom-up approaches, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics,
Module 8
Testing 8L
Test plane, test cases specification, Levels of testing functional testing, structural testing, and reliability assessment. Error handling.
Module 9 8L
Software Project Management and maintenance
Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance,

Project Monitoring control, Risk management.

Module10
CASE Tool concept, UML: Different types of diagram and chart concept 5L
Suggested Text / Reference Books:
1. Software Engineering - Rajib Mal
2. Software Engineering- Pressman (Pearson Ed.)

3. Software Engineering – Jawadekar (MGH)

Course Outcomes :

- The ability to analyze, design, verify, validate, implement, apply, and maintain software systems
- The ability to appropriately apply discrete mathematics, probability and statistics, and relevant topics in computer
- The ability to work in one or more significant application domains
- The ability to manage the development of software systems

Paper Name: Artificial Intelligence
Paper Code: IT505A
Course Objectives:

This course will provide knowledge :

- To develop the student's understanding of the issues involved in trying to define and simulate intelligence.
- To familiarize the student with specific, well known Artificial Intelligence methods, algorithms and results.
- To provide the student additional experience in the analysis and evaluation of complicated systems.

Paper Name: Operation Research & Optimization Techniques
Paper Code: IT505B
Contacts:3L+1T
Credit:4

Course Objectives

- . Formulate a real-world problem as a mathematical programming model
- Understand the theoretical workings of the simplex method for linear programming and perform iterations
- Solve specialized linear programming problems like the transportation and assignment problems
- Basic understanding of game theory
- Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

Course Structure and Syllabus:

UNIT I – INTRODUCTION 8L
Intelligent Agents- Agents and environments-Good behavior- The nature of environments-structure of

agents-Problem Solving agents-example problems-Searching for solutions- uninformed search strategies-avoiding repeated states- searching with partial information.

UNIT II – SEARCHING TECHNIQUES 10L

Informed search and exploration- Informed search strategies- heuristic function-Local search algorithms and optimistic problems- local search in continuous spaces-online search agents and unknown environments-constraint satisfaction problems (CSP)-Backtracking search and Local search for CSPstructure of problems-Adversarial search- Games-Optimal decisions in games-Alpha-Beta pruningimperfect real-time decision- games that include and element of chance.

UNIT III – KNOWLEDGE REPRESENTATION 10L

First order logic-representation revisited-Syntax and semantics for first order logic-using first order logic-Knowledge engineering in first order logic-inference in first order logic-prepositional versus first order logic-unification and lifting-forward chaining-backward chaining-resolution-knowledge representation-ontological engineering-categories and objects-actions-simulation and events-mental events and mental objects.

UNIT IV – LEARNING 9L

Learning from observations-forms of learning- Inductive learning-Learning decision trees-ensemble learning-knowledge in learning-logical formulation of learning-explanation based learning-learning using relevant information-inductive logic programming-statistical learning methods-learning with complete data-leaning with hidden variable-EM algorithm- Instance based learning-Neural networks-Reinforcement learning-Passive reinforcement learning-Active reinforcement learning-Generalization in reinforcement learning.

UNIT V – APPLICATIONS 8L

Communication-communication as action-formal grammar for a fragment of English-Syntactic analysis-Augmented grammars-Semantic interpretation-Ambiguity and disambiguation-Discourse understanding-Grammar induction-Probabilistic language processing- Probabilistic language models-

Information retrieval-Information extraction-Machine translation.

Suggested Text / Reference Books:

1. Stewart Russell and Peter Norvig. " Artificial Intelligence-A Modern Approach ", Pearson Education.
2. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd.,
3. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill,
4. George F. Luger, “Artificial Intelligence-Structures And Strategies For Complex Problem Solving”,

Pearson Education

Course Outcomes: On completion of this course the students should be able to:

- design knowledge representation models;
- implement heuristic search algorithms for AI problem solving;
- develop rule-based expert systems;
- develop rule-based planning tools;
- analyze the performance of rule-based-systems;

Paper Name: Computer Graphics
Paper Code: IT505B
Contacts:3L+1T
Credit:4

Course Objectives:

- This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
- A thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering.

Course Structure and Syllabus:

Module I
Linear Programming Problems (LPP): Basic LPP and Applications; Various Components of LP Problem Formulation.
Solution of Linear Programming Problems: Solution of LPP: Using Simultaneous Equations and Graphical Method; Definitions: Feasible Solution, Basic and non-basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and explanation with examples. [**5L]** Solution of LPP by Simplex Method; Charnes' Big-M Method; Duality Theory. Transportation Problems and Assignment Problems. [**12L]**
Module II
Network Analysis: Shortest Path: Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERTCPM
(Cost Analysis, Crashing, Resource Allocation excluded). [**6L]**
Inventory Control: Introduction to EOQ Models of Deterministic and Probabilistic ; Safety Stock; Buffer Stock.[**3L]**
Module III
Game Theory: Introduction; 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems (statement only) and problems;Games without Saddle Point; Graphical Method; Principle of Dominance.[**5L]**
Module IV
Queuing Theory:
Introduction; Basic Definitions and Notations; Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1): (_ / FIFO) and (M/M/1: N / FIFO) and problems.[**5L]**
Suggested Text / Reference Books:
1. H. A. Taha, "Operations Research", Pearson
2. P. M. Karak – "Linear Programming and Theory of Games", ABS Publishing House
3. Ghosh and Chakraborty, "Linear Programming and Theory of Games", Central Book Agency

4. Ravindran, Philips and Solberg - "Operations Research", WILEY INDIA
5. Kanti Swaroop — "Operations Research", Sultan Chand & Sons

6. Rathindra P. Sen—"Operations Research: Algorithms and Applications", PHI

Course Outcomes: At the end of this course the student should be able to

- Appreciate nature and scope of various decision making situations

With in business contexts.

- Realize the need for mathematical tools for decision support.
- Be able to choose a tool to solve problem on hand.

Paper Name: Object Oriented Programming with C++
Paper Code: IT505D
Contacts:3L+1T
Credit:4

Course Objectives:

- Be able to explain the difference between object oriented programming and procedural programming.
- Be able to program using more advanced C++ features such as→ composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
- Be able to build C++ classes using appropriate encapsulation and design→ principles.

Course Structure and Syllabus:

Introduction [3L]
Programming paradigms,Language translator, **B**asics of OOP, Structure of C++ program, Class and object, Abstraction and
encapsulation, Polymorphism, Inheritance, Static and dynamic binding.
Declaration, Expression and statements [4L]
Data types, Variables, Constants, Operator and expression, Operator precedence and associativity.
Statements: Labelled, Expression, Compound, Control, Jump, Declaration, Try-throw-catch.
Array, pointer and function [4L]
Array, Addresses, Pointer. Function: Declaration, Definition and call, Inline function, Main function argument, Reference variable, Function overloading, Default argument, Parameter passing, Recursion, Scope of variable, Return-by-value and Return-by-reference, Pointer to function
Data abstraction through classes and user defined data types [6L]
Class, Members, Constructor and destructor, Copy constructor.
Dynamic memory management: Operators new and delete, Malloc and free, Static member, Scope of class names, Scope of variables.
Operator Overloading [5L]
Overloading unary and binary operator, Overloaded function calls, Subscripting, class member access, Non-member operator, New and delete, Cast operator.
Class relationships [6L]
Introduction, Polymorphism, Coercion, Overloading, Parametric and inclusion polymorphism

Inheritance: direct and indirect superclasses, Multiple inheritance, Virtual base class,Friend, Virtual function, Abstract class, Overriding and hiding, Dynamic binding of functions, Virtual destructor and operators.

Template and Exception Handling [5L]

Class template, Member function inclusion, Function template, Specialization,Inheritance, Namespace. Concept of exception handling, Catch block, Nested try-catch block, Condition expression in throw expression, Constructor & destructor, Runtime standard exception

Standard Library in C++ [3L]

Standard library function, Input and output, Iostream class hierarchy, Class ios, Other stream classes.

Object oriented design and modelling [4L]

Software development, Qualities of software system, Software architecture, Process life cycle, phases, Modularity, OO methodology, Modeling, UML overview, Object oriented design patterns.

Suggested Text / Reference Books:

1. Objected Oriented Programming with C++- E. Balaguruswamy
2. Schildt, H., The Complete Reference C++, McGraw – Hill.
3. C++ object oriented programming paradigm, Debasish Jana, PHI
4. Pooley, R and P. Stevens, Using UML , Addison-Wesley.
5. Programming In C++, Y.I. Shah and M.H. Thaker, ISTE/EXCEL BOOKS
6. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India

7. Rajaram: Object Oriented Programming and C++, New Age International

Course Outcomes:

1. Be able to develop, design and implement simple computer programs.
2. Understand functions and parameter passing.
3. Be able to do numeric (algebraic) and string-based computation.
4. Understand object-oriented design and programming.
5. Understand dynamic memory allocation and pointers.
6. Be able to design, implement, and test relatively large C++ programs.

Paper Name: Data Communication &Networking/Networking I Lab
Paper Code:IT591
Contacts : 3P
Credits: 2
Objectives: This course will

- Introduce the basic principles in Networking.
- It will cover all the management modules present in the OSI Layers.
- Network management, I/O management.

Course Structure and Syllabus:

NIC Installation & Configuration (Windows/Linux)
Understanding IP address, subnet etc

Familiarization with
_ Networking cables (CAT5, UTP)
_ Connectors (RJ45, T-connector) Hubs, Switches
_ TCP/UDP Socket Programming
_ Simple, TCP based, UDP basedMulticast & Broadcast Sockets
Implementation of a Prototype Multithreaded Server
Implementation of Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window), Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check), Data Link Layer Error Control mechanism (Selective Repeat, Go Back N)
Server Setup/Configuration
FTP, TelNet, NFS, DNS, Firewall.
Socket programming

Course Outcomes:

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

- Different network cables
- Implementation of a Prototype Multithreaded Server
- Implementation of Data Link Layer Flow Control Mechanism
- Server Setup/Configuration: FTP, TelNet, NFS, DNS, Firewall.
- Socket programming

Paper Name: Microprocessor & Microcontroller Lab
Paper Code:IT592
Contacts : 3P
Credits: 2
Course Objectives:

- To provide students basic experimental experiences of 8085
- To develop skills of problem solving using assembly level language

Course Structure and Syllabus:

Sl	Content	Hours
1	Study of Prewritten programs on 8085 trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). **Or,** Familiarization with 8085 simulator on PC. Programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator.	3
2	**Programming using kit or Simulator for:** 1. Table look up 2. Copying a block of memory 3. Shifting a block of memory iv) Packing and unpacking of BCD numbers 4. Addition of BCD numbers	18

	5. Binary to ASCII conversion and vice-versa (Using Subroutine Call) 6. BCD to Binary Conversion and vice-versa vii) String Matching, Multiplication	
3	Program using IN/OUT instructions and 8255 PPI on the trainer kit e.g. subroutine for delay, 1. Glowing all the LEDs one by one with particular delay 2. Reading switch state and glowing LEDs accordingly.	3
4	Serial communication between two trainer kits	3
5	Study of Prewritten programs on 8051 Microcontroller Kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). **Or,** Familiarization with 8051 Simulator on PC. Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical).	3
Total 30 hours (10 classes each of 3 periods)		

Course Outcomes:

- Able to understand assembly-language instructions
- Able to understand and gain the knowledge of computer hardware
- Able to configure computer systems.
- Able to do various port programming
- Able to solve various problem using assembly level language

Paper Name: Database Management System- II Lab
Paper Code: IT593
Contacts : 3P
Credits: 2
Course Objectives:

- At the completion of this course, students should be able to do thefollowing:
- Understand the role of a database management system in anorganization.
- Construct moderately advanced database queries usingStructured Query Language (SQL).
- Understand and successfully apply logical database designprinciples, including E-R diagrams and database normalization.
- Design and implement a small database project using Oracle
- Understand the concept of a database transaction and related
- Database facilities, including concurrency control, journaling,backup and recovery, and data object locking and protocols.
- Describe and discuss selected advanced database topics, such asdistributed database systems, parallel database and object orienteddatabase.
- Understand the role of the database administrator.

Course Structure and Syllabus:

1.Study of Backend Tool – Oracle.
2. Data Definition Language (DDL) commands in RDBMS.
3. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
4. High-level language extension with Cursors.
5. High level language extension with Triggers

6. Procedures and Functions.
7. Embedded SQL.
8. Database design using E-R model and Normalization.
9. Mini project (Application Development using Oracle and Visual Basic)
i.Inventory Control System.
ii.Material Requirement Processing
iii.Hospital Management System
iv.Railway Reservation System
v.Personal Information System
vi.Web Based User Identification System
vii.Time-table Management System

Suggested Text / Reference Books:

1. Oracle 10g complete reference
2. Pl/SQL

Course Outcomes:

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

- Data Definition Language (DDL) commands in RDBMS.
- Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
- High-level language extension with Cursors.
- High level language extension with Triggers
- Procedures and Functions. Embedded SQL.
- Database design using E-R model and Normalization.
- Development of mini projects

Paper Name: Software Engineering & Project Management Lab
Paper Code: IT594
Contacts : 3P
Credits: 2
Course Objectives:

- Demonstrate the UML diagrams with ATM system descriptions.
- Demonstrate the working of software testing tools with c language.
- Understanding Project Planning Tools.

Course Structure and Syllabus:

1. Preparation of requirement document for proposed project in standard format.
2. Project Schedule preparation using tools like MSProject.Generation of Gnatt and PERT chart from schedule.Prepare Project Management Plan in standard format.
3. Draw Use Case diagram,Class diagram,Sequence diagram and prepare Software Design Document using tools like Rational Rose.
4. Estimate project size using Function Point(FP)/Use Case Point.Use Excel/Open Office template for calculation.
5. Design Test Script/Test Plan(both Black box and WhiteBox approach) for a small component of the proposed project.(Develop that component using programming languages like c/Java/VB etc.)
6.Generate Test Result and perform defect root cause analysis using Pareto or Fishbone diagram.
7. Compute Process and Product Metrics (e.g Defect Density,Defect Age,Productivity,Cost etc.)
8. Familiarization with any Version Control System like CVS/VSS/Pvcs etc.

(Following projects can be used as dummy projects:
Library Management System
Railway Reservation System
Employee Payroll
Online Banking System
Online Shopping Cart
Online Examination)

Course Outcomes:

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

- Preparation of requirement document for proposed project in standard format.
- Project Schedule preparation using tools
- Draw Use Case diagram,Class diagram,Sequence diagram and prepare Software Design Document
- Estimate project size using Function Point(FP)/Use Case Point.Use Excel/Open Office template for calculation.
- Design Test Script/Test Plan(both Black box and WhiteBox approach) for a small component of the proposed project.(Develop that component using programming languages like c/Java/VB etc.)
- Generate Test Result and perform defect root cause analysis using Pareto or Fishbone diagram.
- Compute Process and Product Metrics (e.g Defect Density,Defect Age,Productivity,Cost etc.)
- Version Control System like CVS/VSS/Pvcs etc.
- Development of mini projects

Paper Name: Artificial Intelligence Lab
Paper Code: IT595A
Contacts : 3P
Credits: 2
Course Objectives:

- Provide understanding of the theoretical underpinnings of artificial intelligence;
- Introduce the basic problems that are solved in the field of artificial intelligence;
- Give the basic algorithms for simulating intelligence on computer machines;
- Offer schemes for knowledge representation and reasoning;
- Demonstrate the mechanisms of rule-based planning;
- Show the principles for inductive machine learning.
- This course includes the philosophical, psychological, and biological issues related to artificial intelligence.

Course Structure and Syllabus:

Sl. No.	Topics
1	**Preamble:** Introduction to fact base programming, Prolog, SWI-Prolog as tool, Download and Install
2	**Facts:** Simple facts and facts with arguments
3	**Variables & Unifications** Simple Unification Variable Unifications
4	**Rules** Simple Predicates, How to add a rule with program
5	**Back tracking** Fail, Cut, Not
6	**Recursion**
	Family tree, Factorial
7	**Input & Output** Read and Write
8	**Operators and Arithmetic**
9	**Graph Traversal** Depth First Search, Breadth First Search

Course Outcomes:

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

- Proloag
- Simple facts and facts with arguments
- Simple Unification
- Variable Unifications
- Simple Predicates, How to add a rule with program
- Family tree, Factorial
- Operators and Arithmetic
- Depth First Search, Breadth First Search

Paper Name: Operation Research & Optimization Techniques Lab
Paper Code: IT595B
Contacts : 3P
Credits: 2
Course Objectives:

- Understand the meaning, purpose, and tools of Operations Research
- Describe the history of Operations Research
- Describe the Stages of O.R
- Explain the Applications of Operations Research
- Describe the Limitations of Operation Research

- Understand the OR specialist and Manager relationship

Course Structure and Syllabus:

Software based Lab using C /C++
1. Assignment on Transportation problem.
2. Assignment on Assignment problem
3. Assignment on Duality
4. Assignment on Simplex method (Including Charns' Big-M Method)
5. Assignment on Shortest Path by using Dijkstra's or Floyd's Algorithm
6. Assignment on Maximal Flow Problem (Ford-Fulkerson Method).
7. Assignment on PERT/CPM
8. Familiarization with O.R package: TORA

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

- Solutions of Transportation problem.
- Duality
- Simplex method
- Solution on Shortest Path by using Dijkstra's or Floyd's Algorithm
- Maximal Flow Problem
- PERT/CPM
- O.R package: TORA

Paper Name: Computer Graphics Lab
Paper Code: IT595C
Contacts : 3P
Credits: 2
Course Objectives:

- This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
- A thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering.
- Topics cover: geometric transformations, geometric algorithms, software systems (OpenGL, shaders), 3D object models (surface, volume and implicit), visible surface algorithms, image synthesis.
- Shading and mapping, ray tracing, radiosity, global illumination, Monte Carlo path tracing, photon mapping, and anti-aliasing.
- The interdisciplinary nature of computer graphics is emphasized in the wide variety of examples and applications.
- Aiming at conducting Tutorial, seminars and remedial classes.

Course Structure and Syllabus:

1. Implementation of Bresenhams Algorithm – Line, Circle, Ellipse.
2. Implementation of Line, Circle and ellipse Attributes.
3. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
4. Composite 2D Transformations.

5. Cohen Sutherland 2D line clipping and Windowing
6. Sutherland – Hodgeman Polygon clipping Algorithm.
7. Three dimensional transformations - Translation, Rotation, Scaling.
8. Composite 3D transformations.
9. Drawing three dimensional objects and Scenes.
10. Generating Fractal images.

Paper Name: Object Oriented Programming with C++ Lab
Paper Code: IT595D
Contacts : 3P
Credits: 2
Course Objectives:

- Understand the objected oriented features of programming
- Apply programming knowledge to solve problems
- Understand the concept of inheritance, exception handling to write efficient code

Course Structure and Syllabus:

Introduction of UNIX/Linux Operating System which includes preliminary commands, start-up & shutdown methodology, file handling as well as introduction to editors like Vi editor, introduction to GNU C & C++ compiler, as well as introduction to GNU & GDB script. **[4P]**
Introduction to C++, basic loop control, executing programs, writing functions, selection statements, review of functions and parameters, command line arguments, recursion, I/O streams, arrays and string manipulation, pointers, structures & unions**. [6P]**
Object-Oriented Programming in C++, fundamentals of classes, constructors-destructors.
Dealing with member functions, operator overloading and polymorphism (both static & dynamic). **[6P]**
Dealing with inheritance, derived class handling, abstract class, virtual class, overriding, template class, name-space & exception handling. **[4P]**
Dynamic memory allocation, implementation of Linked Lists, using C++. **[4P]**

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

- UNIX/Linux Operating System
- C++, basic loop control, executing programs, writing functions, selection
- statements, review of functions and parameters, command line arguments, recursion, I/O streams, array and string manipulation, pointers, structures & unions.
- fundamentals of classes, constructors-destructors
- inheritance, derived class handling, abstract class, virtual class, overriding, template class, name-space & exception handling.
- Dynamic memory allocation, implementation of Linked Lists, using C++.

Paper Name: Project and Technical Report Writing and Presentation on Industrial Training-I
Paper Code: IT581
Course Objectives:

- The objective of the industrial training is to provide the students with the opportunity to practice and apply knowledge and skills in various actual working environments.

Course Outcomes: For the outcomes, after undergoing the training, the student who successfully fulfills the course requirements will have demonstrated:
a) An ability to work in actual working environment.
b) An ability to utilize technical resources both from prior relevant coursework, as well as from sources students must seek out on their own.
c) An ability to write technical documents and give oral presentations related to the work completed.

Paper Name: General Proficiency-I
Paper Code: HU591
Course Objectives:

- To make students for industryready
- To make students ready for higher studies and research
- To make students ready for competitive examinations like
- GRE, TOEFL, CAT, MAT, GMAT, GATE etc.
- Generate competencies among students
- Providing easy and quick techniques to acquire and apply knowledge of mathematics, science and engineering.
- Providing the skill sets to analyze and interpret data.
  Providing the training (offline and online both) to communicate effectively.

Course outcomes:

- Increase Communication abilities
- Increase Thinking abilities
- Increase General awareness and society
- Knowledge of Professional ethics and identity
- Increase Social interaction,
- Knowing the responsibilities of citizenship,
- Generate leadership skills by team work leadership
- Self-learning abilities
- Understand the impact of the work of engineers on society.

Paper Name: Professional Certification Program I
Paper Code: MC583
Course Objectives:

- The Professional certification allows students to demonstrate proficiency in software tools.
- Become a Certified Associate and stand apart from peers.
- Boost confidence, and expand career opportunities.

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

- Details of the topic they have trained in.

Third Year Second Semester

Paper Name: System Software & Network Administration (Networking II)
Paper Code: IT601
Contacts: 3L
Credits: 4
Course objectives:

- This course is intended for those interested or already in a careerof system administration.
- This course covers basic system administration issues of LINUX operating systems (OS), principles of TCP/IP networking.
- Students are introduced to topics such as system installation and maintenance, system,/network security, and setting up different application services such as HTTP server.
- Students will gain considerable hands-on experience in installing, managing, and trouble-shooting networks on the Linux.
- Manage partitioning, filesystems, and swap space;
- Manage the firewall for security issues.

Course Structure and Syllabus:

Introduction [4L]
Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The
scheduler, init and the init tab file, Run-levels, Run level scripts.
Managing User Accounts: [3L]
Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users.
Managing Unix File Systems: [3L]
Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Boot disks.
Configuring the TCP/IP Networking : [5L]
Kernel Configuration; Mounting the /proc File system, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for
IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.
TCP/IP Firewall :[7L]
Methods of Attack, Firewall, IP Filtering. Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IP Accounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IP Accounting Results.
IP Masquerade and Network Address Translation : [5L]
Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade
The Network Information System : [4L]
Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security.
Network file system: [4L]
Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.
System Backup & Recovery: [4L]
Log files for system and applications; Backup schedules and methods (manual and automated).

Suggested Text / Reference Books:

Books

1. L.L. Beck – "System Software " (3rd Ed.)- Pearson Education

References

2. Michel Ticher – "PC System Programming" , Abacus.
3. Kirch – " Linux network Administrator's guide (2nd Ed.)" – O'Rielly
4. Maxwell – "Unix system administration" - TMH
5. Limoncelli –"The Practice of System & Network Administration"-Pearson
6. Wells, LINUX Installation & Administration, Vikas

Course Outcomes: The student will become capable of

- installing ,
- configuring,
- optimizing &
- Administering Linux based System.

Paper Name: Web Technology(Advance Java &J2EE)
Paper code: IT602:
Contacts: 3L
Credits: 4
Course Objectives:

- Understand the various steps in designing a creative and dynamic website.
- They will able to write html, JavaScript, CSS and applet codes .
- They will have clear understanding of hierarchy of objects in HTML and XML.
- Finally they can create good, effective and customized websites.
- Know regarding internet related technologies. Systematic way of developing a website.
- Design dynamic and interactive web pages by embedding Java Script code in HTML.Use Java Script to validate user input.
- Know the advantages and use of different types of CSS.
- Understand the HTML and XML DOM. Know how to use Dynamic HTML.
- Use CGI and perl.
- Efficiently write Java applets.
- Understand the fundamentals of VB Script.
- Understand the fundamentals of ASP.
- Understand the fundamentals of AJAX.
- Understand the fundamentals of Web Hosting.

Course Structure and Syllabus:

Introduction to World Wide Web [1L]:
Web Architecture, Web Applications, Web servers, Web Browsers and Agents, Internet standards, DNS, SMTP etc.
Classification of Web Protocols [1L]:
Pull and Push mechanism: Pros and Cons. HTTP, HTTPS, XMPP
Mark-up [2L]: HTML 4.x: Elements, Attributes, Tags, Forms, Input, Frames, Tables.
Cascading Style Sheets [1L]: Advantages, Rules, CSS, inline and external, using template Layouts,
JavaScript and DHTML [4L]: Language basics: variables, control statements, inbuilt objects. Achieving interactive static web page with Java script: validation of user input, disabling event propagation stack, manipulation of DOM hierarchy, event bubbling, Fancying with multiple windows and DOM**.**
Non-Browser Web Agents [2L]: Limitation of Applets**:** Security Policy, Signing an Applet, HTTP

Tunneling, Programmatically issuing HTTP GET, POST etc. and retrieval of content
Server-side Programming [6L]: Servlets: Concept of Dynamic Web pages, Web server versus Application server, Role of threading in a Server, Servlet-2.x API conforming to Web 2.0: Role of ***web.xml*** as deployment descriptor, request and response, Basic request handling, parameter retrieval, multiple parameter retrieval, inter-Servlet collaboration: Dispatching the request, Concept of state of web: Sessions , tracking session, Using Cookies and *jsessionId*, Parameter passing to and from session, Servlet Filters and common uses of Filters and Cookies. Migration to Servlet 3.x plus and omission of web.xml and concept of WebSocket.
Persistence: JDBC 3.x framework [4L]: Need and different approaches of persistence of data, Connecting to databases using ***jdbc:odbc*** bridge and Type-4 drivers, Executing basic CRUD using JDBC: *Statement*, *PreparedStatement*, *ResultSet*.
Execution of batch SQL, Stored Procedures using *CallableStatement*, Transaction Failure management: Save Point and roll back concepts, Prevention of *SQL injection*, Concept of connection URL in details: Connecting to a remote database host (server). Concept of roles of Drivers: Java reflection in Action.
Java Server Pages [7L]: Benefits of JSP over Servlets, JSP scriptlets, page directives, declarations, action tags: <**jsp:useBeabn**/>, <**jsp:include**/> <**jsp:forward**/>, introducing **MVC architecture** and its different patterns. **Introduction to Struts**
XML Technologies [2L]: XML, Namespace, DTD, W3C XML Schema
Ajax [2L]: Introduction to Asynchronous pattern and Using XML to communicate over XMLHttpRequest object. Handling 5 states and finding response state. Migration of Ajax to AJAJ
Overview of EJB 2.x [7L]: Need of EJB, Session Beans: Stateless & Stateful, Entity Beans *CMP, BMP,*
Message Driven Beans.
Suggested Text / Reference Books:
1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Kogent Learning Solutions INC.

Course Outcomes:
The aim of this course is to equip you with the necessary techniques you will need within Web Applications. By the end of this course students should be able to:

- Understand client server architecture.
- Understand different client side and server side components.
- Understand Web application architecture : MVC, Struts.
- Understand Enterprize Appication Development.

Paper Name: Soft Computing
Paper code: IT603
Contacts: 3L
Credits: 3
Course Objectives:

- Introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems.
- Explain the students about fuzzy sets and its operations,
- Introduce students to fuzzy systems, fuzzy logic and its applications
- Introduce students to genetic algorithm fundamentals and its operators and procedure
- Explain the students about Artificial Neural Networks and various categories of ANN.
- Explain the students about different types hybrid systems
- To comprehend the world energy situation
- To understand the bad effects of the present concentration use of energy
- To comprehend the notion of distributed end use energy

- To compute the solar radiation on the earth's surface

Course Structure and Syllabus:

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS
Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics
GENETIC ALGORITHMS 9L
Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning – Machine Learning Approach to Knowledge Acquisition.
NEURAL NETWORKS 11L
Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.
FUZZY LOGIC 11L
Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making
NEURO-FUZZY MODELING 4L
Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies
Hybrid Systems 4L
Hybrid systems, GA based BPNN (Weight determination, Application); Neuro Fuzzy Systems—Fuzzy BPNN--fuzzy Neuron, architecture, learning, application; Fuzzy Logic controlled GA;
Suggested Text / Reference Books:
Textbooks:
1. Neural Networks- A Comprehensive foundation, Simon Haykin, 2nd Ed; Pearson
2. Fuzzy Sets & Fuzzy Logic, Klir & Yuan, PHI
3. Genetic Algorithm – Melanie Mitchell, PHI
References:
4. Neural Networks, Fuzzy Logic & Genetic Algorithms – Synthesis & applications, T.S. Rajasekaran & G.A. Vijaylakshmi Pai, PHI
5. Genetic Algorithm & fuzzy Logic Systems - Sanchez, Takanori, Zadeh; World Scientific
6. Genetic Algorithm, Goldberg David E.; Pearson
7. Fuzzy Set Theory & Its Applications - Zimmermann H. J.; Allied Publishers Ltd.
8. Fundamentals of Neural Networks, architectures, algorithms & applications --- Laurence Fausett; Prentice Hall, Englewood Clifts.

Course outcome:
By the end of the course a student is expected to become
- Able to apply Genetic Algorithms and Artificial Neural Networks as computational tools to solve a variety of problems in their area of interest ranging from Optimization problems to Pattern recognition and control tasks.

Paper Name: Multimedia Technology
Paper Code: IT604
Contacts: 3L
Credits: 3
Course Objectives:
- formulate a working definition of interactive multimedia;
- describe image color models and image formats
- demonstrate the use of animation, digitized sound, video

- demonstrate the working principal of multimedia peripherals
- concept of multimedia database

Course Structure and Syllabus:

Introduction
Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications
Text and Audio
Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI
Image and Video
Image: Formats, Image Color Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.
Synchronization
Temporal relationships, synchronization accuracy specification factors, quality of service
Storage models and Access Techniques
Magnetic media, optical media, file systems (traditional, multimedia) Multimedia devices – Output devices, CD-ROM, DVD, Scanner, CCD
Document Architecture and Content Management
Content Design and Development, General Design Principles
Hypertext: Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language (HTML)in Web Publishing. Case study of Applications
Multimedia Applications
Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications,
Multimedia archives and digital libraries, media editors
Suggested Text / Reference Books:
Books:
1.Principles_of_multimedia__Ranjan_Parekh_
Reference:
2. Ralf Steinmetz and Klara Nahrstedt , Multimedia: Computing, Communications & Applications , Pearson Ed.
3. Nalin K. Sharda , Multimedia Information System , PHI.
4. Fred Halsall , Multimedia Communications , Pearson Ed.
5. Koegel Buford , Multimedia Systems , Pearson Ed.
6. Fred Hoffstetter , Multimedia Literacy , McGraw Hill.
7. Ralf Steinmetz and Klara Nahrstedt , Multimedia Fundamentals: Vol. 1- Media Coding and Content Processing PHI.

Course Outcomes :
By the end of this course students should be able to:

- define multimedia and describe its application
- describe various color models and properties of an image
- describe characteristics of Audio and Video.
- Demonstrate the operations of monitor, scanner, magnetic disks.

Describe various compression technique

Paper Name: Design Analysis of Algorithms
Paper Code:IT605A
Contracts: 3L
Credits: 4
Course Objectives

- 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 exists for fundamental problems in computer science and engineering work and compare with one another, and how there are stillsome problems for which it is unknown whether there exist efficient algorithms, and how to design efficient algorithms.
- Use different computational models (e.g., divide-and-conquer), order notation and various complexity measures (e.g., running time, disk space) to analyze the complexity/performance of different algorithms.
- Understand the difference between the lower and upper bounds of various problems and their importance in deciding the optimality of an algorithm.
- Use various techniques for efficient algorithm design (divide-and-conquer, greedy, and dynamic algorithms) and be able to apply them while designing algorithms.
- Differentiate between various algorithms for sorting (e.g., insertion, merge, quick-sort, and heap sort), searching (e.g., linear and binary search), and selection (e.g., min, max) and when to use them.
- Augment various data structures (trees and arrays) to support specific applications.
- Know various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.
- Gather information about Randomization (Randomization quick sort, Primality testing)
- Analysis of Geometric algorithms (range searching, convex hulls, segment intersections, closest pairs)
- Execution of Numerical algorithms(extended Euclid's algorithm)
- Know various Text pattern matching, tries, Ukonnen's algorithm.

Course Structure and Syllabus:

Basic Tools on Designing Algorithms: 4L
What is an algorithm? Algorithm specification and performance analysis, randomized algorithms.
Divide-and-Conquer: 6L
The general method, application to binary search, finding the maximum and minimum, merge sort, quick sort, the problem of selection and Strassen's matrix multiplication.
The Greedy Method: 6L
The general method, application to optimal storage on tapes, job sequencing with deadlines, optimal merge patterns and minimum weight spanning trees.
Dynamic Programming: 10L
The general method, application to multistage graphs, all pairs shortest paths, optimal binary search trees,0/1-Knapsack and traveling salesman problem, Flow shop scheduling
Backtracking: The general method, application to 8- puzzle problem, 8- queen problem and sum of subsets.
Branch and Bound: 6L
The method, application to 0/1 Knapsack traveling salesman problems, and efficiency considerations.
NP-Hard and NP-Complete Problems: 8
Introduction and basic concepts, non-deterministic turing machine, the classes of P and NP, NP-hard graph problems, NP-completeness of the satisfiability problem, and polynomial- space-bounded problem.

Suggested Text / Reference Books:

Text Book:

1. E. Horowitz. et.al., Fundamentals of computer Algorithms, Galgotia Publication Pvt. Ltd., New Delhi,

Reference Books:

1. J.Kleinberg & E. Tardos – Algorithm Design, Pearson Education, New Delhi,
2. G.Brassard & P. Bratley – Fundamentals of Algorithms, PHI, New Delhi,
3. T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi,
4. S.Dasgupta et.al. – Algorithms, TMH, New Delhi -

Course Outcomes: At the end of the course students will

- Know how to measure the complexity of an algorithm, including best-case, worst-case, and average complexities as functions of the input size, as well as classification in terms of asymptotic complexity classes O, □, and Ω.
- Know the basic algorithmic design strategies, including recursion, divide-and-conquer, the greedy method, dynamic programming, and backtracking and branch-and-bound.
- Know the elementary lower bound arguments for algorithms, including lower bounds for searching and sorting using comparison-based algorithms.
- Be able to explain why recurrence relations arise naturally when analyzing the complexity of recursive algorithms.
- Be able to explain the basic principles behind the major design strategies, including the role played by the principle of optimality in dynamic programming.
- Be able to solve recurrence relations for the complexity of a number of recursive algorithms.
- Be able to design solutions to problems that require combining several design strategies or data structures in a novel way.
- Be able to decide between various algorithms for solving a given problem. For example, merge-sort, quick-sort, Kruskal's algorithm, Prim's algorithm, etc.

Paper Name: Digital Image Processing
Paper Code: IT605B
Contracts: 3L
Credits: 4
Course Objectives:

- To understand the application DIP.
- Understand the Industry application (Testing,Robotics,MRI,etc)
- Evolves in Scientific Research & Development(Big area of research and open challenges for the researcher)

Course Structure and Syllabus:

DIGITAL IMAGE FUNDAMENTALS 8L

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, Mach Band effect, Image sampling, Quantization, Dither, Two dimensional mathematical preliminaries.

IMAGE TRANSFORMS 8L

1D DFT, 2D transforms - DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet transform.

IMAGE ENHANCEMENT AND RESTORATION 8L

Histogram modification, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic and Yp mean filters . Design of 2D FIR filters.

Image restoration - degradation model, Unconstrained and Constrained restoration, Inverse filteringremoval
of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations, Gray Level interpolation
IMAGE SEGMENTATION AND RECOGNITION 8L
Image segmentation - Edge detection, Edge linking and boundary detection, Region growing, Region splitting and Merging, Image Recognition - Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation.Neural networks-Backpropagation network and training, Neural network to recognize shapes.
IMAGE COMPRESSION 8L
Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Block Truncation Coding, Transform coding, JPEG standard, JPEG 2000, EZW, SPIHT, MPEG.

Suggested Text / Reference Books:

TEXT BOOKS
1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education
REFERENCES
2. William K Pratt, Digital Image Processing John Willey
3. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy
4. A.K. Jain, PHI, New Delhi -Fundamentals of Digital Image Processing.
5. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India,

Course Outcomes:

- To understand the application DIP.
- Understand the Industry application (Testing,Robotics,MRI,etc)
- Evolves in Scientific Research & Development(Big area of research and open challenges for the researcher)

PaperName : Advance Operating System
Paper Code : IT605C
Contracts: 3L
Credits: 4
Course Objectives :

- To provide comprehensive and up-to- date coverage of the major developments in distributed
- Operating System, Multi-processor Operating System and Database Operating System
- To cover important theoretical foundations including Process Synchronization, Concurrency, Eventordering, Mutual Exclusion, Deadlock, Agreement Protocol, Security, Recovery and fault tolerance.

Course Structure and Syllabus:

Introduction to Distributed System [2L]
Introduction, Examples of distributed system, Resource sharing, Goals of distributed system, hardware and software Concepts, design issues, Challenges.
Operating System Structures: [3L]
Review of structures: monolithic kernel, layered systems, virtual machines. Process based models and client server architecture; The micro-kernel based client-server approach.
Communication [4L]
Inter-process communication, Remote Procedure Call, Remote Object Invocation, Tasks and Threads. Examples from LINUX, Solaris 2 and Windows NT.

Theoretical Foundations: [2L]
Introduction. Inherent Limitations of distributed Systems. Lamport's Logical clock. Global State
Distributed Mutual Exclusion:[4L]
Classification of distributed mutual exclusion algorithm. NonToken based Algorithm:Lamport's algorithm, Ricart-Agrawala algorithm. Token based Algorithm: Suzuki-Kasami's broadcast algorithm.
Distributed Deadlock Detection: [5L]
Deadlock handling strategies in distributed systems. Control organizations for distributed deadlock detection. Centralized and Distributed deadlock detection algorithms: Completely Centralized algorithms, path pushing, edge chasing, global state detection algorithm.
Protection and Security: [4L]
Requirements for protection and security regimes. The access matrix model of protection. System and user modes, rings of protection, access lists, capabilities. User authentication, passwords and signatures. Use of single key and public key encryption.
Distributed file systems: [6L]
Issues in the design of distributed file systems: naming, transparency, update semantics and fault resilience. Use of the Virtual File System layer. Examples of distributed systems including Sun NFS, the Andrew file store, CODA file system and OSF DCE.
Distributed Shared Memory: [4L]
Architecture and motivations. Algorithms for implementing DSM. Memory Coherence
CORBA: [3L]
The Common Object Request Broker Architecture model and software and its relationship to Operating Systems.
Real Time Operating System [4L]
Introduction, Definition and Application, Basic model, Characteristics, Types of real time tasks, Timing Constraints, Modeling Timing Constraints,

Suggested Text / Reference Books:

TEXTBOOKS:

1. *Distributed Systems: Principles and Paradigms.* Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall, 2007.

REFERENCES

2. *Operating Systems Internals and Design Principle,* William Stallings, Prentice Hall Publishers,
3. *Operating Systems Concepts,* A. Silberschatz and P. Galvin, Addison-Wesley
4. *Modern Operating Systems,* Andrew S. Tanenbaum, Prentice Hall or other undergraduate textbook.

Course Outcomes :

At the end of the course students will

- Understating the main concepts of Concurrency, transactions, multimedia operating systems, real-time operating systems and mobile computing.
- Using principles gained in this class to understand problems in distributed systems.
- Developing practical skills needed for designing, augmenting and configuring an OS to be suitable for a particular deployment.
- To feel competent to design, augment and configure; distributed OS, Multimedia OS and mobile computing

Paper Name: System Software & Network Administration Lab/Networking II Lab
Paper Code: IT691
Contracts: 3L
Credits: 2
Course Objectives:

- Describe and program the communication among processes at different hosts to facilitate parallel and distributed computing.
- Describe and distinguish synchronization and concurrency control for a parallel or distributed computing system.
- Evaluate the impact of network topology on parallel/distributed algorithm formulations and traffic their performance.
- Understand, appreciate and apply parallel and distributed algorithms in problem solving.
- Discuss about the different communication operations and their benefits.
- Master skills to measure the performance metrics of parallel and distributed programs.
- Describe the different principle of message passing programming.
- Uses of Open-MP to simulate and study behavior of parallel programs.
- Case study of parallelism adapted in some system software.

Course Structure and Syllabus:

- S.No Experiment
- 1. Study of different types of Network cables and practically implement the Cross-wired cable and straight through cable using clamping tool.
- 1. Study of Network Devices in Detail.
- 2. Study of network IP.
- 3. Connect the computers in Local Area Network.
- 4. Study of basic network command and Network configuration commands.
- 5. Configure a Network topology using packet tracer software.
- 6. Configure a Network topology using packet tracer software.
- 7. Configure a Network using Distance Vector Routing protocol.
- 8. Configure Network using Link State Vector Routing protocol_

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

- different types of Network cables and practically implement the Cross-wired cable and
- straight through cable using clamping tool
- Network Devices in Detail.
- computers in Local Area Network
- basic network commands
- Configure a Network topology using packet tracer software.
- Configure a Network topology using packet tracer software.
- Configure a Network using Distance Vector Routing protocol.
- Configure Network using Link State Vector Routing protocol

Paper Name: Web Technology lab (Advance Java and J2EE)
Paper Code: IT692
Contracts: 3L
Credits: 2
Course Objectives:

- To create a fully functional website with mvc architecture
- To develop an online book store
- To provide an understanding of the language translation peculiarities by designing a complete translator for a mini language

Course Structure and Syllabus:

1. Assignments involving client side programming using HTML, Java Applet etc.
2. Assignments on programming using scripting languages such as JavaScript
3. Assignments involving server side programming using JSP, Servlet etc.
4. Assignments on Enterprise Application Development using JavaBeans, EJB.
5. Assignments involving SOA & Cloud Computing.

Suggested Text / Reference Books:
Reference Books:
1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Kogent Learning Solutions INC.

Paper Name: Web Technology (Advance Java and J2EE)
Paper Code: IT692
Course Outcomes:
At the end of the course students will be able to know :

- Client side scripting : Java Script
- HTML
- Connectivity through Database
- Server Side Components
- Web Application Development Architecture: MVC, Struts
- Session Management
- Filter Applications
- Asysnchronous responses and XML
- Web Scokets
- J2EE

Paper Name: Soft Computing Lab
Paper Code: IT693
Contracts: 3L
Credits: 2
Course Objectives:

- Introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems.

- Explain the students about fuzzy sets and its operations,
- Introduce students to fuzzy systems, fuzzy logic and its applications
- Introduce students to genetic algorithm fundamentals and its operators and procedure
- Explain the students about Artificial Neural Networks and various categories of ANN.

Course Structure and Syllabus:

1) a) Write a Matlab program (m.file) to calculate union, intersection, complement and difference of two fuzzy sets.
b) Write a Matlab program (m.file) to calculate the Demorgan's Law.
2) Find whether the given matrix is (a) reflexive (b) tolerance and (c) transitivity matrix or not.
3) Find whether the given matrix is symmetry or not by aMatlab program.
4) Find the fuzzy relation between two vectors *R* and *S* Using max–product and max-min method by a Matlab program
5) (a)Use Matlab command line commands to display the Gaussian membership function. Given x = 0–10 with increment of 0.1 and Gaussian function is defined between 0.5 and _5.
(b) Use Matlab command line commands to display the triangular membership function. Given x = 0–10 with increment of 0.2 triangular membership function is defined between [3 4 5]
6) Illustrate different types of generalized bell membership functions using Matlab program
(7) Using Matlab program find the crisp lambda cut set relations for _ = 0.2, the fuzzy matrix is given by
R=
0.2 0.7 0.8 1
1 0.9 0.5 0.1
0 0.8 1 0.6
0. 0.4 1 0.3
(8) Temperature control of the reactor where the error and change in error is given to the controller. Here the temperature of the reactor is controlled by the temperature bath around the reactor thus the temperature is controlled by controlling the flow of the coolant into the reactor. Form the membership function and the rule base using FIS editor.
(9) Consider the water tank with following rules
1. IF (level is okay) THEN (valve is no_change) (1)
2. IF (level is low) THEN (valve is open_fast) (1)
3. IF (level is high) THEN (valve is close_fast) (1)
Using Mamdani method and max–min method for fuzzification and method of centroid for defuzzification method
construct a FIS. Before editing that rules, membership functions must be defined with membership function editor.
(10) (a) Form a fuzzy system, which approximates function *f*, when x _ [_10, 10].Repeat the same by adding random, normally distributed noise with zero mean and unit variance.

(b) Simulate the output when the input is sin(t). Observe what happens to the signal shape at the output.
(11) Use Matlab's Fuzzy Logic Toolbox to model the tip given after a dinner for two, where the food can be disgusting, not good, bland, satisfying, good, or delightful, and the service can be poor, average, or good. To get started, you type fuzzy in a Matlab window. Then use the fuzzy inference system and membership function editors
to define and tune your rules.
PART B (Neural Network)
12. Design networks of McCulloch-Pitts neurons that implement logical NOT, AND and OR gates. Draw each network and label all the weight and threshold values.
13. Derive expressions for the weights and thresholds of a McCulloch-Pitts neuron that can compute the following
input-output mappings:
in1 in2 out
0 0 1
0 1 0
1 0 0

1 1 0
Write Matlab code for the above ANN.
14 Investigation the use of back-propagation learning using a sigmoidal nonlinearity to achieve one-to-one mapping, as described here:
1. f(x) = 1/x, 1 _ x _ 100
2. f(x) = $\log_{10}$x, 1 _ x _ 10
3. f(x) = exp(-x), 1 _ x _ 10
4. f(x) = sinx, 0 _ x _ _/2
for each mapping, do the following:
(a) Set up two sets of data, one for network training, and the other for testing.
(b) Use the training data set compute the synaptic weights of the network, assumed to have a single hidden layer.
(c) Evaluate the computation accuracy of the network by using the test data. Use a single layer but with a variable number of hidden neurons. Investigate how the network performance is affected by varying the

size of the hidden layer.

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

- To impart knowledge on origin and basics of soft computing and Neural Networksusing Mat lab-Tool.
- To impart knowledge on genetic algorithms and their applications.
- To impart knowledge on various types of neural networks- learning methods.
- To impart knowledge on fuzzy logic.

Paper Name: Multimedia Technology Lab
Paper Code: IT694
Contracts: 3L
Credits: 2
CourseObjectives:

- To provide students basic experimental experiences in the operation of variousmultimedia components like image, audio, animation.
- To develop skills in the various tools like Photoshop, Forge, Flash.

Course Structure and Syllabus:

1. Sound capturing & editing using tools like SOUNDFORGE
2. Image editing using tools like Adobe Photoshop
3. Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier)
4. Creation of Content using HTML (basic tags, table form, frame, link to other Image)
5. Creating stylesheet using DHTML
6. Home Page creation using HTML, DHTML

Suggested Text / Reference Books
1. Adobe , Adobe Photoshop 6.0: Classroom in a book Pearson Ed.
2. Anushka Wirasinha , Flash in a Flash- Web Development , PHI
3. Macromedia Flash5 fast and easy Web Development, Design, PHI
4. Castro, HTML4 for the World Wide Web, Pearson Ed.
5. Schurman & Purdi , Dynamic HTML in Action, Second Edition , PHI

6. Lozano, Multimedia- Sound & Video , PHI

Paper Name: Project and Technical Report Writing and Presentation on Industrial Training-I (2 weeks duration)
Paper Code: MC681
CourseObjectives:
This course has been designed:

- To inculcate a sense of confidence in the students.
- To help them become good communicators both socially and professionally.
- To assist them to enhance their power of Technical Communication.

Course Outcomes:

- define multimedia and describe its application
- describe various color models and properties of an image
- describe characteristics of Audio and Video.
- demonstrate the operations of monitor, scanner, magnetic disks.
- Describe various compression technique
- Describe multimedia document architectures
- Demonstrate image segmentation
- Demonstrate k-d tree, quad tree, R tree.

Paper Name: General Proficiency-I (General aptitude, Technical Communication & Soft Skill)
Paper Code: MC682
Course Objectives:
Students will be able to:

- Use the standard diction, grammar, and mechanics of American English
- Apply fundamental strategies such as invention, drafting, revising, editing for their writing projects
- Adapt writing to specific purposes, contexts, and audiences
- Employ conventions appropriate to academic and professional writing
- Develop a controlling idea or thesis for the writing project
- Develop effective organizational strategies
- Arrange supporting details coherently
- Speak clearly and project the voice sufficiently, employing appropriate verbal and nonverbal strategies
- Utilize visual aids effectively
- Perform calculations with integers, fractions (rational numbers), decimals, ratios and percents
- Use arithmetic, algebraic, and/or geometric and statistical methods, to solve applied and word problems
- Demonstrate understanding of the terms and symbols used to generate, present, and analyze data
- Interpret and evaluate quantitative or symbolic models such as graphs, tables, units of measurement, scales, distributions
- Represent and communicate quantitative or symbolic information
- Generate and apply conclusions based on pattern recognition

Course Outcomes:
For the outcomes, after undergoing the training, the student who successfully fulfills the course requirements will have demonstrated:
a) An ability to work in actual working environment.
b) An ability to utilize technical resources both from prior relevant coursework, as
well as from sources students must seek out on their own.
c) An ability to write technical documents and give oral presentations related to the work completed.

Paper Name: Professional Certification Program II
Paper Code: IT683
CourseObjectives:
Course Objectives:

- Professional certification allows students to demonstrate proficiency in various software tools.
- Spurred to be a Certified Associate and stand apart from peers in all aspects of technicality.
- Excel confidence, and expand career opportunities.

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

- Details of the topic they have trained in.

Paper Name: Foreign Language Lab(Japanese/French/German/Spanish)
Paper Code: HU691
Contracts: 3L
Credits: 2

Course Objectives:
Students will be able to:

- Adapt with cross culture
- Know a foreign language in depth
- Become an interpreter

Course Outcomes:

- **Communication**
    1. Students will be able to engage in conversation, provide and obtain information, express feelings and emotions, and exchange opinions.
    2. Students will be able to understand and interpret written and spoken language on a variety of topics.
    3. Students will be able to present information, concepts and ideas to an audience of listeners or readers on a variety of topics.
- **Cultures**
    1. Students will be able to demonstrate an understanding of the relationship between the practices and perspectives of the cultures studied.
    2. Students will be able to demonstrate an understanding of the relationship between the products (artifacts) and perspectives of the cultures studied.
- **Connections**
    1. Students will be able to reinforce and further their knowledge of other disciplines through the foreign language.
    2. Students will be able to acquire information and recognize the distinctive viewpoints that are only available through the foreign language and its cultures.
    3.

- **Comparisons**
    1. Students will be able to demonstrate understanding of the nature of language through comparisons of the language studied and their own.
    2. Students will be able to demonstrate understanding of the concept of culture through comparisons of the cultures studied and their own.
- **Communities**
    1. Students will be able to use the language both within and beyond the college setting.

Students will be able to show evidence of becoming life-long learners by using the language for personal enjoyment and enrichment.

Forth Year First Semester

Paper Name: E-Commerce and ERP
Paper Code:IT701
Contact: 3L+1T
Credit: 4
Course Objectives:
This course is designed to assist participants in developing knowledge and skills for managing information systems that support e-Commerce. Beginning with the concepts of industry segmentation of e-Commerce providers and e-Commerce usage. The course also focuses on obstacles to e-Commerce adoption and its futuredirections from both a technological and managerial perspective.

- Outline a basic model of the Internet technology infrastructure.
- Assess E-Commerce strategies and applications, including online marketing, E-Government, E-Learning and global E-Commerce
- Discuss the significance of Web 2.0 content and social networks in E-Commerce
- Differentiate electronic marketplaces and give examples of E-tailing products and services.
- Compare B2B and B2C E-Commerce strategies, including market segmentation
- Categorize advantages and disadvantages of different online payment options
- Discuss common legal, ethical and tax issues in E-Commerce
- Use the knowledge of online security issues to assess existing websites
- Use the knowledge of the major E-Commerce revenue models to evaluate existing websites.

Course Structure and Syllabus:

Introduction to E-Commerce [3L]
Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.
Business to Business E-Commerce [7L]
Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce. Business models for E-commerce, Business Process Re-Engineering.
Legal issues [5L]
Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.
Security Issues [7L]
Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security, Search engines, Intelligent agents in E-Commerce Electronic payment systems, E-security, Mobile commerce.
Business to Consumer E-Commerce and E-Business [8L]
Consumer trade transaction, Web metrics, Elements of E-Commerce, Industry impacts of E-business. Integrating Intranet and internet web applications across multiple networks. Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.
ERP [9L]
The evolution of ERP systems, Business processes supported by ERP systems, The evolution of ERP systems architecture, Enterprise Perspective, Resource Management Perspective, Information System Perspective, Key Managerial Issues, OLAP, E-SCM and E-CRM.
Suggested Text / Reference Books:
1. E-Commerce-Strategy, Technologies & Applications by David Whitley, TMH
2. Handbook on Electronic Commerce, Shaw et al., Springer publication.
3. E-Commerce-Strategy, Technologies & Applications by David Whitley, TMH

4. Applied E-Commerce, Langer, John Wiley Publication.
5. E-Commerce- The cutting edge of business by Kamlesh K. Bajaj, TMH
6. Global Electronic Commerce- Theory and Case Studies by J. Christopher Westland and Theodore H. K Clark, University Press.
7. Enterprise Resource Planning – A Managerial Perspective by D P Goyal, Tata McGraw Hill Education, 2011

Course Outcome
After the course the student will be able to:

- To have a general understanding of the Internet and related technologies
- To understand the policy issues related to privacy, intellectual property rights, and establishing identity those are germane to electronic commerce.
- To analyze the impact that electronic commerce is facing.
- To recognize and understand ways of using electronic commerce technologies to improve intra and inter-organizational processes.
- To specify the development of electronic commerce capabilities in a company
- To have an understanding of contemporary ecommerce concepts and terminology
- To outline the different digital transaction process and basic concepts of e-commerce
- To know the importance of digital library and supply chain management.
- describe the various forms of electronic commerce;
- explain the range of threats to e-commerce security; - identify the different areas susceptible to malicious activity;
- conduct an analysis of the risks associated with the use a particular e-commerce technology;
- describe different cryptographic techniques and their technical characteristics;
- explain how cryptography can be, and is, used to achieve security;
- describe the different standards in use for secure electronic commerce, such as certificates, MACs, etc;
- describe the different protocols in use for secure electronic commerce, such as SSL, TLS and S/MIME;
- analyze e-commerce systems currently in operation, such as electronic payment systems

describe and analyze standard security mechanisms, such as filters, proxies and firewalls.

Paper Name: Mobile Computing
Paper Code: IT702
Contact: 3L+1T
Credit: 4
Course Objectives:

- To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
- To enable the student to analyze and design wireless and mobile cellular communication systems over a stochastic fading channel
- To provide the student with an understanding of Equalization and diversity reception techniques
- To give the student an understanding of digital cellular systems (GSM, CDMA)
- To give the student an understanding of present day cellular technologies.

Course Structure and Syllabus:

A General Overview [2L]: History, Transmission Medium, Need, Advantages, Disadvantages
Introduction to Personal Communications Services (PCS) [5L]: 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) [2L]: GPRS Architecture, GPRS Network Nodes.
Wireless LANs [6L]: Characteristics, IEEE 802.11: Architecture, Physical Layer, MAC Layer, And MAC Management, 802.11a and 802.11b. HIPERLAN: History, WATM, BRAN and HiperLAN2.

Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Management Protocol, L2CAP and Security.
Mobile Transport and Network Layer [12L]: Introduction, Traditional TCP: Congestion Control, Slow Start, Fast Retransmit and Implications of Mobility. Classical TCP Improvements: Indirect TCP, SnoopingTCP, Mobile TCP and Fast Retransmit. Mobile IP: Introduction, IP Packet Delivery, Agent Discovery, Registration, Tunneling and Encapsulation, Optimizations and Reverse Tunneling. Mobile AdhocNetworks:
Routing, Destination Sequence Distance Vector, Dynamic Source Routing and Alternative Metrics.
Cellular Networks [9L]: Cellular Concept, Frequency Reuse, Channel Allocation Management, Call Setup, Location Management, Cell Handoffs, Interference: Co-channel and Adjacent Interference. System Capacity, Improving Cell Capacity and Coverage: Cell Splitting, Sectoring, Repeaters and Microcell ZoneConcept Wireless Application Protocol (WAP) [4L]: The Mobile Internet standard, WAP Gateway and Protocols,

Suggested Text / Reference Books:

Books:

1. J. Schiller, Mobile Communications, Addison –Wesley, 2003
2. T. S. Rapport, Wireless Communications, Principle and Practices
3. Forouzan, Data Communications and Networking, TMH

Course Outcome:

- By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.
- The student will be able to understand impairments due to multipath fading channel and be able simulate standard stochastic channel models for various environments.
- The student will be able understand the fundamental techniques to overcome the different fading effects.
- The student will have detailed understanding of current and proposed cellular technologies.

The student will have the ability to work in advanced research wireless and mobile cellular technologies.

Paper Name: Cloud Computing and SOA
Paper Code: IT703A
Contacts: 3L
Credits: 3
Allocated Hrs: 40Hrs

Course Objectives: Adopting services oriented architecture (SOA) in your enterprise without thinking through IT governance can cause something like the Gold Rush in the 1800s; extreme rates of growth and minimal law and order which produce unexpected outcomes.

- The promise of SOA is that developers can write software code once and have that code re-used by many disparate systems for a variety of functions, thus saving time and money. Governance is a set of processes, tools, and organizational structure that allows for oversight of the IT operation and is essential for delivering on the SOA promise.
- There is more to SOA Security than Authorization and Authentication
- Providing the SOA reference architecture.
- Identify the infrastructure capabilities it will have
- The objective of Cloud Computing is to provide comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.
- Another objective is to expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Course Structure and Syllabus:

Overview of Computing Paradigm [3L]
Recent trends in Computing Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computingBusiness driver for adopting cloud computing

Introduction to Cloud Computing[3L]
Cloud Computing (NIST Model)Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics And DisadvantagesPros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing Role of Open Standards

Cloud Computing Architecture[4L]
Cloud computing stackComparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services Service Models (XaaS) Infrastructure as a Service(IaaS) Platform as a Service(PaaS) Software as a Service(SaaS) Deployment Models Public cloud Private cloud Hybrid cloud Community cloud

Infrastructure as a Service(IaaS)[4L]
Introduction to IaaSIaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM) Resource Virtualization Server Storage NetworkVirtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service) Examples Amazon EC2Renting, EC2 Compute Unit, Platform and Storage, pricing, customers Eucalyptus

Platform as a Service(PaaS)[3L]
Introduction to PaaSWhat is PaaS, Service Oriented Architecture (SOA) Cloud Platform and Management Computation Storage Examples Google App Engine Microsoft Azure SalesForce.comâ ™s Force.com platform

Software as a Service(PaaS)[4L]
Introduction to SaaS Web services Web 2.0 Web OS Case Study on SaaS

Service Management in Cloud Computing[5L]
Service Level Agreements(SLAs) Billing And Accounting Comparing Scaling Hardware: Traditional vs. Cloud Economics of scaling: Benefitting enormously Managing Data Looking at Data, Scalability And Cloud Services Database And Data Stores in Cloud Large Scale Data Processing

Cloud Security[5L]
Infrastructure SecurityNetwork level security, Host level security, Application level security Data security and StorageData privacy and security Issues, Jurisdictional issues raised by Data location Identity And Access Management Access Control Trust, Reputation, Risk Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

Case Study on Open Source And Commercial Clouds[9L]
Eucalyptus Microsoft Azure Amazon EC2

Suggested Text / Reference Books:
1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

Course Outcome: Completing this course should provide you with a good understanding of cloud computing and a systematic knowledge of the fundamental technologies, architecture, and security.

- To articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
- Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
- Explain the core issues of cloud computing such as security, privacy, and interoperability.
- Choose the appropriate technologies, algorithms, and approaches for the related issues.
- Identify problems, and explain, analyze, and evaluate various cloud computing solutions.
- Provide the appropriate cloud computing solutions and recommendations according to the applications used.
- Attempt to generate new ideas and innovations in cloud computing.
- Collaboratively research and write a research paper, and present the research online

Paper Name: Computer Vision and Pattern Recognition
Paper Code: IT703B
Contacts: 3L
Credits: 3

Course Objectives:
At the end of the course students will be able to:
- The main learning objectives include the ability to analyze, design and implement a modern computer vision system, able to understand and interact with its environment (a scene).

Introduction to Pattern Recognition [2L]
Tree Classifiers Getting our feet wet with real classifiers [3L]
(a) Decision Trees: CART, C4.5, ID3. (b) Random Forests
Bayesian Decision Theory [2L]
Linear Discriminants Discriminative Classifiers: the Decision Boundary[3L]
(a) Separability (b) Perceptrons (c) Support Vector Machines
Parametric Techniques Generative Methods grounded in Bayesian Decision Theory [3L]
(a) Maximum Likelihood Estimation (b) Bayesian Parameter Estimation (c) Sufficient Statistics
Non-Parametric Technique [3L]
(a) Kernel Density Estimators (b) Parzen Window (c) Nearest Neighbor Methods
Unsupervised Methods Exploring the Data for Latent Structure [7L]
(a) Component Analysis and Dimension Reduction
i. The Curse of Dimensionality ii. Principal Component Analysis
iii. Fisher Linear Discriminant iv. Locally Linear Embedding
(b) Clustering
i. K-Means ii. Expectation Maximization iii. Mean Shift
Classifier Ensembles [3L]
(a) Bagging (b) Boosting / AdaBoost
Graphical Models The Modern Language of Pattern Recognition and Machine Learning [7L]
(a) Introductory ideas and relation back to earlier topics (b) Bayesian Networks
(c) Sequential Models
i. State-Space Models ii. Hidden Markov Models iii. Dynamic Bayesian Networks
Theoretical Treatments in the Context of Learned Tools [4L]
(a) No Free Lunch Theorem (b) Ugly Duckling Theorem (c) Bias-Variance Dilemma
(d) Jacknife and Bootstrap Methods
Other Items Time Permitting [2L]
(a) Syntactic Methods (b) Neural Networks
Suggested Text / Reference Books:
1. Pattern Classification, R.O.Duda, P.E.Hart and D.G.Stork, John Wiley, 2001

2. Pattern Recognition, S.Theodoridis and K.Koutroumbas, 4th Ed., Academic Press, 2009
3. Pattern Recognition and Machine Learning, C.M.Bishop, Springer, 2006

Course Outcomes :

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

- Explain basic theories and techniques in computer vision and pattern recognition
- Identify various approaches of computer vision and pattern recognition and design the components of the systems for computer vision and pattern recognition
- Describe and discuss the basic functions and methods for image processing
- Design simple systems for computer vision and pattern recognition which can handle certain problem
- Gain skills in evaluating, experimenting with, and optimizing the performance of the systems for computer vision and pattern recognition
- Have a deeper appreciation of research issues in this field

Paper Name: Compiler Design
Paper Code: IT703C
Contacts: 3L
Credits: 3

COURSE OBJECTIVE:

1. To provide knowledge of parsing, lexical and syntax analysis.
2. To analyze various parsing techniques, code optimization.
3. To learn about the compilers they practically use in labs.
4. To know how the parse trees are generated, errors are handled.
5. To know how to code is optimized; all of these concepts will be understood.

Introduction to Compiling [3L]

Compilers, Analysis of the source program, The phases of the compiler, Cousins of the compiler.

Lexical Analysis [6L]

The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of a tokens, Finite automata, From a regular expression to an NFA, From a regular expression to NFA, From a regular expression to DFA, Design of a lexical analyzer generator (Lex).

Syntax Analysis [9L]

The role of a parser, Context free grammars, Writing a grammar, Top down Parsing, Non-recursive Predictive parsing (LL), Bottom up parsing, Handles, Viable prefixes, Operator precedence parsing, LR parsers (SLR, LALR), Parser generators (YACC). Error Recovery strategies for different parsing techniques.

Syntax directed translation [5L]

Syntax director definitions, Construction of syntax trees, Bottom-up evaluation of S attributed definitions, L attributed definitions, Bottom-up evaluation of inherited attributes.

Type checking [4L]

Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions.

Run time environments [5L]

Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Parameter passing (call by value, call by reference, copy restore, call by name), Symbol tables, dynamic storage allocation techniques.

Intermediate code generation [4L]

Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).

Code optimization [5L]
Introduction, Basic blocks & flow graphs, Transformation of basic blocks, Dag representation of basic blocks, The principle sources of optimization, Loops in flow graph, Peephole optimization.
Code generations [4L]
Issues in the design of code generator, a simple code generator, Register allocation & assignment.
Suggested Text / Reference Books:
1. Aho, Sethi, Ullman - "Compiler Principles, Techniques and Tools" - Pearson Education.
2. Holub - "Compiler Design in C" - PHI.

COURSE OUTCOME: After completion of the course students will able

1. To provide knowledge of parsing, lexical and syntax analysis.
2. To analyze various parsing techniques, code optimization.
3. To learn about the compilers they practically use in labs.
4. To know how the parse trees are generated, errors are handled.
5. To know how to code is optimized; all of these concepts will be understood.

Paper Name: VLSI Design
Paper Code: IT704A
Contacts: 3L
Credits: 3
Course Objectives:
At the end of the course students:
- Introduction to CMOS VLSI design methodologies – Emphasis on full-custom design – Circuit and system levels
- Extensive use of Mentor Graphics CAD tools for IC design, simulation, and layout verification
- Specific techniques for designing high-speed, low-power, and easily-testable circuits

Course Structure and Syllabus:

Module 1: [6L]
Introduction to VLSI Design: VLSI Design Concepts, Moor's Law,
Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structural, Physical), YChart, Digital VLSI Design Steps.
MOS structure: E-MOS & D-MOS, Charge inversion in E-MOS, Threshold voltage, Flat-band voltage, Potential balance & Charge balance, Inversion, MOS capacitances.
Module 2: [10L]
Micro-electronic Processes for VLSI Fabrication: Silicon Semiconductor Technology- An Overview, Wafer processing, Oxidation, Epitaxial deposition, Ion-implantation & Diffusion, Cleaning, Etching, Photo-lithography – Positive & Negative photo-resist
Basic CMOS Technology – (Steps in fabricating CMOS), Basic n-well CMOS process, p-well CMOS process, Twin tub process, Silicon on insulator
Layout Design Rule: Stick diagram with examples, Layout rules.
Module 3:[10L]
Three Terminal MOS Structure: Body effect.
Four Terminal MOS Transistor: Drain current, I-V Characteristics. Current-voltage equations (simple derivation).
Scaling in MOSFET: Short Channel Effects, General scaling, Constant Voltage & Field scaling.
CMOS: CMOS inverter, Simple Combinational Gates - NAND gate and NOR Gate using CMOS.

Module 4: [10L]
Hardware Description Language – VHDL or Verilog Combinational & Sequential Logic circuit Design.
Suggested Text / Reference Books:
1. CMOS Digital Integrated Circuit, S.M.Kang & Y.Leblebici, TMH.
2. Modern VLSI Design, Wayne Wolf, Pearson Education.
3. VHDL, Bhaskar, PHI.
4. Digital Integrated Circuit, J.M.Rabaey, Chandrasan, Nicolic, Pearson Education.
5. Advance Digital Design Using Verilog , Michel D. Celliti, PHI
Course Outcomes:
At the end of the course students :
- Be able to use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect.
- Be able to create models of moderately sized CMOS circuits that realize specified digital functions.
- Be able to apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.
- Have an understanding of the characteristics of CMOS circuit construction and the comparison between different state-of-the-art CMOS technologies and processes.
- Be able to complete a significant VLSI design project having a set of objective criteria and design constraints.

Paper Name: Robotics
Paper code: IT704B
Contacts: 3L
Credits: 3
Course Objectives:
Upon successful completion of the course, students will –
- understand the vision technology in conjunction with real world applications - learn the principles and commonly used paradigms and techniques of computer vision
- be able to identfy the limitations of vision systems
- be able to demonstrate successful applications to process and analyze images, and to make automatic decisions based on extracted feature information

Course Structure and Syllabus:

Module 1[3L]
Image formation and Image model-Components of a vision system-Cameras-Radiometry-Light in space-Light in surface- sources, shadows and shading, Color-Human color perception-Representation of color- A model for image color-Surface color from image color
Module 2[3L]
Early vision-Linear Filters and Convolution-Shift variant Linear system- Spatial Frequency and Fourier Transforms-Samoling and Aliasing-Filters as Templates-Normalized co relation and finding patterns-Edge detection-Texture Representation ,Analysis and Application
Module 3 [4L]
Multiple images-The Geometry of multiple views-Stereopsis-Affine structure from motion-Elements of Affine Geometry-Affine structure and motion from two images-Affine structure and motion from multiple images-From Affine to Euclidean images.
Module 4 [5L]
Middle level vision-Segmentation by clustering-Shot Boundary Detection and Background Subtraction-Image segmentation by clustering pixels-Segmentation by Graph-Theoretic clustering-Segmentation by fitting a model-The Hough Transform-Fitting lines-Fitting curves- Fitting as a probabilistic inference problem-Robustness-Segmentation and fitting using probabilistic methods.

Module 5 [4L]

High level vision-:Geometric methods-Model based vision-Obtaining hypothesis by pose consistency, pose clustering and using Invariants- Verification-smooth surface and their outlines-Aspect graphs- Range data-Range Data segmentation- Range image Registration and model acquisition-Object Recognition.

Module 6 [2L]

Introduction -- brief history, types, classification and usage, Science and Technology of robots, Some useful websites, textbooks and research journals.

Module 7 [6L]

Elements of robots – links, joints, actuators, and sensors

Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors, proximity and distance measuring sensors, and vision.

Module 7 [5L]

Kinematics of serial and parallel robots

Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint and loop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.

Module 8 [3L]

Velocity and static analysis of robot manipulators

Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysis for serial and parallel manipulators, Loss and gain of degree of freedom,

Module 9 [3L]

Dynamics of serial and parallel manipulators

Mass and inertia of links, Lagrangian formulation for equations of motion for serial and parallel manipulators, Generation of symbolic equations of motion using a computer, Simulation (direct and inverse) of dynamic equations of motion, Examples of a planar 2R and four-bar mechanism, Recursive dynamics,

Module 10 [3L]

Motion planning and control

Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link, Independent joint PID control, Control of a multi-link manipulator, Non-linear model based control schemes, Simulation and experimental case studies on serial and parallel manipulators, Control of constrained manipulators, Cartesian control, Force control and hybrid position/force control, Advanced topics in non-linear control of manipulators.

Module 11 [4L]

Control considerations, Hardware Architecture, Hardware for joint controllers, Computational Speed, Robot Language, Robot Programming.

Suggested Text / Reference Books:

1. Computer vision – A modern Approach , David A forsyth & Jean ponce , Prentice Hall ,2002.
2. “Computer vision and Applications” , Bernd Jahne and Horst HauBecker Academic press ,2000.
3. K.S Fu R.C . CSG Lee-Robotics Control,Sensing, Vision & Intelligence,McGraw-Hill.
4. M.P. Groover, M.Weins,R.N. Nagel,N.C. Odrey –Industrial Robotics,McGraw Hill

5. Andrew C. Straugard-Robotics & AI,PHI
6. S.Sitharama Iyengar, Alberto Elefes -Autonomous Mobile Robots Control,Planning & Achitecture,IEEE Computer Society Press

Course Outcomes:
Upon successful completion of the course, students will –

- understand the vision technology in conjunction with real world applications - learn the principles and commonly used paradigms and techniques of computer vision
- be able to identfy the limitations of vision systems
- be able to demonstrate successsful applications to process and analyze images, and to make automatic decisions based on extracted feature information

Paper Name: Bioinformatics & DNA Computing
Paper Code: IT704C
Contacts: 3L
Credits- 3

Course Objectives:

- Develop an understanding of the basic principles of molecular and cell biology.
- Become familiar with existing tools and resources for computational analysis of biologicaldata, including sequences, phylogenies, microarrays, ontologies, and biomolecular interactions.
- Develop an awareness of the computational problems that arise in the modeling and analysisof living systems.
- Understand basic abstractions and computational approaches used to formulate and addressthese problems.

Be able to use and extend existing computational infrastructure for analyzing biological data.

Course Structure and Syllabus:

MODULE 1: INTRODUCTION TO CELLULAR BIOLOGY 3L
Concepts of Cell, types of cell, components of cell, organelle. Functions of different organelles.

MODULE 2: THE CENTRAL DOGMA 9L
Concepts of DNA: Basic Structure of DNA; Double Helix structure; Watson and crick model. Exons and Introns and Gene Concept. Concepts of RNA: Basic structure, Difference between RNA and DNA. Types of RNA.
Concept of Protein: Basic components and structure. Introduction to Central Dogma: Transcription and Translation Introduction to Metabolic Pathways.

MODULE 3: BIOINFORMATICS DATABASES 3L
Introduction to Bioinformatics. Recent challenges in Bioinformatics. Data Warehouse, Data models, Database Management Concepts. Different Bioinformatics database types. Protein Sequence Databases: PDB, SWISS-PROT database. DNA sequence databases: DDBJ, GenBank.

MODULE 4: BIOINFORMATICS SEARCH ENGINES 3L
Sequence database search programs like BLAST and FASTA. NCBI different modules: GenBank; OMIM, Taxonomy browser, PubMed.

MODULE 5: DNA SEQUENCE ANALYSIS AND DATA VISUALIZATION 12L
DNA Mapping and Assembly: Size of Human DNA, Copying DNA: Polymerase Chain Reaction (PCR), Hybridization and Microarrays, Cutting DNA into Fragments, Sequencing Short DNA Molecules, Mapping Long DNA Molecules. DeBruijn Graph. Sequence Alignment: Introduction,

local and global alignment, pair wise and multiple alignments, Dynamic Programming Concept. Alignment algorithms: Needleman and Wunsch algorithm, Smith-Waterman.

MODULE 6: INTRODUCTION PROBABILISTIC MODELS USED IN COMPUTATIONAL BIOLOGY 9L

Probabilistic Models; Hidden Markov Model: Concepts, Architecture, Transition matrix, estimation matrix. Application of HMM in Bioinformatics: Gene finding, profile searches, multiple sequence alignment and regulatory site identification. Bayesian networks Model: Architecture, Principle, Application in Bioinformatics.

MODULE 7: BIOLOGICAL DATA CLASSIFICATION AND CLUSTERING 6L

Assigning protein function and predicting splice sites: Decision Tree

Suggested Text / Reference Books:

1. Bioinformatics and Molecular Evolution Paul G. Higgs and Teresa K. Attwood
2. Bioinformatics Computing By Bryan Bergeron
3. BIOINFORMATICS AND FUNCTIONAL GENOMICS Jonathan Pevsner
4. GENE CLONING AND DNA ANALYSIS T.A. BROWN

Course Outcomes :

1. Make creative and knowledgeable use of a range of existing theories, techniques and tools relevant to their field of research.
2. Refine existing techniques or define novel ones, as necessary, in the process of solving research problems.
3. Organize and carry out research tasks
4. Propose, plan and manage well defined research and design projects involving a team of individuals.
5. Interpret and critically assess existing theories and models within his field of specialization.
6. Have the ability to assess research and implementation projects that include components from both engineering/computer science and biomedical sciences and identify the key factors in a given situation.
7. Work on a project in a team of professionals from different fields, contributing to the analysis of the project; participate in implementing and carrying out the work needed, and in evaluating the results.
8. Work with confidence in a typical biological laboratory and be aware of safety and contamination issues.

Paper Name: E-Commerce & ERP Lab
Paper Code: IT791
Contracts: 3L
Credits-2
CourseObjectives:
At the of the course students will be able to know

- Outline a basic model of the Internet technology infrastructure.
- Assess E-Commerce strategies and applications, including online marketing, E-Government, E-Learning and global E-Commerce
- Discuss the significance of Web 2.0 content and social networks in E-Commerce
- Differentiate electronic marketplaces and give examples of E-tailing products and services.
- Compare B2B and B2C E-Commerce strategies, including market segmentation
- Categorize advantages and disadvantages of different online payment options
- Discuss common legal, ethical and tax issues in E-Commerce
- Use the knowledge of online security issues to assess existing websites
- Use the knowledge of the major E-Commerce revenue models to evaluate existing websites.

Course Structure and Syllabus:

Following E-Commerce experiments are to be implemented using either VB, ASP, SQL or JAVA, JSP, SQL.
• Creating E-Commerce Site [3P]: Designing and maintaining WebPages. Advertising in the Website, Portals and Vortals.
E-Commerce Interaction [6P]: Comparison Shopping in B2C, Exchanges Handling in B2B, Interaction Examples: Virtual Shopping Carts.
• E-Commerce Applications [6P]: Online Store, Online Banking, Credit Card Transaction Processing.
Suggested Text / Reference Books:
1. E-Commerce through ASP by W Clarke- BPB
2. Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS by Mathew Reynolds, Wrox Publishers
3. Professional Java Server Programming J2EE 1.3 Edition By Allamaraju et al, SPD.

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

- Creating E-Commerce Site
- E-Commerce Interaction
- B2B, Interaction Examples
- How to develop E-Commerce application

Paper Name: C# and .NET Framework Lab
Paper Code: IT792
Contracts: 3L
Credits- 2
CourseObjectives:
At the end of the course students will be able to know:

- Give the students network programming concepts using C#, including the language's network classes,
- The Winsock interface, DNS resolution, the core topics of the network layer - to make sockets connections via TCP, and "connectionless" connections via UDP, asynchronous socket programming, multithreading,
- Multicasting, providing application layer programming examples - use SNMP to manage network devices, SMTP to communicate with remote mail servers, and HTTP to Webenable your applications.

Course Structure and Syllabus:

C#.NET:
_ OOPs Concept
_ Variables, Datatypes and Type System
_ Loops
_ Classes and Objects
_ Inheritance
_ Polymorphism
_ Abstraction and Encapsulation
_ Generics
_ Null Coalesce Operator and Nullable Types
_ Anonymous Types
_ Properties
_ Anonymous methods and Partial methods
_ Delegates and Events
_ Attributes and Reflection

Suggested Text / Reference Books:

1. Writing Solid Code - Steve Maguire

2. Mythical Man-Month - Frederick P. Brooks Jr
3. Code Complete - Steve McConnell
4. The Art of Computer Programming - Knuth
5. Algorithms - Robert Sedgewick
6. Debugging Applications - John Robbins
7. Taligent's Guide to Designing Programs - Taligent

8. Design Patterns - Gamma, Helm, Johnson, Vlissides

Course Outcomes:

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

- Variables, Datatypes and Type System
- Loops
- Classes and Objects
- Inheritance
- Polymorphism
- Abstraction and Encapsulation
- Generics
- Null Coalesce Operator and Nullable Types
- Anonymous Types
- Properties

- Anonymous methods and Partial methods
- Delegates and Events
- Attributes and Reflection

Paper Name : Minor Projects
Paper Code : IT781
Course Objectives:

At the end of the minor project students will be:

- Familiar about the details of development steps of any projects
- Familiar with the technology used in development of the project.

Course Outcomes :

At the end of the minor project students will be :

- Familiar about the details of development steps of any projects
- Familiar with the technology used in development of the project.

Paper Name: Project and Technical Report Writing and Presentation on Industrial Training-I (2 weeks duration)
Paper Code: MC781
Course Objectives:

- The objective of the industrial training is to provide the students with the opportunity to practice and apply knowledge and skills in various actual working environments.

Course Outcomes:
For the outcomes, after undergoing the training, the student who successfully fulfills the course requirements will have demonstrated:
a) An ability to work in actual working environment.
b) An ability to utilize technical resources both from prior relevant coursework, as well as from sources students must seek out on their own.
c) An ability to write technical documents and give oral presentations related to the work completed.

Paper Name: General Proficiency-I (General aptitude, Technical Communication & SoftSkill)
Paper Code: MC782
CourseObjectives:
At the end of the course students:

- To make ready students for industry
- To make ready students for higher studies and research
- To make ready students for competitive examinations like GRE, TOEFL, CAT, MAT, GMAT, GATE etc.
- Generate competencies among students
- Providing easy and quick techniques to acquire and apply knowledge of mathematics, science and engineering.
- Providing the skill sets to analyze and interpret data.
- Providing the training (offline and online both) to communicate effectively.

Course Outcomes:
At the end of the course students:

- Will be able to develop their aptitude skills
- Will be able to develop their Soft skills
- Will be able to develop their Technical Communications

Paper Name: Professional Certification Program III
Paper Code: IT783
Course Objectives:

- The Professional certification allows students to demonstrate proficiency in software tools.
- Become a Certified Associate and stand apart from peers.
- Boost confidence, and expand career opportunities.

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

- Details of the topic they have trained in.

Forth Year Second Semester

Paper Name: Industrial Management
Paper Code: HU801
Contacts: 3L +1T
Credits: 4
Course Objectives:

The course enables students to understand basic principles/concepts of:

- Industrial management and organization;
- Industrial plant design;
- Effective material management;
- Management and resource allocation; and Engineering economy.

Course Structure and Syllabus:

Engineering/Technology Management:[4L]
objectives and functions of management, general and scientific management, strategic management, historical development and functions of engineering/technology management.
Quality Management: [10L]
Concept, Dimensions for goods and services, Cost of Quality, Statistical Quality Control, Control Charts, Acceptance Sampling (single).
Total Quality Management: Concept, benefits, Criticism.
New Quality Tools: Kaizen, Six Sigma, Quality Circles.
Productions Management: [10L]
Concept. Difference from Operations Management, Types of Production(Mass, Batch, Project), Functions of Production Management.
Productivity: Concept, Different Inputs and Productivity Measures, Efficiency and Effectiveness, Measures to increase Productivity.
Organizational Behavior: [8L]
Different Schools of Management Thought : Scientific Management, Administrative Theory, Theory of Bureaucracy, Human Relations Theory(Elton Mayo).
Motivation: Concept, Different Theories (Maslow, ERG, Herzberg,)
Communication: Purpose, process, Barriers to effective communication, Guidelines to make communication effective.
Perception: Process, Importance, Factors influencing perception, Shortcuts for judging people- Halo effect, Stereotyping, Projection.
Inventory Management:[7L]
Objectives of Inventory management, Levels of stock, Wilson EOQ model, EOQ model with discount, EOQ model with shortage, EOQ with Replenishment. ABC analysis, FSN analysis, VED analysis
Suggested Text / Reference Books

1. Industrial Management, Vol.1 L.C. Jhamb, EPH
2. Industrial Relations, Trade Unions & Labour Legislation - Sinha, Pearson Education Asia
3. Organizational Behaviour, S.P. Robbins, Prentice Hall
4. Productions and Operations Management, S. N. Chary, TMH
5. Productions and Operations Management, Joseph Monks,TMH

Course Outcomes :

- Students will be able to perform the Management Functions.
- Students will be able to compare selected Theories of Management.
- Students will be able to perform the functions in the Marketing Mix.

- Students will be able to use basic Business Application Software.
- Students will be able to assess ethical issues in Business situation

Paper Name: Internetworking Technology
Paper Code: IT801
Contacts: 3L +1T
Credits: 4
Course Objectives:

- To provide a practical understanding of computer networks that comprises the Internet, with respect to system architectures, protocols, and client-server interaction.
- To gain an understanding of the concepts and techniques that have been used to design and implement the TCP/IP Internet and to understand the issues that are driving the development of new protocols to broaden and enhance the operation of the Internet. The Internet is currently a collection of autonomous systems that make use of routing technology to transport datagrams between hosts using an unreliable, best-effort service. A transport protocol is implemented in the hosts to provide a reliable stream service on top of the unreliable datagram service.
- This course will first examine the current architecture and operation of the Internet. The classful addressing concept will be introduced and the mapping of Internet addresses to physical addresses will be discussed. The basic protocols IP, ICMP, UDP, and TCP, and IP routing will be examined and the extensions that have been made to the addressing paradigm, including subnet addressing, classless addressing, and network address translation, will be described.

The course will next examine the performance enhancements being developed to provide quality of service (QoS) over the Internet and to provide faster routing thought the use of IP switching techniques.

Course Structure and Syllabus:

An Overview on Internet [4L] :
The need for an Internet, The TCP/IP Internet, Internet services, Internet protocols and standardization, Review of Network technologies. Internetworking Concepts [6L] : Architectural model introduction, Application level interconnection, Network level interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Gateways or routers, Internet and Intranet.

Internet Address [5L] :
Introduction, Universal identifiers, Three primary classes of IP addresses, Classless IP address, Network and Broadcast addresses, Mapping internet addresses to physical addresses (ARP), ARP protocol format,Transport Gateways and subnet addressing, Multicast addressing.

Internet Protocol [6L]:
Internet Architecture and Philosophy, The concept of unreliable delivery, Connectionless delivery system, The Internet Datagram, Routing direct and indirect delivery, Table driven IP routing, Protocol layering, Reliable stream transport, TCP performance, Bootstrap protocol (BOOTP).

Routing [7L] :
The origin of Gateway routing tables, Original Internet Architecture and Cores, Core Gateways, Automatic route propagation, Vector distance (Bellman-Ford), routing, Gateway to Gateway Protocol (GGP), Autonomous system concept, Exterior Gateway Protocol (EGP), Interior Gateway Protocol (RIP, OSPF, HELLO), Routing Information Protocol (RIP), Combining RIP, HELLO, and EGP, Routing with partial information.

Enterprise Networking [7L] :
Corporate networking, Broadband at the Metropolitan area level, High speed dedicated WAN services and switched WAN services, ISDN, BISDN and ATM services, Frame relay technology and services, Virtual private network concepts PPTP protocol.

Internet Servers [4L] :

DNS, DHCP Servers, FTP, TELNET, E-Mail
Firewall & Networking [6L] : Introduction, Implementation of Firewall, Activities of Firewall, Configuration of firewall, Firewalls & SSL, SSL implementation, Bit implementation of SSL, Use of SSL.

Suggested Text / Reference Books:

1. Computer Networks and Internets - Douglas E. Comer; PE.
2. Communication Networks - Leon-Garcia-Widjaja; TMH.
3. Internetworking with TCP / IP - Douglas E .Comer; PE.
4. TCP/IP protocol suite - Forouzan Behrouz A; TMH.
5. Computer Networks – Andrew S. Tanenbaum; PHI.
6. Data and Computer Communication - William Stallings; PHI.
7. The Complete reference of Networking - Craig Zacker; TMH.

Course Outcomes:

- Use network programming concepts to develop and implement distributed applications and protocols over the Internet, OR Develop and use software based tools to implement and evaluate the performance of communication network protocols.
- Develop and implement next generation protocols required for emerging applications
- Model and evaluate performance of networking systems
- Carry out research and development tasks in networking

Paper Name: Data Mining and Data Ware Housing
Paper Code: IT802A
Contacts: 3L
Credits- 3

Course Objectives:

• Compare and contrast different conceptions of data mining as evidenced in both research and application.
• Explain the role of finding associations in commercial market basket data.
• Characterize the kinds of patterns that can be discovered by association rule mining.
• Describe how to extend a relational system to find patterns using association rules.
• Evaluate methodological issues underlying the effective application of data mining.
• Identify and characterize sources of noise, redundancy, and outliers in presented data.
• Identify mechanisms (on-line aggregation, anytime behavior, interactive visualization) to close the loop in the data mining process.
• Describe why the various close-the-loop processes improve the effectiveness of data mining.

Course Structure and Syllabus:

Introduction : [2L]
Data warehousing – definitions and characteristics, Multi-dimensional data model, Warehouse schema.

Data Marts: [4L]
Data marts, types of data marts, loading a data mart, metadata, data model, maintenance, nature of data, software components; external data, reference data, performance issues, monitoring requirements and security in a data mart.

Online Analytical Processing : [4L]
OLTP and OLAP systems, Data Modeling, LAP tools, State of the market, Arbor Essbase web, Microstrategy DSS web, Brio Technology, star schema for multi-dimensional view, snowflake schema; OLAP tools.

Developing a Data Warehousing: [4L]
Building of a Data Warehousing, Architectural strategies & organizational issues, design considerations, data content, distribution of data, Tools for Data Warehousing.

Data Mining: [4L]
Definitions; KDD(Knowledge Discovery database) versus Data Mining; DBMS versus Data Mining, Data Mining Techniques; Issues and challenges; Applications of Data Warehousing & Data mining in Government.
Association Rules: [4L]
A priori algorithm, Partition algorithm, Dynamic inset counting algorithm, FP – tree growth algorithm; Generalized association rule. Clustering Techniques: Clustering paradigm, Partition algorithms, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; Categorical clustering, STIRR, ROCK, CACTUS.
Decision Trees: [4L]
Tree construction principle, Best split, Splitting indices, Splitting criteria, Decision tree construction with pre-sorting.
Web Mining: [5L]
Web content Mining, Web structure Mining, Web usage Mining, Text Mining.
Temporal and Spatial Data Mining: Basic concepts of temporal data Mining, The GSP algorithm, SPADE, SPIRIT, WUM.
Suggested Text / Reference Books:
Texts:
1. Data Warehousing Fundamentals for IT Professionals, Second Edition by Paulraj Ponniah, Wiley India.
2. Data Warehousing –Concepts, Techniques, products, application; Prabhu; PHI.
3. Data Mining Techniques; A. K. Pujari; Universities Press.
References:
1. Data Mining, Practical Machine Learning Tools and Techniques, Third Edition; Ian H. Witten, Eibe Frank, Mark A. Hall
2. Data Warehousing, Data Mining, & OLAP – Second Edition by Alex Berson and Stephen J. Smith, TataMcGraw Hill Education
3. Data warehouse Toolkit by Ralph Kimball, Wiley India
4. Data Warehousing in the real world; Anahory; Pearson Education.
5. Data Mining Introductory & Advanced Topic; Dunham; Pearson Education.

Paper Name: Real Time Embedded System
Paper Code:IT802B
Contacts: 3L
Credits- 3
Course Objectives: After completing the course students will

- The primary goal of this course is to meet the participant with basics of real-time systems and to give the participant knowledge and skills necessary to design and develop embedded applications by means of real-time operating systems.

Course Structure and Syllabus:

Introduction:
Definition, Classification and Characterization; Challenges for Embedded Systems; Exemplary Embedded System.
Hardware Overview: Terminologies; Fundamental Components.
Interrupt & Interrupt Routines: Interrupt Basics; Shared Data between Interrupt Routines and Main Program; Interrupt Latency.
Real-Time Operating Systems: Introduction; Real-Time Operating system architecture; Task &

Task States; Semaphore and Shared Data; Message Queue, Mailbox & Pipes; Timer & Events; Memory & Interrupt Management in RTOS environment.
Design Consideration: Encapsulating Semaphores and Queues; Saving Memory & Power; Hard Real-Time Scheduling Considerations; Scheduling Real-Time Tasks in Multiprocessors and Distributed Systems; Hardware Software Co-Design in an Embedded Systems.
Commercial Real-Time Operating Systems: Unix or Windows as Real-Time Operating Systems; Real-Time POSIX Standard; A survey of Real-Time Operating Systems- PSOS, VRTX, VxWorks, QNX, microC/OS-II, RT Linux, Lynx, Windows CE.
Development Tools For Embedded Systems: Host and Target Machines; Compilers, Linker & Locaters; Transferring Firmware into the Target Systems; Debugging in Host Machine & Target Machines.
Real-Time & Embedded Systems Case Study: Smart Card (SOC-System On Chip); Digital Camera; Mobile Phones.
Suggested Text / Reference Books:
Texts:
1. Computers and Components, Wayne Wolf, Elseveir.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
References:
1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

Paper Name: Building Enterprise Application
Paper Code:IT802C
Contacts: 3L
Credit: 3
Course Objectives:
At the end of this elective, student shall be able to:

- The role of education in promoting entrepreneurial attitudes and behaviors is widely recognized today. Transversal competences like creativity, sense of initiative and entrepreneurship will help young people to develop their capacity to think creatively and to innovate, to develop pro-activity, flexibility, autonomy, the capacity to manage a project and to achieve results.

Course Structure and Syllabus:

Unit I: 3L
Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications
Unit II: 6L
Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation
Unit III: 12L
Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture - design, different technical layers, best practices, data architecture and design –

relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design.

Unit IV: 9L

Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage

Unit V: 6L

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

Suggested Text / Reference Books:

1, Martin Fowler, "Patterns of Enterprise application Architecture'- Pearson.
2. Gamma et al, 'Design patterns : elements of reusable object-oriented software', Addison Wesley

Course Outcomes:

- Learn the concepts of database technology evolutionary path which has led to the need for data mining and its applications.
- Examine the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
- Apply pre-processing statistical methods for any given raw data.
- Explore DWH and OLAP, and devise efficient & cost effective methods for maintaining DWHs.
- Discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems, make predictions of outcomes.
- Comprehend the roles that data mining plays in various fields and manipulate different data mining techniques
- Select and apply proper data mining algorithms to build analytical applications.
- Evaluate systematically supervised and unsupervised models and algorithms w.r.t. their accuracy.
- Develop practical work of DM techniques and design hypotheses based on the analysis to conceptualize a DM solution to a practical problem.

Paper Name: Network Security & Cryptography
Paper Code: IT803A
Contacts: 3L
Credit: 3

Course Objectives:

- To understand how to communicate via internet with secure manner with confidentiality, authentication, non-repudiation, availability.
- Techniques for providing e-mail privacy.
- Techniques to detect attacks.
- Types of attacks and avoid techniques.
- Data security for business organization.

Module1:
Attacks on Computers & Computer Security (5L)
Introduction, Need for Security, Security approaches, Principles of Security, Types of attack.

Module2:
Cryptography:**Concepts & Techniques (7L)**
Introduction, Plaintext & Cipher text, Substitution Techniques, Transposition Techniques, Encryption & Decryption, Symmetric & Asymmetric key Cryptography, Key Range & Key Size

Module3:
Symmetric Key Algorithm (8L)
Introduction, Algorithm types & Modes, Overview of Symmetric Key Cryptography, DES(Data Encryption Standard) algorithm, IDEA(International Data Encryption Algorithm) algorithm, RC5(Rivest Cipher 5) algorithm.

Module4:
Asymmetric Key Algorithm, Digital Signature and RSA (5L)
Introduction, Overview of Asymmetric key Cryptography, RSA algorithm, Symmetric & Asymmetric key Cryptography together, Digital Signature, Basic concepts of Message Digest and Hash Function (Algorithms on Message Digest and Hash function not required).

Module5:
Internet Security Protocols, User Authentication (6L)
Basic Concepts, SSL protocol, Authentication Basics, Password, Authentication Token, Certificate based Authentication, Biometric Authentication.

Module6 :
Electronic Mail Security (4L)
Basics of mail security, Pretty Good Privacy, S/MIME.

Module7:
Firewall (3L)
Introduction, Types of firewall, Firewall Configurations, DMZ Network
Text :
1. "Cryptography and Network Security", William Stallings, 2nd Edition, Pearson Education Asia
2. "Network Security private communication in a public world", C. Kaufman, R. Perlman and M. Speciner, Pearson
3. Cryptography & Network Security: Atul Kahate, TMH.
Reference :
1. "Network Security Essentials: Applications and Standards" by William Stallings, Pearson

Course Outcomes:

- Knowledge of different cryptographic algorithms.
- Different means of protecting data.
- Knowledge of detecting and correcting communication errors.
- Internet based transaction & related security implementation.

Paper Name: Natural Language Processing
Paper Code:IT803B
Contacts: 3L
Credit: 3
Course Objectives:

- This course aims to provide a self-contained introduction to the central issues of Natural Language Processing (NLP), to introduce various practical skills associated with the design and implementation of NLP systems, and to prepare students intending to follow the two-unit advanced course CS405: advanced Topics in Natural Language Processing.

Course Structure and Syllabus:

Module I 5L
Introduction: Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Language, Thought, and Understanding, The State of the Art and the Near-Term Future.
Regular Expressions and Automata: Regular Expressions, Finite-State Automata, Regular Languages and FSAs.

Module II 5L
Word Classes and Part-of –Speech Tagging: (Mostly) English Word Classes, Tagsets for English, Part-of –Speech Tagging, Rule-Based Part-of –Speech Tagging, Stochastic Part-of –Speech Tagging, Transformation-Based Tagging, Other Issues.

Module III 6L
Context-Free Grammars for English: Constituency, Context-Free Rules and Trees, Sentences Level Constructions, The Noun Phrase, Coordination, Agreement, The Verb Phrase and Subcategorization, Auxiliaries, Spoken Language Syntax, Grammar Equivalence and Normal Form, Finite-State and Context- Free Grammars, Grammars and Human Processing.

Module IV 6L
Parsing with Context-Free Grammars: Parsing as Search, A Basic Top-Down Parser, Problems with the Basic Top-Down Parser, The Early Algorithm, Finite – State Parsing Methods.

Module V 5L
Features and Unification: Feature Structures, Unification of Features Structures, Features Structures in the Grammar, Implementing Unification, Parsing with Unification Constraints, Types and Inheritance.

Module VI 6L
Representing Meaning: Computational Desiderata for Representations, Meaning Structure of Language, First Order Predicate Calculus, Some Linguistically Relevant Concepts.
Semantic Analysis: Syntax-Driven Semantic Analysis, Attachments for a Fragment of English, Integrating Semantic Analysis into the Early Parser, Idioms and Composionality, Robust Semantic Analysis.

Module VII 9L
Discourse: Reference Resolution, Text Coherence, Discourse Structure, Psycholinguistic Studies of Reference and Coherence.
Natural Language Generation: Introduction to Language Generation, An Architecture for Generation, Surface Realization, Discourse Planning, Other Issues.
Module VIII Markov Models
Suggested Text / Reference Books:
Text Book:
1. D.Jurafsky & J.H.Martin- Speech and Language Processing, 4th Edn, Pearson Education.
Reference Book:
1. J. Allen – Natural Language Understanding, Pearson Education, New Delhi.

Course outcome :

Students can set up and implement language technology experiment step by step

Students can evaluate language technology components for a given language technological problem consider which computer programs will be suitable, install them and apply them to linguistic data.

Students are familiar with a sample of machine learning techniques and can assess which ones are suitable for a given problem

Students can explain the interaction between rule based and probabilistic methods in language technology.

Paper Name: Remote Sensing and GIS
Paper Code:IT803C
Course Objectives:

The course aims to give the students

- an overview of remote sensing and DEM applications
- analysis in geo-scientific research and investigation

Course Structure and Syllabus:

Introduction and Overview of Geographic Information Systems [4L]

Definition of a GIS, features and functions; why GIS is important; how GIS is applied; GIS as an Information System; GIS and cartography; contributing and allied disciplines; GIS data feeds; historical development of GIS.
GIS and Maps, Map Projections and Coordinate Systems [4L]
Maps and their characteristics (selection, abstraction, scale, etc.); automated cartography versus GIS; map projections; coordinate systems; precision and error.
Data Sources, Data Input, Data Quality and Database Concepts [7L]
Major data feeds to GIS and their characteristics: maps, GPS, images, databases, commercial data; locating and evaluating data; data formats; data quality; metadata. Database concepts and components; flat files; relational database systems; data modeling; views of the database; normalization; databases and GIS.
Spatial Analysis [3L]
Questions a GIS can answer; GIS analytical functions; vector analysis including topological overlay; raster analysis; statistics; integrated spatial analysis.
Making Maps [6L]
Parts of a map; map functions in GIS; map design and map elements; choosing a map type;

producing a map formats, plotters and media; online and CD-ROM distribution; interactive maps and the Web.
Implementing a GIS [5L]
Planning a GIS; requirements; pilot projects; case studies; data management; personnel and skill sets; costs and benefits; selecting a GIS package; professional GIS packages; desktop GIS; embedded GIS; public domain and low-cost packages.
Technology & Instruments involved in GIS & Remote Sensing [8L]
GIS applications; GIS application areas and user segments; creating custom GIS software applications; user interfaces; case studies. Future data; future hardware; future software; Objectoriented concepts and GIS; future issues – data ownership, privacy, education; GIS career options and how to pursue them.
Remote Sensing [8L]
Remote sensing of environment, E.M. Principle, Thermal infrared remote sensing, Remote sensing of Vegetation, Remote sensing of water, urban landscape
Suggested Text / Reference Books:
Texts:
1. "Principles of geographical information systems", P. A. Burrough and R. A. Mcdonnel, Oxford.
2. "Remote sensing of the environment", J. R. Jensen, Pearson

Course Outcome :

The course aims to give the students an overview of remote sensing and DEM applications and analysis in geo-scientific research and investigation

Paper Name: Software Testing Lab
Paper Code: IT891
Course Objectives:

- Test process and continuous quality improvement
- Test generation from requirements
- Modeling techniques: UML: FSM and Statecharts, Combinatorial design; and others.
- Test generation from models.
- Test adequacy assessment.
- Industrial applications.

Course Structure and Syllabus:

- 1. Introduction to QUICK Test professional
- 2. RFT (Rational Functional Tester) tool usage
- 3. JUnit - Test Framework
- 4. log4j – Architecture
- 5. Selenium IDE, Automated testing Tool

Course Outcomes :
At the end of the course students will be :
a QUICK Test professional
able to use JUnit Test Framework
familiar with RFT, log4j

familiar with different test tools

Paper Name : Mobile Application Development Lab
Paper Code : IT892
Course Objectives:

By the conclusion of this course, students will be able to:

- Describe those aspects of mobile programming that make it unique from programming for other platforms,
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced phone features, and
- Deploy applications to the Android marketplace for distribution.

Course Structure and Syllabus:

1. Simulation of application using J2ME simulator
a. Midlet and other basic UI items.
b. Bluetooth API
c. Implementation of Wireless Messaging
d. MMAPI
2. Simulation of applications to access web sites using Microsoft Windows Mobile .net environment.
3. Simulation of Implementation of playing games and photo sharing applications using BREW (Binary Runtime Environment for Wireless Toolkit)
4. Simulation of Infotainment (news, weather forecasts etc) using WAP
5. Simulation of applications using symbian OS

Course Outcomes :

At the end of the course students will be :
Familiar with J2ME simulation
Familiar with Microsoft Windows Mobile .net environment.
BREW (Binary Runtime Environment for Wireless Toolkit)
Familiar with Simulation of Infotainment (news, weather forecasts etc) using WAP
Familiar with Simulation of applications using symbian OS

Paper Name: Major Projects
Paper Code: IT881
Course Objectives:

- Acquainted with the development steps of any projects
- Thorough understanding of the technology used in development of the project.

Course Outcomes:

At the end of the minor project students will be :

- Familiar about the details of development steps of any projects
- Familiar with the technology used in development of the project.

Paper Name: General proficiency-IV (Practice Session for GRE,TOEFLE,CAT,MAT,GMAT etc.)
Paper Code: MC881
Course Objectives:
To develop skill of the students son they can be ready for competitive examinations
Course Outcomes:
At the end of the course Students will be able to :

- Get a good score in examinations like : GRE,TOEFLE,CAT,MAT,GMAT